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Poster

1. Risk Factors that Predict Levothyroxine Medication after Thyroid Lobectomy

Chang J Kim¹, Sohee Lee², Ja S Bae³, Chan K Jung⁴, Jinhee Jang⁵

^{1,3}Department of Surgery, Seoul St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Republic of Korea

²Department of Surgery, Eunpyeong St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Republic of Korea

⁴Department of Hospital Pathology, Seoul St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Republic of Korea

⁵Department of Radiology, Seoul St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Republic of Korea

Background: The risk of needing lifelong thyroid hormone supplementation is an important factor affecting treatment decisions for both patients and clinicians ahead thyroid lobectomy. The purposes of this study were to assess the predictive factors of levothyroxine medication after thyroid lobectomy.

Materials and methods: We retrospectively reviewed 252 patients who had undergone lobectomy for benign thyroid nodules between April 2009 and April 2017. We conducted two independent analyzes: patients who started taking levothyroxine after surgery were compared with those who did not, and patients who did not need levothyroxine at last follow-up were compared with those who required continued treatment. We investigated the correlations of patient clinicopathological characteristics and levothyroxine medication after lobectomy.

Results: Ninety-eight patients started levothyroxine after surgery. Of these, 34 patients successfully ceased medication and 64 patients continued treatment as of their last follow-up. In multivariate analysis, older age and preoperative TSH ≥ 2.0 $\mu\text{IU/mL}$ were associated with levothyroxine initiation after surgery. In terms of continuity of levothyroxine, both older age and TSH ≥ 3.0 $\mu\text{IU/mL}$ showed significant correlation with continuous medication. We created a risk-scoring system to predict likelihood of starting and maintaining levothyroxine using the two significant factors in each comparison. A risk score of 3 or more indicated increased risk of starting levothyroxine (specificity = 81.8%; sensitivity = 48.0%). A risk score of 3 or more indicated increased risk of continuous medication, (specificity = 94.2%; sensitivity = 35.9%).

Conclusion: Greater age and higher preoperative TSH levels correlated with initiation and continuity of levothyroxine medication after lobectomy.

2. Two Distinct E3 Ligases Target Thyroid Transcription Factor 1 for its Ubiquitination and Degradation in Thyroid Follicular Normal Epithelial and Carcinoma Cells, Respectively

Jia Liu

Changchun, China

Background: Thyroid transcription factor-1 (TTF1/NKX2.1) is a homeodomain-containing transcription factor, belonging to NKX2 family. Thyroid transcription factor-1 is expressed in both thyroid follicular normal epithelial cells and follicular thyroid carcinoma cells. In normal thyroid cells, it regulates the tissue-specific expression of genes, such as thyroglobulin (TG), thyroid peroxidase (TPO), and thyrotropin receptor (TSHR). Reduction of

TTF1 levels have been shown contribute to the oncogenesis of thyroid carcinoma. However, the mechanism of TTF1's metabolism in thyroid normal and carcinoma cells have not been revealed. Ubiquitin E3 ligases play key roles in mediating ubiquitination and degradation of intracellular proteins. Here we identify two distinct ubiquitin E3 ligases are responsible for TTF1 degradation in thyroid normal cells and carcinoma cells, respectively. **Materials and methods:** Thyroid follicular epithelial cells (HTori3) and follicular thyroid carcinoma cells (FTC133) were used to investigate phorbol myristate acetate (PMA)-induced TTF1 ubiquitination and degradation by immunoblotting and *in vitro* ubiquitination assay. Different E3 ligases were tested to identify the ones regulating TTF1 stability by immunoblotting and co-immunoprecipitation. Cells migration and proliferation were investigated by a wound healing assay and cell counting.

Results: Phorbol myristate acetate induced TTF1 protein degradation in dose- and time-dependent manners in both HTori3 and FTC133 cells, without altering TTF1 mRNA levels. Proteasome inhibitor MG-132, not lysosome inhibitor leupeptin, attenuated TTF1 degradation in both cell types, suggesting that PMA induces TTF1 degradation in the proteasome. Overexpression of HECW1 E3 ligase induced TTF1 degradation and ubiquitination in normal thyroid follicular epithelial HTori3 cells, but not in carcinoma FTC133 cells. Overexpression of ubiquitin E3 ligase subunit FBXL19 increased TTF1 ubiquitination and degradation in FTC133 cells, while it had no effect on TTF1 levels in HTori3 cells, suggesting that TTF1 stability is controlled by different ubiquitin E3 ligases in thyroid normal and carcinoma cells, respectively. Furthermore, we found that lysine 151 residue is a key ubiquitin acceptor site within TTF1 in both cell types. Overexpression of TTF1 increased TG and NIS mRNA levels, cell migration and cell proliferation in HTori3 cells, while the effects were reversed by the overexpression of HECW1.

Conclusion: This is the first study that investigates TTF1 stability in any system. This study reveals an undiscovered molecular mechanism by which TTF1 ubiquitination and degradation is regulated by different E3 ligases in thyroid normal and tumor cells. The data may provide new therapeutic targets specifically to treat thyroid cancer by modulating TTF1 stability.

3. Generation and Characterization of Thyroid Tissue-derived Mesenchymal Stem Cells

Nani Md Latar¹, Sebastian Aspinall², Annette Meeson³

¹Universiti Kebangsaan Malaysia Medical Centre, Kuala Lumpur, Malaysia

²Aberdeen Royal Infirmary, Foresterhill, Aberdeen, UK

³Institute of Genetic Medicine, UK

Introduction: Mesenchymal stem cells (MSC) are multipotent cells that have the ability to divide and undergo multilineage differentiation. Its utilization in regenerative medicine is popular nowadays despite the uncertainty that existed on its safety in tissue transplantation. The aim of this study is to identify the presence of MSC within normal, benign and malignant thyroid cells based on the guideline set by the International Society of Cellular Therapy (ISCT).

Materials and methods: Fresh thyroid tissue specimens obtained following surgery were digested, suspended, RBC-lysed and cultured in MSC media under low oxygen tension of 5%. Tissue-derived limbal MSC were used as control. Immunophenotyping was performed to identify the MSC properties within normal (N-MSC), benign (B-MSC) and malignant (M-MSC) cultured cells. Alizarin Red S and Oil-red-O stains were used to assess their ability to differentiate into osteogenic and adipogenic lineages, respectively. Gene expression for these processes were detected using semi-quantitative PCR analysis.

Results: Three different samples from each tissue type were assessed. N-MSC and B-MSC expressed significantly higher level of CD90, CD44, CD146 and CD166 (positive markers for MSC) when compared to M-MSC. All tissue-derived MSC showed ability to undergo osteogenic and adipogenic differentiations where they expressed mRNA for ALP (osteogenic), BSP (osteogenic) and aP2 (adipogenic) genes.

Conclusion: Identification thyroid MSC within normal and benign thyroid tissues and the difference in immunophenotyping with their malignant counterpart provide a platform to explore their potential benefit as regenerative tools. However, concerns over safety and efficacy of these cells in relation to tumorigenesis must be further evaluated.

4. Experience of Multiple Endocrine Neoplasia Type IIA: Reality of Prophylactic Thyroidectomy in Japan

Ryuta Nagaoka¹, Iwao Sugitani², Marie Saito³, Tomoo Jikuzono⁴, Ritsuko Okamura⁵, Takehito Igarashi⁶, Kazuo Shimizu⁷

¹⁻⁷Department of Endocrine Surgery, Nippon Medical School, Tokyo, Japan

Purpose/Introduction: In regard to multiple endocrine neoplasia type IIA (MENIIA), American Thyroid Association guidelines recommend prophylactic thyroidectomy according to the risk level of medullary thyroid carcinoma (MTC), which determined by *RET* mutation test. But in Japan, prophylactic thyroidectomy is hardly performed now, because of several socio-medical reasons.

Materials and methods: We have encountered 24 patients (14 males and 10 females from 15 families) with MENIIA between 1997 and 2017. Mean age at diagnosis was 41.2 years (range, 20–82 years). Mean duration of follow-up after thyroidectomy was 6.9 years (range, 1.7–21.1 years).

Results: There were 7 index cases and 17 familial cases. Genetic tests for *RET* mutation were done for 16 patients from 10 families and revealed to have codon 611 ($n = 1$), 618 ($n = 1$), 620 ($n = 6$), 630 ($n = 2$), 634 ($n = 5$) and 804 ($n = 1$) mutations. Twenty three patients received total thyroidectomy (including one case of completion total thyroidectomy), the remaining one is scheduled to have thyroidectomy in the near future. Prophylactic total thyroidectomy was not done. Pheochromocytoma was observed in 10 patients and 6 had primary parathyroidism. Hirschsprung disease was observed in 1 patient with *RET* 620 mutation. As of now, 1 patient with *RET* 634 mutation died from lung metastases, but the others are alive without recurrence.

Conclusion: Although we have not conducted prophylactic thyroidectomy for carrier of MENIIA, prognosis is not bad with MENIIA patients. It is necessary to conduct RET mutation test for MTC patients actively under appropriate genetic counseling.

5. Monitored Transoral Endoscopic Thyroidectomy via Vestibular Approach: Practice Patterns for Surgeon

Ting-Chun Kuo¹, Ming-Hsun Wu², Yi-Chia Wang³, Kuen-Yuan Chen⁴, Quan-Yang Duh⁵

^{1,4}Department of Surgery, National Taiwan University Hospital, Taipei, Taiwan; Department of Traumatology, National Taiwan University Hospital, Taipei, Taiwan

²Department of Traumatology, National Taiwan University Hospital, Taipei, Taiwan

³Department of Anesthesiology, National Taiwan University Hospital, Taipei, Taiwan

⁵Department of Surgery, Section of Endocrine Surgery, University of California San Francisco, San Francisco, California, USA

Purpose: There has been growing interest to the transoral endoscopic thyroidectomy vestibular approach (TOETVA). However, the setting between groups was of little difference and not all were routinely neuro-monitored. As early adopters of monitored TOETVA, we aim to define the learning curve for the procedure, which can be valuable information for those who consider devoting resources to integrate this new procedure within their armamentarium.

Materials and methods: A single surgical team conducted monitored TOETVA. The present study was conducted using the CUSUM method. Patients were nasotracheal intubated with infused neuromuscular blocker monitored using train-of-four (TOF Watch SX®). Intraoperative neural integrity monitored by Medtronic NIM 3.0 or Inomed ISIS IOM System.

Results: We conducted monitored TOETVA since December, 2016 and enrolled consecutive 119 patients for this study, who had a mean age of 44.7 years with a mean body mass index of 22.49 kg/m², 107 were women; 20 had thyroiditis; 15 received total thyroidectomy. CUSUM analyses of the learning curve revealed 2 phases, with proficiency thresholds at 35 cases operative time. Bilateral procedure (OR 10.22, $p = 0.0055$) and larger thyroid size (OR 1.88, $p = 0.0114$) independently associated with prolonged operative time in multivariate analyses.

Conclusion: Depicting the practice pattern is valuable for surgeons as de novo resources integration for this new procedure with distinct route. The learning curve for monitored TOETVA was about 35 cases for experienced thyroid surgeons. Bilateral approach and larger tumor size is independently associated with difficulty and should be avoided for learning phase practice.

6. Spectrum of Pancreatic Neuroendocrine Tumors at a Tertiary Care Center of North India

Yadav Rajni¹, MC Sharma², NR Dash³, S Rastogi⁴

¹⁻⁴Department of Pathology, Gastrointestinal Surgery and Medical Oncology, All India Institute of Medical Sciences, New Delhi, India

Introduction: Neuroendocrine tumors of pancreas (PanNETs) constitute for about 1–2% of all pancreatic neoplasms. The grading of these tumors using the WHO grading system has been recognized as an important prognostic parameter and guides the management of these tumors. We aimed to evaluate the neuroendocrine tumors of pancreas diagnosed at our center over a duration of last 6 years using this system.

Materials and methods: A total of 94 cases were retrieved from the archives. Seventy cases were resection specimens in form of enucleation, Whipple or distal pancreatectomy, 20 had biopsies and 4 were cases received for review.

Results: Age of the patients ranged from 13 years to 88 years with a mean of 42 years. There were 59 males and 35 females. More than one tumor was present in 8 cases. Tumor size ranged from 0.3 cm to 13 cm with a mean of 3.5 cm. G1, 2 and 3 NET comprised of 47, 40 and 2 cases while 5 cases belonged to G3 NEC subgroup. There was associated unilateral pheochromocytoma in 1, bilateral pheochromocytoma in 1, nodular adrenal cortical hyperplasia in 1, MEN1 syndrome in 2, cavernous hemangioma of liver in 1 and intestinal tuberculosis in 1 case. Insulin and gastrin were positive in 10 and 2 cases. Liver metastasis was there in 5 cases.

Conclusion: G1 grade is the most common closely followed by G2 and G3 tumors are much more uncommon. WHO grading system using Ki67 proliferation index is must for appropriate management and prognostication of PanNETs.

7. The Presurgical Therapeutic Effect of Dexamethasone for Graves' Disease with Uncontrollable Hyperthyroidism

Masahide Nakano¹, Nobuhiro Fukunari²

^{1,2}Showa University Northern Yokohama Hospital, Thyroid Center, Japan

Purpose/Introduction: Administering steroid is considered effective for uncontrollable hyperthyroidism with Graves' disease. However, there are still many unclear points with appropriate use of steroid. We evaluated the outcome of dosage and dosing period of steroid for improving thyroid function. Aim of this study is to estimate the proper dosage and period of steroid until reaching the safe surgical condition.

Materials and methods: In this study, 23 patients of Graves' disease have been medicated with steroid before surgery between April 2009 and May 2018. The dose of dexamethasone (Dexa) has been modified every 3 or 4 days accordingly until the serum level of free T3 (FT3) decreased under 5 pg/mL. During the medication with Dexa, the dose of anti-thyroid drugs and potassium iodide were not changed.

Results: In the patients medicated with Dexa 8 mg/day, 6 mg/day, 4 mg/day, 2 mg/day, FT3 was decreased 9.4%, 8.3%, 5.6%, 6.8%, respectively compared to previous day. The average dose of Dexa was 5.04 mg/day and the average period from start using Dexa to surgery was 11.1 days. None of the cases had complication from surgery and side effect of Dexa. Even though the pretreatment FT3 value or combined drugs, high dose Dexa was able to decrease FT3 value. However there were no difference between 2 mg and 4 mg. In the case of the same Dexa dose, the therapeutic effect was higher in the case of high pretreatment FT3 value.

Conclusion: The results of this study show that FT3 decreased by Dexa in a short time without complication. We conclude that 5 mg of Dexa for 11 days medication could reduce the uncontrollable hyperthyroidism before surgery.

8. Is Thyroiditis Causing an Increase in Multinodular Goitres?

SA Seneviratne

Department of Surgery, University of Colombo, Sri Lanka

Purpose: Incidence of endemic multi nodular goitre in Sri Lanka has reduced over last two decades due to nationwide iodine supplementation. However, iodine supplementation has resulted in a gradual increase in the incidence of goitres due to chronic thyroiditis in many countries. We conducted this study to identify the prevalence of thyroiditis in patients undergoing thyroidectomy for benign goitres.

Materials and methods: A retrospective analysis of histopathology reports of patients who underwent thyroidectomy for benign nodular goitres from 2001 to 2019 at the Professorial Surgical Unit, National Hospital of Sri Lanka was performed.

Results: Of 296 patients who underwent thyroidectomy for multinodular goitre, 50 (16.8%) had concurrent thyroiditis. Mean age of patients with thyroiditis did not differ from patients without thyroiditis (both groups mean age 46 years). A greater proportion of patients with multinodular goitres were females with a male to female ratio of 1:8. Prevalence of thyroiditis in the study population did not differ significantly between males and females (20% and 13.3%, $p = 0.46$). Proportion with thyroiditis peaked in the age group 50–59 years (20.5%). A gradual increase in thyroiditis observed with 13.7% over initial 14 years compared with 24% over last four years of the study.

Conclusion: Chronic thyroiditis was observed in 16.8% of patients which is more than double what is reported in Sri Lanka previously. Iodine supplementation has likely played a role in this progressive increase. Further population based studies are needed to identify the prevalence and pathophysiology of thyroiditis among patients with multinodular goitres.

9. Preliminary Experience of Genetic Analysis on Fine Needle Aspirate of Indeterminate Thyroid Nodules

S Mattoo¹, A Agarwal², N Kumari³, N Krishnani⁴, S Maylivaganan⁵

^{1–5}Sanjay Gandhi Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

Introduction: The management of thyroid nodules with indeterminate cytology is controversial. This study aimed to study the frequency of BRAF, H-, K-, N-RAS mutations in such nodules to evaluate their clinical utility in prediction of malignancy preoperatively.

Materials and methods: We studied a prospective cohort of 33 cases, including 3 atypia of undetermined significance or follicular lesions of undetermined significance, 16 follicular neoplasms, 5 suspicious for malignancy and 9 malignant (Bethesda class VI) cases. Real-time PCR was carried out to detect mutations in BRAF, KRAS, NRAS and HRAS genes. Diagnosis of malignancy was confirmed by histology.

Results: 7/24 (29%) indeterminate nodules were malignant on histopathology. Out of such malignant cases, BRAF, HRAS, NRAS mutations were present in 4 (57%) each while KRAS was detected in 2 (29%) cases while in histologically proven benign cases (17/24, 71%), BRAF, HRAS, NRAS and KRAS mutations were detected in 8 (47%), 7 (41%), 8 (47%) and 2 (12%) cases, respectively. Together BRAF and any RAS mutation could identify only 2/7 (29%) cases of malignancy in indeterminate nodules achieving a sensitivity and specificity of 50% and 83%, respectively. The positive and negative likelihood ratios to predict malignancy were 2.94 and 0.6, respectively.

Conclusion: BRAF and RAS mutational analysis may not be appropriate to predict malignancy in indeterminate thyroid nodules as frequency of mutations is high even in benign lesions like follicular adenomas.

10. Histopathological Features and Clinical Outcomes of Thyroid Needle Tract Implantation: A Single-center Study of 66 Cases

Toshitetsu Hayashi¹, Mitsuyoshi Hirokawa², Miyoko Higuchi³, Ayana Suzuki⁴, Risa Kanematsu⁵, Takumi Kudo⁶, Yasuhiro Ito⁷, Akira Miyauchi⁸

^{1,2}Department of Diagnostic Pathology and Cytology, Kuma Hospital, Kobe, Japan

³⁻⁵Department of Clinical Laboratory, Kuma Hospital, Kobe, Japan

⁶Department of Internal Medicine, Kuma Hospital, Kobe, Japan

^{7,8}Department of Surgery, Kuma Hospital, Kobe, Japan

Introduction: Thyroid needle tract implantations (NTIs) are rare. This study aims to determine the histopathological features of NTIs with follow-up to elucidate their prognostic implications.

Materials and methods: Sixty six patients with 126 lesions of NTI were retrieved from the archives of Kuma Hospital between 2006 and 2017. Tumor recurrences following incomplete resection, intraoperative spillage, microscopic NTI without clinical significance were excluded.

Results: The histological types were papillary (PTC, 75%), follicular (FTC, 10%), poorly differentiated (PDTC, 10%), and anaplastic (ATC, 3%) carcinomas. Needle tract implantation was solitary in 38 (58%) and multiple in 28 (42%) cases. Among the 126 lesions, 16 (13%) were confined to dermis, 87 (69%) to subcutaneous tissue, and 23 (18%) involving muscle or deeper. Thirty four cases (52%) of NTI presented as more aggressive histologic subtypes than their original tumors. The Ki-67 indexes of NTI of PTC and FTC were significantly higher than those of original tumors ($p < 0.05$, respectively, Mann–Whitney U test). At last follow-up, 8 (12%; PTC $n = 5$, FTC $n = 1$, PDTC $n = 1$, ATC $n = 1$) died from the disease, 13 (20%; PTC $n = 10$, FTC $n = 2$, PDTC $n = 1$) had distant metastases, 8 (12%; PTC $n = 8$) had structural recurrence, and the remaining 37 (56%) were alive and free of disease.

Conclusion: We investigated the largest series of NTI highlighting the development of more aggressive histological variants, significantly higher Ki-67 indexes than their original tumors, and association with adverse clinical outcomes. Therefore, it is important to explore carefully the histopathological features and rigorous follow-up including adjuvant therapy in patients with NTI.

11. Predictive Value of Cervical Lymph Node Ratio for Early Recurrence of Papillary Thyroid Cancer

H Alwagih¹, A Nabawi², M Sakr³, B El Sabaa⁴, M Belal⁵

¹Head and Neck and Endocrine Surgery Unit, Alexandria Main University Hospital, Alexandria School of Medicine, Alexandria, Egypt; Universiti Sultan Zainal Abidin (UniSZA), Malaysia

²⁻⁵Head and Neck and Endocrine Surgery Unit, Alexandria Main University Hospital, Alexandria School of Medicine, Alexandria, Egypt

Purpose/Introduction: Because the mortality from papillary thyroid cancer (PTC) is low, the most relevant oncologic outcome is recurrence. The purpose of this study is to determine how the lymph node ratio (LNR) may be used to predict the likelihood of disease recurrence.

Materials and methods: This study was carried out on 30 patients with N1b stage of PTC presenting to the Endocrine Surgery Unit, Alexandria University Hospital, Egypt between May 2015 and May 2016. Thyroidectomy with central neck dissection (CND) was done in 16 patients, lateral neck dissection (LND) in 14 patients, and CND and LND in 15 patients. The threshold LNR (cut off value) was calculated by selecting the LNR associated with greater than 50% observed probability of recurrence. For the total LNs (t LNR) retrieved, it was 0.30, whereas the threshold central LNR (c LNR) was 0.71. Patients were followed up by clinical examination, ultrasound (US) neck, and serum thyroglobulin (Tg) within 6–12 months postoperatively.

Results: Neck US done after 6 months was normal in all patients. Ultrasound done after 12 months showed (small remnant and residual tumor) in four patients (13.3%). After RAI ablation serum Tg value showed that 4 patients (13.3%) had high Tg value. Patients with high Tg value and/or abnormal neck US, had mean c LNR of 0.84 and mean t LNR of 0.32 with increased risk of recurrence.

Conclusion: Lymph node ratio can be used to risk-stratify patients with PTC for recurrence. Lymph node ratio is helpful in deciding frequency of follow-up, and the need for radioactive iodine ablation.

12. Early Postoperative PTH Normalization Does Not Exclude the Multiglandular Disease in PHPT Patients

Dmitriy Buzanakov¹, IV Sleptsov², AA Semenov³, TV Borisenko⁴, RA Chernikov⁵, TS Pridvzhkina⁶, VA Makarin⁷, AA Uspenskaya⁸, NI Timofeeva⁹, IK Chinchuk¹⁰, KY Novokshonov¹¹, JV Karelina¹², EA Fedorov¹³, NA Gorskaya¹⁴, IV Sablin¹⁵, YN Malugov¹⁶, SA Elcheparova¹⁷, AN Bubnov¹⁸

^{1–18}Saint-Petersburg State University, North-Western Center of Endocrinology and Endocrine Surgery, Russia

Introduction: Focused parathyroidectomy is a tempting strategy for treatment of primary hyperparathyroidism (PHPT) due to its relative simplicity and low surgical risks. But this method still has an unavoidable risk of PHPT persistence because of multiglandular disease (MGD).

Materials and methods: Retrospective cohort study of 435 cases of surgical treatment for PHPT in SPbSU clinic. Parathormone (PTH) and ionized calcium were assessed after surgery. Patients showed no calcium normalization with high/increasing PTH were classified as persistence cases.

Results: In 102 cases (23.4%) bilateral neck exploration (BNE) was performed. Other patients were treated with focused unilateral parathyroidectomy (FPTX). Eleven (2.5%) showed persistence. Only one case was reported in a group of BNE (OR 3.06 [95% CI: 0.3–24.2]). In 6 cases of persistence after FPTX the normalization of PTH levels in first 1–4 hours after surgery was reported (range from 0.6 to 7.0 pmol/L). In 29 cases MGD was histologically confirmed after initial surgery. Along with the cases of persistence after FPTX the frequency of MGD accounts for 8.9%. In 8 cases of MGD concordant preoperative US/Tc99-Sestamibi scan localization of the solitary adenoma had been reported (50%). Neck CT also showed low sensitivity in detecting multiple adenomas (56%).

Conclusion: Normalization of early postoperative PTH does not exclude the MGD. Low sensitivity of preoperative visualization methods in predicting MGD does not allow to recommend FPTX for initial treatment.

13. Endoscopic Thyroidectomy: An Experience of More than 200 Cases from North India

Gyan chand

Lucknow, India

Purpose: In era of cosmesis, we satisfying the higher demands for endoscopic thyroidectomy (ET) to avoid visible scar-in-the neck. The newer innovative technologies helped us to ensure appropriate and safe surgical outcomes.

Materials and methods: We analyzed the clinic-pathological profile and surgical outcomes of ET via axillo-breast approach (ABA) or trans-oral approach (TOVA) from January 2013 to July 2019.

Results: Total 214 patients underwent ET, 172 were operated via ABA (47 via ipsilateral axillo breast approach (IABA) and 125 via bilateral axillo breast approach (BABA) and 42 were operated by TOVA. Majority underwent HT (IABA-39; BABA-83 and TOVA-37). M:F = 1:33, mean age 38.82-year. Commonest preoperative diagnosis was colloid goiter in 191. Twenty three underwent ET for malignancy. Mean gland weight 20.35 g (10–223). Eight (4%) procedures converted to open. Twenty five percent patients developed biochemical hypocalcaemia and 14.58% required IV calcium supplement. Three patients sustained RL injury. No permanent voice changes. Mean operating time 152.0 ± 38.6 minutes for HT, 206 ± 62 minutes for TT via ABA and 110 ± 22 minutes for HT via TOVA. Mean duration of drain with ABA was 3.2 days, whereas no drain in TOVA. Six (3.7%) with ABA developed seroma, 12 (7.4%) had paraesthesia, none in TOVA. Mean hospital stay of ABA 5.4 days and TOVA 2.4 days. Cosmetic outcome was excellent in both the group.

Conclusion: Endoscopic thyroid surgery is a safe and reproducible procedure via both approaches; however TOVA has fewer complications and most superior cosmetic outcomes in carefully selected patients.

14. Comparison of TI-RADS Systems using Computer-aided Detection Technology

KY Chen¹, MH Wu², CN Chen³, E Shen⁴, A Chen⁵

^{1–3}Department of Surgery, National Taiwan University Hospital, Taipei, Taiwan

⁴AmCad BioMed Corporation, Taipei, Taiwan

⁵Graduate Institute of Industrial Engineering, National Taiwan University, Taipei, Taiwan

Purpose/Introduction: Several thyroid imaging, reporting, and data system (TI-RADS) have been published. Most of the guidelines recommended observation for nodules (<1 cm) and FNAC for nodule (>2 cm). In this study, we will focus on the management of nodules (>1 and <2 cm). We aim to compare the different guidelines on the treatment of thyroid nodules with the computer-aided detection (CADE) technology. We also propose a novel guideline for FNAC to reduce unnecessary procedures under reasonable sensitivity.

Materials and methods: Four hundred and twenty two nodules size between one and two centimeters were evaluated, which were pathologically proven (191 benign and 231 malignant). Eight guidelines were evaluated with sonographic features computerized by a CADE software device

(AmCAD UT detection). This CAde device quantifies six sonographic features: hypoechogenicity, echogenic foci, heterogeneous texture, irregular margin, anechoic area, and taller-than-wide features.

Results: For group (1–1.5 cm), the BTA (2014) had the sensitivity of 91%, with the specificity 23%. For group (1.5–2 cm), higher sensitivity is demanded. The Russ (2016) had the sensitivity of 96%, with the specificity 19%. The novel guideline was proposed. For group (1–1.5 cm), if either one of US features including hypoechogenicity, calcifications and taller than wide were present, then sensitivity is 91% and specificity is 26%. For group (1.5–2 cm), if either one of US features including hypoechogenicity, calcifications and heterogeneity were present, the sensitivity is 95% and specificity is 21%.

Conclusion: The CAde device is an effective tool to assist physicians in following the TI-RADS guidelines. With the proposed novel guideline, 91% of malignant nodules (1–1.5 cm) and 95% of malignant nodules (1.5–2) could be successfully identified and proceed to FNAC.

15. MTC: The Genotype–Phenotype Correlation, Clinicopathological Profile and Management Outcomes

AJ Cherian¹, SS Thomas², R Pai³, TV Paul⁴, S Rajaratnam⁵, N Thomas⁶, MJ Paul⁷, DT Abraham⁸

^{1–8}Christian Medical College, Vellore, Tamil Nadu, India

Purpose: This study was conducted to assess the genotype–phenotype correlation among hereditary medullary thyroid carcinoma (HMTc) and compare the clinicopathological profile and management outcomes between HMTc and sporadic MTC (SMTC).

Materials and methods: Data regarding patients with MTC managed between 2008 and 2016 were retrospectively collected following Institutional Ethical Clearance. This cohort was grouped into two—HMTc and SMTC, the groups being compared by Chi-square and independent t test using STATA (v.13.1).

Results: Medullary thyroid carcinoma accounted for 90/2,022 (4.5%) patients with thyroid carcinoma managed during the study period. RET was positive in 25/71 (35.2%) tested. Mutations were present in codons 634 (twelve patients), 804 (eight patients), 790 (three patients) and 618 (two patients). Patients with 634 mutation (mean age 32.08, range: 14–52 years) were associated with penetrance of MTC in 12/12 (100%), pheochromocytoma in 6/12 (50%) and PHPT in 2/12 (16.6%). A comparison between the clinicopathological profile and management outcomes between both groups is depicted in Table 1.

Conclusion: The incidence of HMTc was 35% in this cohort with codon 634 being the most commonly mutated. Sporadic MTC witnessed a significant male preponderance ($p = 0.01$). Penetrance of pheochromocytoma and PHPT in patients with 634 mutation was 50% and 17%, respectively. Compared with SMTC, HMTc are more often bilateral and multifocal ($p < 0.001$). Medullary thyroid carcinoma IIA appears to be less aggressive than SMTC as a significant number presented with a goitre alone ($p = 0.00$), underwent a less extent of surgery ($p = 0.009$) and had a lower postoperative calcitonin value ($p = 0.016$) in this cohort.

Table 1: Comparing hereditary and sporadic medullary thyroid carcinoma

	Variable	Hereditary MTC (n = 25)	Sporadic MTC (n = 46)	p value
1	Mean age (range in years)	35.2 (14–57)	39.9 (16–70)	0.11
2	Gender (M:F)	8:17	29:17	0.01
3	Presenting complaint			
	Goiter only	17	8	
	Goiter + LN	8	38	0.00
4	Metastasis at presentation	2	6	0.5
5	Preoperative calcitonin (<50 pg/mL)	4	1	0.018
6	Extent of surgery			
	TT/CCLND	10	6	
	Selective neck dissection	15	40	0.009
7	Pathology			
	Mean tumor size (cm)	3.25	3.53	0.46
	Unifocal	4	28	
	Multifocal	4	3	
	Bilateral	9	4	<0.01
8	Mean postoperative calcitonin (pg/mL)	1,261	5,150	0.016
9	Mortality	0	5	0.09

16. Clinicopathological Features and Long-term Outcome of Abdominal Paraganglioma

HR Choi¹, Zeng Yap², SH Choi³, SM Choi⁴, JK Kim⁵, CR Lee⁶, S Kang⁷, J Lee⁸, JJ Jeong⁹, K Nam¹⁰, WY Chung¹¹

^{1–11}Department of Surgery, Yonsei University College of Medicine, Seoul, South Korea

Purpose/Introduction: Paragangliomas (PGL) are rare neuroendocrine tumors derived from chromaffin cells of the autonomic nervous system. We aim to describe our experience and the long-term outcome of abdominal PGL over the last decade.

Materials and methods: A retrospective review of patients diagnosed with PGL in our hospital between November 2005 and June 2017 was conducted. All non-abdominal PGL were excluded and the clinicopathological features and long-term outcome of the patients were analyzed.

Results: A total of 46 patients were diagnosed with abdominal PGL. The average age of diagnosis was 55.4 and there was no gender predilection. The average tumor size was 5.85 cm and they were predominantly located in the infra-renal position (50%). The mean follow-up period was 42 months (range 1.8–252). All patients with metastases had PASS (pheochromocytoma of the adrenal gland scaled score) >4. One patient presented with synchronous metastases whilst two developed local recurrence and distant metastases. One presented with only local recurrence. One patient died 5 years after diagnosis.

Conclusion: Abdominal PGL is a rare tumor with excellent long-term prognosis. Recurrence although uncommon, can occur decades after initial diagnosis. Long term follow-up is therefore recommended for all patients with PGL, especially in patients with PASS >4.

17. Outcomes of MEN1-related Primary Hyperparathyroidism According to Surgical Extents

HR Choi¹, SH Choi², SM Choi³, JK Kim⁴, CR Lee⁵, S Kang⁶, J Lee⁷, JJ Jeong⁸, K Nam⁹, WY Chung¹⁰

^{1–10}Department of Surgery, Yonsei University College of Medicine, Seoul, South Korea

Purpose/Introduction: Surgical excision is treatment of choice for multiple endocrine neoplasia type I (MEN I)-related primary hyperparathyroidism (PHPT). However, surgical strategy of MEN1-related PHPT remains controversial. This study was aimed to investigate outcomes of PHPT according to various surgical extents.

Materials and methods: Thirty three patients underwent parathyroidectomy due to MEN1-related PHPT at Yonsei Severance Hospital between 2005 and 2018 were included. Medical records were retrospectively reviewed. The Chi-squared test was used to compare categorical variables. A $p < 0.05$ was considered statistically significant.

Results: Total parathyroidectomy with heterotopic autotransplantation (TPX) was the most common surgical method (17/33) followed by less than subtotal parathyroidectomy (LPX; 12/33) and subtotal parathyroidectomy (SPX; 4/33). Postoperative persistent hyperparathyroidism was highest in LPX group (3/12; 25%). Recurrence is significantly low in TPX group compared to SPX and LPX (0 in TPX, 2 in SPX and 2 in LPX, $p = 0.013$). Otherwise, both permanent and transient hypoparathyroidism were more common in TPX (total 6, 6/17 in TPX, 35.3%; total 4, 4/17 in TPX, 23.5%, $p = 0.031$, $p = 0.154$, respectively). Since 2015, parathyroid venous sampling (PVS) has been introduced as preoperative localization tool at our hospital. Total 8 patients among 14 patients who got surgery after 2015 underwent PVS before parathyroidectomy, and the surgical extents were various among patients. None of them experienced permanent hypoparathyroidism ($p = 0.003$). Also, none of them recurred even after LPX.

Conclusion: Total parathyroidectomy with heterotopic autotransplantation with autotransplantation has been considered as standard surgery for MEN1-related PHPT. However, considering significant postoperative hypoparathyroidism rate of TPX and feasibility of PVS, individualized decision of surgical extent in MEN1-related PHPT is important.

18. Quality of Life in Symptomatic Primary Hyperparathyroidism Patients After Parathyroidectomy

D Dahiya¹, GB Mohan², SK Bhadada³, A Behera⁴

^{1–4}Department of General Surgery and Endocrinology, Postgraduate Institute of Medical Education and Research, Chandigarh, India

Purpose: Subjective symptoms are not considered as an indication for surgery in primary hyperparathyroidism (PHPT) in a consensus statement of the National Institutes of Health although they significantly affect the quality of life (QOL). The aim of this study was to assess QOL using the Short Form Health Survey-36 (SF-36) questionnaire before and after curative parathyroidectomy (PTX) in patients with symptomatic PHPT.

Materials and methods: This was a prospective observational study in 50 symptomatic PHPT patients from a tertiary care center in north India who underwent curative parathyroidectomy. Patients were evaluated before operation and 3 months after surgery for QOL using SF-36 questionnaire.

Results: There were 30 female and 20 male patients who had significantly lower QOL scores preoperatively which improved in each domain of SF 36 after curative surgery. Mean of physical and mental component score both pre and postoperatively is shown in Table 1.

Conclusion: Curative parathyroidectomy in PHPT patients significantly improves QOL in all domains of SF 36 within 3 months. Therefore, poor QOL should also be an indication of intervention in these patients.

Table 1

	Preoperative (mean $\pm$ SD)	Postoperative (mean $\pm$ SD)	p value
Physical health	63.80 $\pm$ 29.7	87.80 $\pm$ 18.7	0.001
Role limitation due to physical health	93.00 $\pm$ 22.61	99.50 $\pm$ 3.53	0.758
Role limitation due to emotional problems	98.66 $\pm$ 6.60	100 $\pm$ 0.00	0.000
Energy/fatigue	52.70 $\pm$ 20.10	72.50 $\pm$ 12.67	0.00
Emotional well being	50.96 $\pm$ 19.51	68.40 $\pm$ 10.61	0.00
Social functioning	74.50 $\pm$ 28.57	88.75 $\pm$ 16.41	0.00
Pain	43.90 $\pm$ 33.19	84.35 $\pm$ 18.07	0.001
General health	33.70 $\pm$ 19.73	72.80 $\pm$ 16.00	0.335

19. Assessment of Left Ventricular Dysfunction by 2D Echo and MUGA Scan in Primary Hyperparathyroidism

D Dahiya¹, K Abuji², A Sood³, R Vijayvergia⁴, S Bhadada⁵, A Behera⁶

¹⁻⁶Department of General Surgery and Endocrinology, Postgraduate Institute of Medical Education and Research, Chandigarh, India

Introduction: Primary hyperparathyroidism (PHPT) is associated with cardiovascular abnormalities which in turn increases the morbidity and mortality in these patients. Parathormone and calcium both have direct positive inotropic effect on the heart and lead to myocardial and endothelial dysfunction. However, the extent and severity of cardiovascular abnormality is not clearly known. Therefore, we evaluated both structural and functional cardiac changes in PHPT patients by using 2D echo and MUGA scan. We also aimed to assess any improvement in these parameters after curative parathyroid surgery.

Materials and methods: In this prospective study 30 patients of PHPT without any known cardiac disease were enrolled. 2D echo and MUGA scan were performed preoperatively and 3 to 6 months after curative parathyroidectomy.

Results: One patient each had mild mitral regurgitation and enlarged left ventricle, two patients had ventricular hypertrophy on 2D echo; and all these changes improved after parathyroidectomy. Mean ejection fraction was 54.73 $\pm$ 3.5% on 2D echo and was 55.67 $\pm$ 7.24% on MUGA scan. No difference in systolic and diastolic left ventricular function pre and postparathyroidectomy was observed.

Conclusion: Symptomatic PHPT patients without any known cardiac disease in our study did not present with significant systolic and diastolic cardiac dysfunction or abnormal cardiac morphology. This is contrary to the available literature wherein systolic and diastolic dysfunction has been reported in PHPT patients with improvement after curative surgery. This warrants further detailed analysis of possible inotropic effect of PTH on cardiovascular system.

20. Endocrine Manifestations of Patients with Von Hippel Lindau Syndrome: SGPGI Experience

Mallika Dhanda¹, Amit Agarwal², M Sabaretnam³, SK Mishra⁴, Gaurav Agarwal⁵, Anjali Mishra⁶, Gyan Chand⁷, Sushil Gupta⁸, Kaushik Mandal⁹

¹⁻⁷Department of Endocrine Surgery, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

⁸Department of Endocrinology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

⁹Department of Medical Genetics, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

Purpose/Introduction: To study endocrine manifestations, genotype phenotype correlation in VHL syndrome.

Materials and methods: Retrospective study (January 2010 to July 2019) with prospective data collection of patients of VHL. We studied epidemiological data, clinical features, genetic evaluation, surgical management and outcome with follow-up. Statistical analysis using SPSS software was done.

Results: Eighty families with 25 members of VHL syndrome analyzed. Twenty one had pheochromocytoma (PCC). Ninety patients presented as sporadic PCC were subjected to VHL mutation testing guided by bilateral disease, early age or positive family history of either cerebellar hemangioblastoma (CHB) or PCC (2 diagnosed on screening and 4 presented with CHB). The average age for PCC was 25.2 years (5–70 years) with male:female ratio of approximately 2:1. Fifteen were hypertensive, while 6 patients were normotensive. Fourteen patients had bilateral PCC and all were nor-metanephrine (NMN) secreting (1,398–11,850 μ g/24 hours), 2 of which also secreted metanephrine (MN). Seven with unilateral disease underwent unilateral total adrenalectomy. Of 14 patients with bilateral PCC, 10 underwent bilateral total adrenalectomy, while 4 had cortical preserving surgery. Immediate postoperative biochemical resolution was seen in all but 3 patients who had symptomatic resolution. All cases were histopathologically reported as pheochromocytomas—none showed adrenal hyperplasia. On VHL gene sequencing clustering of mutation in exon 3 was found; 18—missense mutations with single frameshift mutation. On follow-up one patient has developed CHB and another developed bilateral pheochromocytoma.

Conclusion: Endocrine manifestations can be helpful in differentiating VHL disease from sporadic PCC allowing screening of family members and early surgical intervention.

21. Effect of Thyroidectomy on Tracheal Remodelling and Consequent Airway Physiology

LE Enny¹, S Garg², M Shreyamsa³, Sasimouli⁴, KR Singh⁵, P Ramakant⁶, AK Mishra⁷

¹⁻⁷Department of Endocrine Surgery, King George's Medical University, Lucknow, Uttar Pradesh, India

Introduction: Upper airway obstruction (UAO) is seen in 26–60% of patients undergoing thyroidectomy (hemi/total HT/TT). Forced spirometry (FS) is the simplest method to evaluate UAO and X-ray neck, the simplest methods to detect tracheal deviation and change in tracheal diameter.

Materials and methods: Fifty patients undergoing HT/TT with no breathing abnormalities were enrolled in the study. All patients underwent preoperative and postoperative (10th day and 6 weeks), X-ray neck and FS tests. SPSS version 23 was used for data analysis.

Results: 84.3% (44) were female, mean duration and weight of goitre were 54.7 months and 72.21 g, respectively. Significant increase in tracheal diameter (anteroposterior as well as transverse) was observed at level of maximum constriction (C7 level) at postoperative day 10 and 6 weeks as compared to preoperative value ($14.2 \text{ mm} \pm 2.6$ vs $16.3 \text{ mm} \pm 1.8$, 16.6 ± 1.9 , $p = 0.000$ at anteroposterior and 12.6 ± 2.4 vs 14.9 ± 1.5 , 14.7 ± 3.7 , $p = 0.000$ at transverse dia.). Significant improvement was observed at postoperative 6 weeks as compared to preoperative value in FEV1 (1.9 vs 2.4 , $p = 0.03$) PEFR (3.9 vs 4.5 , $p = 0.04$), FEV1/FEV0.5 (1.51 vs 1.3 , $p = 0.04$), FEF50%/FIF50% (1.1 vs 0.84 , $p = 0.000$). On Pearson correlation analysis, no correlation was found between X-ray and spirometry findings. Patient with left sided tracheal deviation had significantly better preoperative FVC (2.53 vs 2.05 , $p = 0.012$) and FEV25–75 (2.48 vs 1.83 , $p = 0.04$) as compared to patients with right sided deviation.

Conclusion: Even though patients with goitre maybe asymptomatic at presentation, there can be underlying significant abnormal changes in airway physiology and tracheal dimension which can be analyzed by using forced spirometry and X-ray neck.

22. RFA for Primary and Recurrent Thyroid Carcinoma

N Fukunari¹, M Fukushima², T Nishikawa³, S Sakaue⁴, M Nakano⁵

¹⁻⁵Department of Surgery, Thyroid Centre, Showa University School of Medicine, Yokohama Northern Hospital, Japan

Objectives: Thyroid RFA has shown its effectiveness and safety for the treatment of benign thyroid nodules. The aim of this study is to evaluate the clinical advantage of RFA instead of surgery for the treatment of primary and local recurrence and node metastasis of thyroid carcinoma.

Materials and methods: Thirty-three patients with primary micropapillary thyroid cancer, who refused thyroid surgery because of apprehensive for active surveillance and postoperative complications, have accepted and treated with RFA. Fifteen patients with refractory thyroid cancers, which consisted of 4 local recurrences and 13 node metastases were treated with radiofrequency ablation.

Results: All of the refractory thyroid cancer patients in this series underwent total thyroidectomy with node dissection before RFA and refused or hoped to avoid repeated surgery. RFA was performed under local anesthesia with 17–18 gauge of RF electrodes (STARmed, Korea). The clinical evaluation of radiofrequency ablation was depended on not only the changes of ultrasound findings but also repeated FNA and measurement of serum thyroglobulin (Tg) before and after treatment. All of the lesions were treated without any clinical complications by RFA. Tumor shrinkage has been shown with US and CT images, and also serum Tg levels were decreased in 1 month later. Repeated FNA or CNB were performed in 45 patients and revealed no cancer cell remained except one single case.

Conclusion: Thyroid RFA for primary and recurrent thyroid malignancies has shown its effectiveness and clinical benefits for the patients.

23. New Generation Intraoperative Parathyroid Hormone Assay is Better in Focused Parathyroidectomy

Fung MH Matrix¹, Lang BH Hin²

^{1,2}Queen Mary Hospital, University of Hong Kong, Hong Kong

Introduction: Intraoperative parathyroid hormone assay (IOPTH) facilitates focused (minimally-invasive) parathyroidectomy in primary hyperparathyroidism (pHPT). With the third-generation (3G) immunometric assay that measures whole (1–84) PTH without interference from smaller fragments, we compared the rate of change and diagnostic accuracy of IOPTH between the 3G and conventional (2G) assays in patients with single parathyroid adenoma.

Materials and methods: Consecutive pHPT patients who underwent surgery with IOPTH were analyzed. Peripheral blood was taken on induction, 10- and 20-minute after parathyroid adenoma excision and tested for IOPTH using the 2G and 3G assays by the same biochemical analyzer. Estimated glomerular filtration rate (eGFR) was calculated.

Results: Two hundred and fifty-eight patients were analyzed. The 6-month cure rate was 96.0%. Rate of IOPTH drop was significantly faster in the 3G assay at 10- and 20-minute (76% vs 74% , $p < 0.001$ and 85% vs 82% , $p < 0.001$, respectively). Also, the proportion of patients with normalized PTH values at 10- and 20-minute was significantly greater in the 3G assay (71% vs 59% , $p < 0.001$ and 85% vs 73% , $p < 0.001$, respectively). Patients having $\text{eGFR} < 85 \text{ mL/minute/1.73 m}^2$ had significantly slower PTH drop in the 2G but not 3G assay. The overall sensitivity, positive predictive value and accuracy between 2G and 3G assays were comparable (96% vs 96% ; 94% vs 93% ; 91% vs 90%).

Conclusion: Despite the comparable accuracy between the two generations of assay, it appears advantageous to adopt the newer 3G over the conventional 2G IOPTH assay because of the more rapid IOPTH drop and greater chance of normalized PTH values after excision, irrespective of renal function.

24. Ethnic Differences in T Stage of Thyroid Cancer Presentation in South Western Sydney Local Health District

D Goonawardhana¹, C Pham², N Niles³

¹⁻³Liverpool Hospital, Australia

Purpose/Introduction: The incidence of thyroid cancer is known to vary by race and ethnicity, with poorer outcomes demonstrated in ethnically diverse groups. Whilst there is extensive research into this relationship, there has been little investigation in Australia into whether ethnicity is linked to later stage of presentation, and subsequently, likely poorer outcomes. The South Western Sydney Local Health District (SWSLHD) is a fast growing, culturally and economically diverse community in New South Wales. Given the ethnic diversity of the patient demographic, we investigated whether patients from ethnic backgrounds were more likely to present with later stage of thyroid cancer.

Materials and methods: A retrospective review of 257 patients diagnosed with either papillary or follicular thyroid carcinoma seen by an endocrine surgeon working in the SWSLHD between 2016 and 2019 was undertaken. Information regarding each patient's ethnicity, country of birth, preferred language and stage of disease using the AJCC 7th and 8th edition guidelines was analyzed.

Results: The data demonstrated that there is a positive correlation between Asian ethnicity and later T (tumor) stage of presentation (T3 or T4) and a slight positive correlation between South Asian ethnicity and T3 or T4 presentation.

Conclusion: There is an increased rate of later T stage of presentation in Asian and South Asian patients compared to Anglo, European, Pacific Islander and South American patients. Given the small cohort in this study, further analysis with a larger sample size and inclusion of other likely contributing factors, such as health literacy and medical insurance status, is warranted.

25. The Comparison of Modified Video-assisted Lateral Neck Dissection and Conventional Dissection

Hui Han

Thyroid Surgery Department, The First Hospital of Jilin University, Changchun, Jilin, China, e-mail: hh198404@hotmail.com

Purpose: A prospective randomized controlled study to conducted in order to study the postoperative differences between the applications of modified video-assisted lateral neck dissection (VALND) and conventional open lateral neck dissection (LND) in papillary thyroid cancer (PTC).

Materials and methods: Two hundred and sixteen cases of PTC were randomly assigned from thyroid surgery follow-up database of 1st hospital of Jilin University, the implementation of the modified VALND (97 cases) and conventional open LND (119 cases) were from April 2016 to April 2019.

Results: The intraoperative bleeding were significantly less in conventional open LND group than modified VALND group (30 mL ± 10 mL vs 60 ± 20 mL), but postoperative drainage volume were much less in modified VALND group (82 mL ± 21 mL vs 133 ± 54 mL). The operative time is longer in modified group (2.6 ± 0.5 hours) than in conventional group (2.1 ± 0.3 hours) ($p < 0.05$). The incidence of postoperative complications was obvious lower in modified group than in conventional group ($p < 0.05$), such as lymphorrhagia (3% vs 5%), tetany (7% vs 9%), neck and shoulder syndrome (1% vs 3%). There is no significant difference in chocking cough, hoarseness of voice, tumor recurrence rate after radioactive iodine therapy between the two groups ($p > 0.05$).

Conclusion: Although the operative time of modified VALND group is higher than conventional open LND group, it can better to avoid too much bleeding. However, patients could feel much comfortable in modified VALND group, and modified VALND is much conducive to the recovery of postoperative patients with PTC.

26. The Relations of Body Mass Index and Aggressive Features of Thyroid Carcinoma

H Hong¹, LH Lee², HK Kim³, JH Lee⁴, EY Soh⁵

¹⁻⁵Department of Thyroid Endocrinology Surgery, Ajou University Medical Center, Ajou University School of Medicine, Korea

Purpose/Introduction: The association between recurrence after thyroidectomy and high BMI is still controversial. We sought to establish the relationships between the aggressive features and BMI of thyroid cancer patients and the effect of obesity on recurrence after thyroidectomy.

Materials and methods: The relationship between BMI and aggressive factors were analyzed in 2,562 patients who underwent thyroidectomy from 2009 to 2017. Based on BMI, patients were divided into four groups; (a) BMI < 18.5 kg/m² (3.2%); (b) 18.5 ≤ BMI < 25 kg/m² (61.2%); (c) 25 ≤ BMI < 30 kg/m² (29.1%); (d) BMI ≥ 30 kg/m² (6.5%).

Results: Among the patients, 80.1% were women and 19.9% were men. The mean (SD) age was 46 (12) years. In obese group with (d), the tumor size of >1 cm was more frequent ($p = 0.003$), and the TNM stage ($p < 0.001$) was more advanced than those of other groups. Additionally, in the overweight group with (c), the thyroid cancer invaded the surrounding tissue grossly ($p = 0.004$). The more obese the patients were, higher frequently total thyroidectomies were performed ($p = 0.008$). Thyroid cancer recurred in 1.6% patients during the follow-up time (median, 25.5 months). The recurrence is not different statistically among BMI groups ($p = 0.67$).

Conclusion: The patients with thyroid cancer who had high BMI were associated with more aggressive features than other groups. However, there was no difference of recurrence among four groups. It may be attributed to more frequent total thyroidectomy in obese patients. The long-term of follow-up is still needed to prove this conclusion.

27. Surgeon-performed Ultrasound Guided FNAC of Thyroid Nodules

Nurul N Jamaluddin¹, Sharun NA Suhaimi², Nani H Md Latar³, Rohaizak Muhammad⁴

¹⁻⁴University Kebangsaan, Malaysia Medical Centre, Malaysia

Purpose/Introduction: Ultrasound guided fine needle aspiration cytology (USG FNAC) of thyroid nodules has high diagnostic accuracy than conventional FNAC. It is routinely conducted by radiologist. However, more recently surgeons have been performing USG FNAC of thyroid nodules (SPUSG FNAC). Thus, we conducted a preliminary study on the results of SPUSG FNAC of thyroid nodules in our center.

Materials and methods: This is a cross sectional retrospective study of 58 patients with suspicious thyroid nodule who underwent diagnostic SPUSG FNAC, conducted in University Kebangsaan Malaysia Medical Centre (UKMMC) between January 2019 and October 2019. Two endocrine surgeons conducted the SPUSG FNAC. Cytological diagnosis is made according to Bethesda classification.

Results: A total of 58 patients underwent SPUSG FNAC of thyroid nodules. The cytological diagnosis showed that 34 (58.6%) patients had benign nodule (C2), 6 (10.3%) patients had indeterminate (C3), 4 (6.9%) patients had C4 and C5, respectively while 10 (17.2%) patients had inconclusive results (C1). All patients with inconclusive results were found to have multinodular goitre with cystic component. Among the patients with diagnostic cytology, 10 patients underwent surgery and final histological reports are similar to preoperative FNAC.

Conclusion: SPUSG FNAC of thyroid nodules in UKMMC has been found to be diagnostic in the majority of cases. Considering the local long waiting period for intra department referral for diagnostic procedure and cytology reporting in our population, we advocate the routine use of SPUSG FNAC of suspicious thyroid nodules undergoing surgery.

28. BRD4 Inhibitors Combined with Immunotherapy Synergistically Enhance the Treatment of Tumors

M Xianying¹, L Yong², W Yaoqi³, Z Qiang⁴, C Guang⁵, P Renzhu⁶, Y Shuai⁷

¹⁻⁷The First Hospital, Jilin University, Jilin, China

Materials and methods: The potential and particle size of the nanoparticles were measured by a particle size analyzer. Real-time quantitative PCR was used to detect the expression of PD-L1 and CD47 in tumor cells treated with different nanoparticles. After co-culture of the nanoparticles and the tumor cells, the distribution of the nanoparticles was examined by laser confocal microscopy. The tumor-bearing mice were injected with fluorescently labeled particles through the tail vein, and the nanoparticle distribution was detected by a small animal *in vivo* imaging system. The distribution of nanoparticles in tumor tissues was examined by confocal microscopy. Tumor growth curves were drawn by injecting different drug nanoparticles into tumor-bearing mice through the tail vein.

Results: The particle size of NPs is 112 ± 0.6 nm and the zeta potential is +26.3 mV. Decreased expression of PD-L1 and CD47 in tumor cells after NPs treatment. NPs can enter tumor cells *in vitro*. NPs can be enriched in tumor tissue. NPs can enter tumor tissue *in vivo*. NPs can target tumor tissue and inhibit tumor growth (Figs 1 to 6).

Conclusion: We designed and synthesized nanoparticles that can load BRD4 molecular inhibitors and down-regulate siRNA expression of CD47 molecules. Nanoparticles that combine immunotherapy with chemotherapy can release drugs into tumor tissue, reducing side effects.

Fig. 1: Characterization of NPs

Fig. 2: The expression of PD-L1 and CD47 in tumor cells after treatment with nanoparticles detected by qRT-PCR technique *in vitro*

Fig. 3: CLSM images show the distribution of NPs during tumor cell 4 hours after administration of NPs or PBS control. Cell nuclei were stained with DAPI (blue), cytoskeleton was stained with phalloidin-FITC (green) and the NPs was labeled with Cy5 (red) and Dil (yellow). The picture indicated that Dil+ fluorescence distributed in cytoplasm and Cy5+ distributed in extracellular space. Scale bar 1/4 50 mm

Fig. 4: The distribution of nanoparticles in tissues and organs of tumor-bearing mice. The distribution of nanoparticles in tumor-bearing mice was detected at different time points after injection of NPs. At 24 hours after the injection of the nanoparticles, the mice were sacrificed and the tissues were taken out to observe the distribution of fluorescence in tissues and organs

Fig. 5: Laser confocal microscopy for the distribution of nanoparticles in tumors. Cell nuclei were stained with DAPI (blue), cytoskeleton was stained with phalloidin-FITC (green) and the NPs was labeled with DiD (red)

Fig. 6: The tumor growth curves. Tumor growth after treatment of tumor-bearing mice with different nanoparticles

29. Analysis of BRAFV600E Mutation in cfDNA of PTC Patients based on Electrochemical Enrichment Method

M Xianying¹, W Jia², W Yaoqi³, Z Qiang⁴, C Guang⁵, P Renzhu⁶, Y Shuai⁷

¹⁻⁷Department of Thyroid Surgery, The First Hospital of Jilin University, Changchun, China

Purpose/Introduction: We introduce a PAAM/PA/PDA hydrogel-based electrochemical method for efficient DNA enrichment through electric field-mediated adsorption/desorption of DNA on PAAM/PA/PDA hydrogel modified glassy carbon electrode (GCE). The mutational status of BRAFV600E in papillary thyroid cancer (PTC) patients was successfully addressed when the ctDNAs enriched from at least 20 μ L blood plasma sample were used as template for PCR amplification.

Materials and methods: The PAAM/PA/PDA porous hydrogel modified GCE was prepared as working electrode for the electrochemical sensor. A constant positive electrical stimulation was applied to the working electrode to adsorb cfDNA, then applied a constant electrical stimulation in the opposite direction with the hydrogel immersed in Tris buffer. After a PCR step, the products were detected by agarose gel electrophoresis and sequenced by the traditional Sanger sequencing method.

Results: Combination of the PCR amplification technique, the practicability of as-proposed method is demonstrated by screening of circulating tumor DNAs (ctDNAs) with BRAFV600E mutation in cfDNAs from the blood plasma samples of patients with PTC or thyroid nodule (TN). In the 10 cases with matched cfDNA and PTC tissues (Fig. 1), GCE-PAAM/PA/PDA enriched cfDNA test exhibits a slightly higher sensitivity than those of genomic DNAs test extracted from PTC tissues (6/10 vs 5/10).

Conclusion: A GCE-PAAM/PA/PDA electrochemical sensor was developed to be applied to detect BRAFV600E mutation in PTC, which is expected to accelerate the applications of ctDNA in clinical practices such as early diagnosis of thyroid cancer or other types of malignant tumors, guidance of patients' treatment plans and tumor prognosis.

Fig. 1: Sequencing image details of investigated genomic DNA and matched cfDNA. In the sequencing chain, A (adenosine) represents the wild genotype while T (thymidine) represents the mutant genotype

30. Prediction Mode of More than Five Central Lymph Nodes Metastases in Clinically Node-negative Ipsilateral Papillary Thyroid Carcinoma with Tumor Size 1–4 cm

Lei Jin¹, Hai-Li Sun², Liang Zhou³, Liu-Hong Shi⁴, Lei Xie⁵, Jian-Biao Wang⁶

^{1,3–6}Department of Head and Neck Surgery, Sir Run Run Shaw Hospital, Zhejiang University School of Medicine, Hangzhou, Zhejiang, China

²Department of Outpatient Nursing, Sir Run Run Shaw Hospital, Zhejiang University School of Medicine, Hangzhou, Zhejiang, China

Purpose/Introduction: In the 2015 American Thyroid Association guidelines, either lobectomy or total thyroidectomy was recommended for papillary thyroid carcinoma (PTC) 1–4 cm without extrathyroidal extension and lymph node metastasis. However, lymph node metastases have been strongly associated with recurrence and low survival, especially in PTC patients with 5 or more metastatic lymph nodes. Therefore, the purpose of this study was to investigate predictive factors of more than five central lymph nodes metastases (CLNM) in PTC patients with tumor size 1–4 cm.

Materials and methods: A total of 382 patients with clinically node-negative (cN0) ipsilateral PTC who underwent thyroidectomy with central neck dissection between January 2012 and December 2016 were analyzed retrospectively.

Results: More than five CLNM were detected in 54 (14.1%) patients, while CLNM were detected in 230 (60.2%) patients. Multivariate logistic regression revealed that age <45 years ($p < 0.001$), male gender ($p = 0.013$), and tumor size >2 cm ($p = 0.001$) were independent predictive factors of >5 CLNM in cN0 ipsilateral PTC patients with tumor size 1–4 cm. The prediction equation ($Y = 1.694 \times \text{age} + 0.807 \times \text{gender} + 1.190 \times \text{tumor size} - 3.530$) was developed, with sensitivity (57.4%) and specificity (80.8%), respectively, at optimal cut-off point -1.685 .

Conclusion: When the predictive value is higher than -1.685 according to the equation in cN0 ipsilateral PTC patients with tumor size 1–4, total thyroidectomy may be considered.

31. Predictive Factors of Central Lymph Node Metastasis in PTC Patients Who Underwent Prophylactic CND

Hidegori Kamio¹, Kiyomi Horiuchi², Akiko Sakamoto³, Yoko Omi⁴, Eiichirou Noguchi⁵, Yusaku Yoshida⁶, Mikiko Fujimoto⁷, Takahiro Okamoto⁸

¹⁻⁸Department of Breast and Endocrine Surgery, Tokyo Women's Medical University, Tokyo, Japan

Purpose: A meta-analysis showed that adding prophylactic central node dissection (CND) to total thyroidectomy was associated with reduced regional lymph node recurrence rates in patients with papillary thyroid carcinoma (PTC). Assuming the observed absolute risk difference of 2.3% to be a treatment effect, the prophylactic CND would be required for 43 patients to prevent recurrence in one patient. The study aimed at defining patients at low risk of having metastases in the central region who would be candidates for omitting prophylactic CND.

Materials and methods: We conducted a retrospective study on 431 patients who underwent initial thyroidectomy along with prophylactic CND for any T cN0 M0 PTC from 2010 to 2017. The primary outcome was the prevalence of pN1. The secondary outcome was the incidence of disease recurrence. A multivariable logistic regression analysis was used to determine the associations between pN1 and clinicopathologic variables. The probability of recurrence was estimated using the Kaplan–Meier method.

Results: The prevalence of pN1 was 49% (95% CI: 44–54). The 5-year disease free survival was 97.6% in pN0 and 94.1% in pN1, respectively ($p = 0.23$). Odds ratios (95% CI) of factors associated with pN1 were 2.38 (1.47–3.83) for male gender, 2.39 (1.54–3.69) for age <45 years, 1.69 (1.06–2.68) for tumor size >1.0 cm, and 1.99 (1.27–3.12) for extra-thyroidal extension. The probability of pN1 for patients without any of the factors was 37% (28–46).

Conclusion: The study failed to define patients who would be good candidates for omitting prophylactic CND, although it revealed some clinicopathologic factors associated with pN1.

32. Endoscopic Thyroidectomy: Which One is the Better Technique for Beginners?

Kamal Kataria¹, Kush R Lohani², Chitresh Sharma³, Piyush Ranjan⁴, Anita Dhar⁵, Anurag Srivastava⁶

¹⁻⁶Department of Surgical Disciplines, All India Institute of Medical Sciences, New Delhi, India

Purpose: The endoscopic thyroidectomy is an advanced procedure and has a long learning curve. Various approaches have been evolved in the past and most commonly employed approach is combined axillary-breast approach (ABA). Recently transoral endoscopic thyroidectomy vestibular approach (TOETVA) is being popularised as scarless procedure however the learning curve of TOETVA is even longer than ABA. The purpose of this study was to compare the initial experience of ABA and TOETVA with respect to difficulties and outcome.

Materials and methods: Prospective nonrandomized interventional study was conducted including ten patients in each group (TOETVA vs ABA) who underwent hemi-thyroidectomy for non-malignant solitary thyroid nodule of the size up to 3 cm.

Results: The initial ten patients who underwent TOETVA and ABA were included in each group. All the patients were female and were comparable in respect to age and size of nodule. The operative time (121 vs 138.5 minutes $p = 0.34$) and blood loss (50 vs 60 mL, $p = 0.9$) were almost similar in both groups. The flap raising time was significantly less with TOETVA group (29.3 vs 47.2 minutes, $p < 0.001$), but it was associated with more difficulty in approaching upper pole ($p = 0.13$), more intraoperative events (30% vs 10%, $p = 0.58$) and conversions to open procedure (20% vs 10%, $p = 1$). Similarly, postoperative pain was more with TOETVA compared to ABA (6.4 vs 5.2, $p = 0.03$). The other postoperative complications were similar in both groups. These include voice changes (10% vs 20%), port-site and flap ecchymosis (0 vs 10%), swallowing difficulty (50% vs 40%) and flap paraesthesia (30% vs 50%). Hospital stay was similar in both the groups (2.5 vs 3 days, $p = 1$). Patients in both groups had 100% cosmetic satisfaction with adequate postoperative analgesia.

Conclusion: Axillary breast approach should be preferred to start learning the endoscopic thyroidectomy, as it is easier and safer than transoral vestibular approach.

33. Adrenalectomy Volume-related Outcomes of CESQIP-participating Surgeons

Colleen M Kiernan¹, Carmen C Solorzano², Barbara S Miller³, Paul Graham⁴, Nancy D Perrier⁵, Jeffrey E Lee⁶, Paul G Gauger⁷, Elizabeth G Grubbs⁸, Tracy S Wang⁹

¹⁻⁹Vanderbilt University Medical Center, USA

Purpose/Introduction: Previous studies have defined a high-volume adrenal surgeon (HVS) as performing ≥ 6 adrenalectomies/year. The aim of this study was to utilize the collaborative endocrine surgery quality improvement program (CESQIP) to describe the effect of surgeon volume on practice trends and outcomes for adrenalectomy.

Materials and methods: All patients who underwent, unilateral adrenalectomy were identified. The data were analyzed by de-identified surgeon and divided in two groups, based on surgeon volume; ≥ 6 adrenalectomies/year defined a HVS. Patient demographics, perioperative and outcome variables were compared.

Results: Of 781 adrenalectomies performed by 53 surgeons, most (675; 86%) were performed by HVS (25; 47%). The majority (90%) were performed for benign disease and most (72%) were functional. Most adrenalectomies were minimally invasive [91% HVS, 94% low-volume adrenal surgeon (LVS)]. Low-volume adrenal surgeon were more likely to utilize a transabdominal minimally invasive approach (73% vs 46%; $p < 0.001$) and to convert to an open procedure (5% vs 2%; $p = 0.04$). High-volume adrenal surgeon performed a higher number of posterior retroperitoneoscopic (40% vs 16%; $p < 0.001$) and robotic (12% vs 7%; $p < 0.001$) adrenalectomies. Low-volume adrenal surgeon had longer operative times (58% vs 51% > 2 hours; $p < 0.04$) and hospital length-of-stay (57% vs 41% > 1 day; $p < 0.001$); there were no differences in reported complications, emergency department visits, readmissions, or 30-day mortality (Fig. 1).

Conclusion: The majority (86%) of adrenalectomies in CESQIP were performed by HVS, although more CESQIP adrenal surgeons were LVS. Even among endocrine surgeons, LVS were more likely to have longer operative times and length-of-stay HVS. Refining the threshold definition of a HVS may require continued maturity of the CESQIP dataset and clarification of the most meaningful outcomes.

Fig. 1: Number of adrenalectomies performed per year by CESQIP participating surgeons

34. Clinical and Pathologic Features for Predicting Malignancy in Thyroid Follicular Neoplasms

Kwang S Kim¹, Chan K Jung², Ja S Bae³, Jeong S Kim⁴

^{1,3,4}Department of Surgery, College of Medicine, The Catholic University of Korea, Seoul, Korea

²Department of Hospital Pathology, College of Medicine, The Catholic University of Korea, Seoul, Korea

Background: Unfortunately, the cytology finding of follicular neoplasm does not distinguish between benign follicular adenoma and follicular thyroid carcinoma. The objective of this retrospective study was to identify the clinical and pathologic features to predict malignancy in patients preoperatively diagnosed as follicular neoplasm.

Materials and methods: A total of 416 patients with follicular neoplasm who underwent thyroidectomy were reviewed at Seoul St. Mary's Hospital (Seoul, Korea) from January 2010 to June 2018. Clinicopathologic features were analyzed retrospectively by complete medical chart review and pathologic slide review.

Results: Thyroid malignancy was diagnosed in 209 patients (50.2%). One hundred and eighteen patients (28.4%) were diagnosed with follicular variant papillary thyroid carcinoma (fvPTC), 59 patients (14.2%) were diagnosed with follicular thyroid carcinoma (FTC), and 23 patients (5.5%) were diagnosed with conventional PTC. The number of patients with nuclear atypia was quite more in malignancy group than in benign group (16.4% vs 1.9%, $p < 0.001$). Multivariate analysis indicated that the significant risk factors of diagnosis of malignancy include cytologic and pathologic diagnosis with nuclear atypia [odds ratio (OR): 10.762, 95% confidence interval (CI): 3.002–38.575, $p < 0.001$], NRAS mutation (OR: 2.483, 95% CI: 1.212–5.086, $p = 0.013$), and male gender (OR: 2.027, 95% CI: 1.042–3.944, $p = 0.037$).

Conclusion: In our result, prevalence of malignancy in patient with preoperative diagnosis of follicular neoplasm was much higher than previous reports. Cytologic or pathologic nuclear atypia is useful predictors for the presence of malignancy. Further studies must be conducted to support our results.

Keywords: Follicular neoplasm, Atypia, Thyroidectomy, Thyroid carcinoma.

35. Is it Mandatory to Supplement Levothyroxine to Maintain Euthyroid Status in Patients After Isthmus: Preserving Lobectomy for Thyroid Cancer?

Hee J Kim¹, Soo Y Kim², Hokin Chang³, Seok-Mo Kim⁴, Yong S Lee⁵, Hang-Seok Chang⁶, Cheong S Park⁷

¹⁻⁷Department of Surgery, Thyroid Cancer Center, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Background: The incidence and factors associated with hypothyroidism after isthmus-preserving lobectomy for thyroid cancer remains unclear. The aim of this study was to evaluate factors associated with hypothyroidism with the need for thyroid hormone replacement and furthermore to evaluate if empirical levothyroxine supplementation is mandatory for patients after isthmus-preserving lobectomy to maintain euthyroid status.

Materials and methods: From April to July 2014, 107 patients receiving isthmus-preserving lobectomy for thyroid cancer were enrolled. Levothyroxine has not been given on routine basis after thyroidectomy. Patients were evaluated through thyroid function test at the time of outpatient visit 1 week after surgery, 6 months after surgery and 18 months after surgery.

Results: Among 107 patients, 36 patients (33.6%) were given levothyroxine at the outpatient visit 1 week after surgery, 41 patients (38.3%) 6 months after surgery and 62 patients (57.9%) received levothyroxine at 18 months after lobectomy. When patients without levothyroxine intake were compared with patients with levothyroxine supplementation at the time of 18 months after surgery, the two groups did not show any differences in gender (35 vs 46 female, $p = 0.843$), age (43.8 ± 11.3 vs 44.2 ± 11.6 , $p = 0.846$), tumor size (0.6 ± 0.3 vs 0.6 ± 0.4 , $p = 0.288$). Only the presence of thyroiditis (8 vs 24, $p = 0.034$) and FT4 level (1.2 ± 0.2 vs 1.5 ± 0.4 , $p < 0.001$) was statistically significant 18 months postoperatively. On logistic regression studies, only thyroiditis with an OR of 2.92 was significantly associated with the intake of levothyroxine.

Conclusion: Thyroiditis is associated with postoperative hypothyroidism and levothyroxine supplementation accordingly. However, in patients without thyroiditis, it is not mandatory to supplement levothyroxine to maintain euthyroid status.

36. Public's Perception of Scar Cosmesis after Thyroidectomy: Results of a Survey of Turkish vs South Korean Individuals

Soo Y Kim¹, Özer Makay², Murat Ozdemir³, Hang-Seok Chang⁴, Cheong S Park⁵, Yong S Lee⁶

^{1,4-6}Yonsei University, Gangnam Severance Hospital, Thyroid Cancer Center, Seoul, South Korea

^{2,3}Department of Surgery, Ege University Hospital, Division Endocrine Surgery, Izmir, Turkey

Introduction: "Scarless thyroidectomy (transoral endoscopic thyroidectomy)" is described for the surgical management of thyroid diseases in selected cases. Objective of this study was to investigate whether public's perception of neck scar cosmesis in Turkey share the same perspectives as compared to the South Korean population.

Materials and methods: A review board-approved survey was administered to individuals. A total of 809 individuals completed the 15-question survey during a 2 months period. This was evaluated against age, gender, ethnicity, educational status, profession, income, presence of a neck scar, scar length, thickness, coloring, and length and psychological consequences of presence of a neck scar.

Results: Replies were received from 525 (65%) Turkish and 284 (35%) Korean individuals (68% female, 32% male, mean age 47.2 ± 13.3). Compared to Turkish individuals, Korean's would significantly feel more uncomfortable with a scar in the neck ($p < 0.05$). This also counted for the length and thickness of the scar ($p < 0.05$). They also reported to feel damaged and less attractive with a scar in the neck ($p < 0.05$). Multivariate analysis showed that youngest age group (<26) in Turkey would feel more uncomfortable with a scar in the neck, compared to reference age group of 57–66 [OR = 2.91 (95% CI = 1.39–5.11)]. Korean ladies would feel more uncomfortable with a neck scar, compared to Korean men [OR = 2.75 (95% CI = 1.33–6.67)].

Conclusion: Among the surveyed individuals, for South Koreans, a scar in the neck is associated with concerns and fears when compared to Turkish individuals. Being young in Turkey and female in South Korea are factors affecting perception of scar cosmesis.

37. Transoral Endoscopic Thyroidectomy by a Vestibular Approach with Endoscopic Retractor: Experience with the First 132 Patients

Seok-Mo Kim¹, Soo Y Kim², Hee J Kim³, Ho-Jin Chang⁴, Yong S Lee⁵, Cheong S Park⁶, Hang-Seok Chang⁷

¹⁻⁷Department of Surgery, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Background: Transoral endoscopic thyroidectomy by a vestibular approach (TOETVA) is a novel technique for thyroid cancer operation. The aim of this study was to report on our initial experiences with TOETVA with endoscopic retractor for the management of thyroid carcinoma.

Materials and methods: From September 2016 to April 2018, 132 patients with thyroid cancer underwent TOETVA. We used a three-port technique through the oral vestibule with endoscopic retractor, and thyroidectomy with ipsilateral central compartment dissection was performed endoscopically using conventional laparoscopic instruments.

Results: All patients had papillary thyroid carcinoma. Less than total or total thyroidectomy with ipsilateral central compartment node dissection was performed (124 vs 8). The mean operation time was 87.6 minutes (range, 56–213 minutes). The average number of lymph nodes resected was 2.6 (range, 1–12). Six patients experienced a transient hoarseness, which was resolved within 3 months. Most of the patients could return home within 3 days after surgery.

Conclusion: In this large series from a single center, we found that TOETVA with endoscopic retractor can be performed safely and radically in selected patients with thyroid cancer.

38. Clinicopathologic Characteristics of Diffuse Sclerosing Variant of Papillary Thyroid Carcinoma According to Age Groups

Hee J Kim¹, Taeil Yoon², Soo Y Kim³, Hojin Chang⁴, Seok-Mo Kim⁵, Hang-Seok Chang⁶, Cheong S Park⁷, Yong S Lee⁸

^{1,3-8}Department of Surgery, Thyroid Cancer Center, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

²21st Century Women's Clinic, Suwon, Korea

Background: Diffuse sclerosing variant of papillary thyroid carcinoma (DSV-PTC) is an uncommon variant of papillary thyroid carcinoma. This subtype is considered an aggressive histotype associated with poor prognosis. Diffuse sclerosing variant of papillary thyroid carcinoma tends to occur more frequently in patient with third decade of life, and to be more aggressive when it occurs in early ages. The aim of this study was to investigate the clinicopathologic characteristics of DSV-PTC according to age groups.

Materials and methods: Between January 2005 and December 2017, 20,765 patients were treated as papillary thyroid carcinoma. Among them, 397 patients (1.9%) who diagnosed as DSV-PTC in final pathologic report were enrolled in this study. All patients were undergone thyroidectomy. Clinicopathologic characteristics were evaluated according to age groups.

Results: Diffuse sclerosing variant of papillary thyroid carcinoma was more popular in youngest group, and incidence decreased gradually according to age groups. Comparing the incidence of DSV-PTC according to ages, female patients were predominant in younger groups ($p < 0.001$). Tumor size is larger in accordance with age groups ($p < 0.001$). Aggressive characteristics including capsule invasion, central node metastasis and lateral node metastasis are more prevalent in younger groups. BRAF mutation was more popular between 30 and 60 years old ($p < 0.001$).

Conclusion: Although DSV-PTC was more prevalent in younger ages as with previous reports, a few patients were diagnosed as DSV-PTC even though more than 60-year-old. Furthermore, older patients with DSV-PTC had less aggressive behaviors comparing younger patients with DSV-PTC. Clinicians should be aware of the existence of DSV-PTC in older age groups.

39. Adverse Effects of Tyrosine Kinase Inhibitors: Real World Use

Seok-Mo Kim¹, Hee J Kim², Soo Y Kim³, Hojin Chang⁴, Hang-Seok Chang⁵, Cheong S Park⁶, Yong S Lee⁷

¹⁻⁷Department of Surgery, Thyroid Cancer Center, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Background: Kinase inhibitors are recommended for treating radioactive iodine (RAI)-refractory differentiated thyroid cancer patients that is not otherwise amenable to local control using alternative approaches. Although associated with a significant progression-free survival improvement as compared to placebo in a large phase III study, the benefit of TKIs needs to be proved in the context of associated moderate to severe toxicities that require frequent dose reduction and delays.

Materials and methods: Retrospective cohort study of medical records of 71 patients treated with tyrosine kinase inhibitors lenvatinib and sorafenib for thyroid cancer at Gangnam Severance Hospital from July 2016 to December 2017 was conducted. Baseline clinical parameters, dosage and adverse effects from initiation of treatment were collected.

Results: As tyrosine kinase inhibitors, sorafenib ($n = 48$) and lenvatinib ($n = 23$) was used. Adverse effects occurred in 19 patients (82.6%), requiring dose reduction in 8 (34.8%) of patients and drug cessation in 1 patient (4.3%). For patients using sorafenib, the initial starting dose was ≤ 400 mg daily in 12 patients (25.0%), 600 mg in 16 patients (33.3%) and 800 mg daily in 20 patients (41.7%). Dose reduction was needed for adverse effects in 27 patients (56.3%), and drug cessation was necessary in 4 patients (8.3%). When most common adverse effect was compared between sorafenib and lenvatinib, hand-foot-syndrome was significantly more frequent in patient using sorafenib (42 (87.5%) vs 13 (56.2%), $p = 0.003$).

Discussion and conclusion: Both of the TKIs showed high rate of adverse effect. Adverse effect was more observed in sorafenib patients, which needed more often drug cessation.

40. Role of Radiotherapy in Bone Metastases in Thyroid Malignancies and Quality of Life: A Single Institution Study

Chandralekha Krishnan

India

Purpose: Follicular thyroid malignancies have overall good prognosis. They have metastatic potential especially to lung and bone. Bone metastases can herald the quality of life though the survival can be prolonged. The various management for bone metastases includes radio iodine therapy (RAI), surgery and external beam radiotherapy. External beam radiotherapy is indicated for analgesic purpose. The aim of this study is to analyze the role of radiotherapy in metastatic thyroid carcinomas with bone metastases in pain palliation.

Materials and methods: In our center which mainly abodes the low economic group of people who were unwilling for RAI and those who were inoperable were taken up for radiotherapy for pain palliation. Prospective analysis was done for a period of 1 year. Patient and tumor characteristics and radiotherapy details were collected. Distant metastases were documented with clinical or radiological or diagnostic nuclear imaging. The pain reduction scoring was assessed using EORTC QLC BM22.

Results: The cohort consists of 22 patients with follicular thyroid carcinoma where five had bone metastases at presentation. The remaining had undergone surgery for the primary thyroid malignancy. The questionnaire concentrates on pain site, pain characteristics, functional interference and psychosocial aspects. At 2 month follow-up there was significant improvement in all the domains.

Conclusion: Responders to radiotherapy at 2 months presented improvement in BM 22 pain domains and also improvement in quality of life.

41. Correlation between Recurrent Laryngeal Nerve Caliber and Body Figure: A Preoperative Tool to Assess Thin-diameter Nerves in Thyroidectomies

Kun-Ta Wu¹, Shun-Yu Chi², Yi-Chia Chan³, Yi-Ju Wu⁴, Fong-Fu Chou⁵

¹⁻⁵Division of General Surgery, Kaohsiung Chang Gung Memorial Hospital, Kaohsiung, Taiwan

Background: Inadvertent recurrent laryngeal nerve (RLN) injury still being one of major cause of complication in thyroidectomized patients. The objective of this study is to clarify the correlation between whether preoperative clinical parameters could predict the size of RLN.

Materials and methods: Data of thyroidectomies for various diseases of the thyroid gland was collected during the years 2014 January to 2017 April. Routine identification and exposure of the RLNs at risk to its entry into the larynx was done. The maximum diameter of exposed nerves were measured and recorded. Intraoperative findings and demographic data were collected for analysis.

Results: A total 871 patients, with 1,431 RLNs at risk was enrolled in this study. The RLN diameter is thinner in female (bil. $p < 0.001$), body height < 160 cm (bil. $p < 0.05$, Lt. $p = 0.008$; Rt. $p < 0.0001$) and BMI < 25 (bil. $p < 0.0001$). The RLN size is in direct proportion to age (bil. $p < 0.05$), body weight (bil. $p < 0.05$), height (Rt. $p < 0.001$, Lt. $p = 0.078$) and BMI (bil. $p < 0.05$).

Conclusion: The thinner RLN diameter do correlate with higher RLN palsy risk. Thinner and branched recurrent laryngeal nerves could be anticipated in female patients, body height < 160 cm, BMI < 25 , and age < 50 . Branched RLNs is also noted to have significantly thinner motor branches than the trunk of non-branched RLNs, which could explain higher historical rate of RLN injury in this subgroup.

42. Factors Associated with Extrathyroidal Extension in Papillary Thyroid Cancer

CY Kuo¹, SP Cheng², CL Liu³, JJ Lee⁴, MN Chien⁵, CH Leung⁶

¹⁻⁶MacKay Memorial Hospital and Mackay Medical College, Taiwan

Introduction: Extrathyroidal extension may not be accurately recognized during thyroidectomy and might increase the risk of recurrence. This study aimed to investigate preoperative factors that were associated with extrathyroidal extension.

Materials and methods: We analyzed 887 patients with papillary thyroid cancer who underwent surgical treatment from 2005 to 2017. Binary logistic regression analyzes were used to identify potential predictors.

Results: Minimal extrathyroidal extension was present in 233 (26%) patients and advanced extrathyroidal extension in 60 (7%). Age, body mass index (BMI), and tumor size were independent predictors of all or advanced extrathyroidal extension. Among 493 patients who had available BRAF mutation status, age [odds ratio (OR) = 1.025], BMI (OR = 1.091), tumor size (OR = 1.544), and BRAF V600E mutation (OR = 2.311) were independently associated with extrathyroidal extension.

Conclusion: Older age, higher BMI, larger tumor size, and the presence of BRAF mutation were predictive of extrathyroidal extension. These factors should be taken into consideration in surgical decision making.

43. Is a Chest-computed Tomography Necessary to Initiate Active Surveillance for Adult Patients with Low-risk Papillary Thyroid Microcarcinomas?

Shiori Kawano¹, Akira Miyauchi², Yasuhiro Ito³, Masatoshi Yamamoto⁴, Takahiro Sasaki⁵, Nobuaki Kanemura⁶, Tsutomu Sano⁷, Makoto Fujishima⁸, Hiroo Masuoka⁹, Takuya Higashiyama¹⁰, Minoru Kihara¹¹, Akihiro Miya¹²

^{1-4,8-12}Department of Surgery, Kuma Hospital, Kobe, Japan

⁵⁻⁷Department of Head and Neck Surgery, Kuma Hospital, Kobe, Japan

Background: For patients with low-risk papillary thyroid microcarcinoma (PTMC) without metastasis or extrathyroid extension, active surveillance is accepted as a first-line management in Japanese and American guidelines. Although the exclusion criteria include presence of distant metastasis, we usually do not take chest computed tomography (CT) for the candidates of active surveillance. However, we almost routinely took chest CT preoperatively for patients with thyroid cancer including PTMCs. The present study evaluated the necessity of chest CT for active surveillance candidates.

Materials and methods: The chest CTs taken preoperatively in consecutive 879 patients with cT1aNO PTMC who underwent surgery from January 2006 to August 2011 in our hospital were retrospectively reviewed. The patients were 89% women and 11% men, with the median age of 55 years. The median of the maximum size of PTMCs was 8 mm.

Results: Abnormal findings were detected in 277 patients (32%) of the patients, 36 patients (4%) were referred to specialized departments for the evaluation, and 7 patients (0.7%) received invasive tests and treatments. Although 3 patients (0.3%) benefited from the chest CT with detected lung cancer in 2 and cardiac lesion in 1, no distant metastasis of thyroid cancer was found.

Conclusion: Considering the disadvantages of routine chest CT such as detecting many irrelevant lesions without detecting metastasis of thyroid cancer as well as radiation exposure, it is suggested that whole body searches by imaging examinations may not be necessary for patients with cT1aNO PTMCs.

44. Comparison of Recurrent Laryngeal Nerve Identification Time using Intraoperative Nerve Mapping Technique During Thyroid Surgery

Eunhye Lee¹, Jin Yoon¹, Keunchul Lee¹, Hyeong W Yu¹, Su-Jin Kim⁵, Young J Chai⁶, June Y Choi⁷, Kyu E Lee⁸

^{1-4,7}Department of Surgery, Seoul National University Bundang Hospital, South Korea

^{5,8}Department of Surgery, Seoul National University Hospital, South Korea

⁶Department of Surgery, Seoul National University Boramae Medical Center, South Korea

Purpose/Introduction: Saving recurrent laryngeal nerve (RLN) is an important goal in thyroid surgery. Because RLN not always runs a routine path, no standardized surgical method has been established. Intraoperative nerve monitoring (IONM) aids identification and dissection of RLN. We defined a new anatomical definition that helps identifying RLN, and aimed an efficient use of IONM within it.

Materials and methods: Twenty patients, 31 RLNs, either total thyroidectomy or lobectomy, were reviewed retrospectively in Seoul National University Bundang Hospital from January to April 2017. Papillary thyroid carcinoma (PTC), follicular neoplasm, and Graves' disease were included. Patients under age 18, with right side non-RLN in arteriosclerosis, cancer invasion or vocal cord palsy were excluded. Lower central triangle (LCT) is an imaginary triangle consisting of lower pole as apex and common carotid artery as opposite side. The samples were in two groups: IONM and non-IONM.

Results: Thirty one patients in total: 18 were IONM group while 13 were non-IONM group. Groups were similar in ages, sex, the number of lobectomy and PTC, and nodule size. RLN detection time was 9.76 seconds shorter ($p = 0.00$) and confirmation time was 4.48 seconds shorter ($p = 0.07$) in IONM group than non-IONM group. Categorized by anatomical location of nerve in LCT, right RLN ($n = 15$) was located mostly on sections 1 and 2 (section 1: $n = 8$, 53%, section 2: $n = 5$, 30%) while left RLN ($n = 16$) was located mostly on section 1 ($n = 13$, 81%). No vocal cord palsy found either transient or permanent.

Conclusion: While IONM is an appropriate aid, our new approach using LCT may help identification of RLN in thyroid surgery (Fig. 1).

Fig. 1: The common carotid artery and the lower pole of thyroid gland form the lower central triangle, with the recurrent laryngeal nerve lying in the middle of the triangle

45. Long-term Survival More than 1 Year based on the Multimodal Treatment for Anaplastic Thyroid Cancer

Hyejoon Lee¹, Hee J Kim², Soo Y Kim³, Ho-Jin Chang⁴, Yong S Lee⁵, Cheong S Park⁶, Hang-Seok Chang⁷, Seok-Mo Kim⁸

¹⁻⁸Department of Surgery, Yonsei University College of Medicine, Gangnam Severance Hospital, Seoul, Korea

Background: Anaplastic thyroid carcinoma (ATC) is one of the most aggressive human malignancies with a mean survival time of 6 months regardless of treatment. The aim of this study is to present 23 series of ATC with long-term survival more than 1 year.

Materials and methods: This retrospective study used the single center database system of Gangnam Severance Hospital. The management and outcomes of 23 patients with a definitive histological diagnosis of ATC were reviewed.

Results: Long-term survivors were 11 men and 12 women, with mean age of 58 years. Nine patients had distant metastases at the diagnosis. Surgical debulking or complete resection of tumor were done in 19 patients, chemotherapy was done in 15 patients, radiation therapy was done in 18 patients and tyrosine kinase inhibitor was applied in 6 patients. Median survival was 1,090 days, and the 2- and 3-year survival rate was 59.7% and 35.8%, respectively. Ten patients were dead, 3 with local disease and 7 with distant metastasis.

Discussion and conclusion: Anaplastic thyroid cancer can be cured, and multimodality treatment including surgical resection, chemotherapy, radiotherapy and tyrosine kinase inhibitor can induce long-term survival more than 1 year.

46. How Does Stress Affect Thyroid Stimulating Hormone in the Patients Who Underwent Thyroidectomy?

J Lee¹, EY Soh²

^{1,2}Department of Surgery, Ajou University School of Medicine, Suwon, Korea

Introduction: For recent decades, there have been many studies on the relationship with thyroid dysfunction and mood disorder, anxiety, or stress, but the results have been inconsistent. Also, few studies have examined the effects of psychological disorder on thyroid function in patients who underwent thyroidectomy. In this study, we investigated the relationship between stress and thyroid dysfunction in such patients.

Materials and methods: Thirty-three patients were enrolled who underwent thyroidectomy from July 2007 to January 2016 and who experienced life events after thyroid surgery. The male to female ratio was 1:10 and the mean age was 48 years (min. 29, max. 72) at the time of surgery. The mean follow-up period was 49 months (min. 8, max. 93). Statistical analysis was performed using paired *t* test, McNemer test, and PROC Mixed with SAS 9.4.

Results: Eight patients (28.5%) had subclinical hypothyroidism and 14 patients (50%) had hypothyroidism above TSH > 10 µIU/mL. When the patients were under stress, free T4 decreased and TSH increased, even though each patient had taken the same dose of levothyroxine for more than 8 months (*p* < 0.001). When we performed PROC MIXED to investigate the effect of stress on TSH, adjusting the effect of free T4 on TSH, TSH increased significantly in the patients after stress (*p* < 0.001).

Conclusion: In the patients who underwent thyroidectomy, TSH increased after life events or stress, because of the loss or lack of the compensatory response of thyroid.

47. Factors to Affect Thyroid Stimulating Hormone in the Patients Who Underwent Thyroidectomy

Sunseok Yoon¹, Jeonghun Lee², Euy Y Soh³

¹⁻³Department of Surgery, Ajou University Hospital, Suwon, Korea

Introduction: Since the patients with thyroid cancer underwent thyroidectomy, thyroid stimulating hormone (TSH) concentration should be checked periodically to be maintained in the recommended ranges. For recent decades, there have been many studies on the relationship with TSH and mood disorder or stress in normal population. In this study, we investigated the relationship between stress and TSH and factors related with TSH in the patients who underwent thyroidectomy.

Materials and methods: A prospective cross-sectional study was performed and one hundred thirty-eight patients were enrolled who visited from June to October 2019. To evaluate the severity of stress, we used three validated questionnaire including short stress overload scale (SOS-S), Korean version of daily stress inventory (K-DSI), and Holmes and Rahe stress life inventory (HRSI). The male to female ratio was about 1:4 and the mean age was 46.7 years at the time of laboratory test.

Results: Any stress scale of questionnaires was not related with the level of TSH (*p* > 0.148) in the patients who underwent thyroidectomy. The types of treatment such as the extent of thyroidectomy and radioactive iodine therapy were not important statistically concerning relationship with TSH. Body mass index (BMI) was not related with TSH. However, in young patients the level of TSH was high (*p* = 0.035) and free T4 was negatively related with TSH as known well (*p* < 0.001).

Conclusion: In present cross-sectional study, stress did not affect the level of TSH in patients who underwent thyroidectomy, but age was an important factor to affect TSH except free T4. However, there was limitations of small number of enrolled patients and methodology of management of unmeasured confounders.

Keywords: Stress, Thyroid, Thyroid stimulating hormone.

48. MicroRNA-421 Targets ROCK1 to Inhibit Papillary Thyroid Carcinoma Progression

Rui Li

Changchun, China

MicroRNA-421 (miR-421) was reported to be involved in development and progression of multiple cancers. However, the functional roles and underlying regulatory mechanism of miR-421 in papillary thyroid carcinoma (PTC) are yet to be unraveled. Here, decreased miR-421 levels are reported in PTC tissues and cell lines when compared to adjacent normal tissues and control cells, respectively. Significantly, decreased miR-421 was closely associated with TNM stage and lymph node metastasis of PTC patients. Gain of functional assays pointed out that overexpression of miR-421 in PTC cells suppressed proliferation, migration and invasion, and promoted cell apoptosis. Moreover, rho-associated coiled-coil kinase 1 (ROCK1), a known oncogene, was identified as a direct target of miR-421 in PTC. Rho-associated coiled-coil kinase 1 expression was increased in PTC tissues, and its expression was negative correlated with miR-421 expression. Moreover, ROCK1 overexpression partially attenuated the inhibitory effect in PTC cells mediated by miR-421 overexpression. These results suggest that miR-421 inhibits PTC progression by functioning as a tumor suppressor through targeting ROCK1.

Keywords: Invasion, miR-421, Papillary thyroid carcinoma, Proliferation, ROCK1.

49. Knockdown of lncRNAUCA1 Inhibits Proliferation and Invasion of Papillary Thyroid Carcinoma through Regulating miR-204/IGFBP5 Axis

Rui Li

Changchun, China

Background: Long noncoding RNA (lncRNA) UCA1 has been reported to function as an oncogene in multiple cancers. However, the biological roles and underlying mechanism of UCA1 in papillary thyroid carcinoma (PTC) remain unclear. This study aimed to investigate the underlying function of UCA1 on thyroid cancer progression.

Materials and methods: A series of experiments involving cell counting kit-8, woundhealing, and transwell invasion assays were conducted to determine the cellular capabilities of proliferation, migration, and invasion, respectively. Binding sites between UCA1 and miR-204 were identified using a luciferase reporter system, whereas mRNA and protein expression of target genes were determined by real-time quantitative reverse transcription-PCR (qRT-PCR) and western blot, respectively.

Results: The results revealed that UCA1 was upregulated in PTC tissue and cell lines. UCA1 knockdown significantly suppressed the cell proliferation, migration, and invasion of TPC-1 cells. Bioinformatics analysis and luciferase reporter assay verified the complementary binding within UCA1 and miR-204 at the 3'-UTR. Moreover, miR-204 inhibition reversed the UCA1 knockdown-mediated inhibitory effect on cell proliferation, migration, and invasion. We also found that UCA1 could regulate expression of IGFBP5, a direct target of miR-204 in PTC.

Conclusion: Our study demonstrated that UCA1 exerts activity of oncogenes in PTC through regulating miR-204/IGFBP5 axis.

Keywords: IGFBP5, lncRNA, miR-204, Papillary thyroid carcinoma, UCA1.

50. The Challenging Diagnosis of Hurthle Cell Neoplasms: Sonographic Features and Immunohistological Characteristics

Sanders H Lin¹, SL Peng², CY Wang³, SM Huang⁴

¹Department of Family Medicine, Taipei Medical University Hospital, Taipei, Taiwan

^{2,3}Department of Surgery, National Cheng Kung University Hospital, Tainan, Taiwan

⁴Department of Surgery, National Cheng Kung University Hospital, Tainan, Taiwan; Department of Surgery, Chang Bing Show Chwan Memorial Hospital, Changhua, Taiwan

Purpose/Introduction: The purpose of this study was to identify the sonographic features that would facilitate the differentiation of Hurthle cell carcinoma from Hurthle cell adenoma.

Materials and methods: Retrospective analysis of the sonographic appearance of 38 histologically proven Hurthle cell neoplasms in 38 patients aged 18–90 years was done. Twenty nine patients had Hurthle cell carcinoma and 9 patients had Hurthle cell adenoma. Features on sonography we reviewed included the size and echogenicity of the tumors, the presence of cystic areas or calcifications, and detectable blood flow on color Doppler imaging. GRIM-19 (NDUFA13) immunohistochemical staining was performed in 2 patients with extensive necrosis and 12 control patients without (Figs 1 to 4).

Results: The tumors ranged from 0.9 to 6.8 cm in diameter. Five (13%) of the 38 Hurthle cell neoplasms were homogeneously hypoechoic. Twenty five tumors (65%) were predominantly isoechoic with hypoechoic areas to thyroid parenchyma. Seven tumors (18%) were predominantly isoechoic. Twenty seven (71%) neoplasms contained cystic components, but only 7 tumors has cystic area more than 80% of tumor cross section area, which we define as extensive necrosis. Four (44%) of Hurthle cell carcinomas had extensive necrosis, whereas only 3 (10%) of Hurthle cell adenomas contain extensive necrosis (odds ratio 0.144, *p* value 0.041) (Table S1).

Conclusion: Hurthle cell neoplasms show a spectrum of sonographic appearances which was not significantly correlated with age nor size. We also observed greater tendency for Hurthle cell carcinoma to undergo extensive necrosis. Viable lesional cells are often not found in these lesions causing challenging diagnosis with fine needle aspiration, and require surgical removal of the entire lesion.

Table S1: Summary of patient data, sonography appearance, and pathologic findings

<i>Doppler flow</i>							
<i>Patients</i>	<i>Age/sex</i>	<i>Size (cm)</i>	<i>Echogenicity</i>	<i>Central</i>	<i>Peripheral</i>	<i>Classifications</i>	<i>Cystic/necrotic area</i>
1	18/F	2.6	Isoechoic	Not available	Not available	Yes	0.0
2	57/M	0.9	Hypoechoic	Not available	Not available	No	0.9
3	71/F	2.5	Hypoechoic	Not available	Not available	No	0.95
4	60/F	3.0	Hypoechoic	No	No	No	1.0
5	60/M	3.0	Mixed	No	No	Yes	0.0
6	60/F	2.4	Mixed	Not available	Not available	Yes	1.0
7	62/F	2.0	Mixed	Not available	Not available	Yes	0.1
8	51/F	3.0	Mixed	Yes	Yes	No	0.1
9	57/M	6.8	Mixed	No	No	No	0.3
10	54/F	4.0	Mixed	Not available	Not available	No	0.9
11	39/F	5.1	Mixed	Not available	Not available	Yes	0.5
12	49/F	2.2	Mixed	Not available	Not available	No	0.1
13	44/F	2.6	Mixed	Not available	Not available	Yes	0.1
14	52/F	3.5	Isoechoic	Yes	Yes	No	0.0
15	47/F	2.7	Isoechoic	Yes	No	Yes	0.0
16	81/F	4.1	Mixed	Yes	Yes	Yes	0.1
17	31/F	2.6	Mixed	Not available	Not available	No	0.2
18	73/M	5.3	Mixed	Not available	Not available	No	0.5
19	57/F	2.7	Mixed	Yes	No	No	0.2
20	40/F	1.4	Hypoechoic	Not available	Not available	No	0.9
21	36/F	4.2	Mixed	No	Yes	No	0.1
22	53/F	5.3	Mixed	Not available	Not available	Yes	0.7
23	36/M	0.9	Hypoechoic	Yes	Yes	No	0.0
24	62/F	2.3	Mixed	Not available	Not available	Yes	0.4
25	24/F	3.2	Mixed	Yes	Yes	Yes	0.3
26	40/M	3.8	Mixed	Not available	Not available	No	0.1
27	62/F	1.6	isoechoic	No	Yes	No	0.0
28	62/M	1.5	Mixed	No	No	No	0.0
29	60/F	3.0	Mixed	Not available	Not available	No	1.0
30	47/F	3.1	Mixed	No	No	No	0.4
31	53/F	4.0	Mixed	Not available	Not available	No	0.1
32	38/F	1.6	Isoechoic	Not available	Not available	Yes	0.0
33	38/F	3.9	Mixed	Not available	Not available	No	0.2
34	66/M	2.1	Isoechoic	No	Yes	No	0.0
35	59/F	2.8	Mixed	Not available	Not available	No	0.4
36	53/F	0.9	Isoechoic	Not available	Not available	Yes	0.0
37	45/M	4.4	Mixed	Not available	Not available	No	0.4
38	34/M	4.5	Isoechoic	Yes	No	No	0.0

Fig. 1: Color doppler imaging

Fig. 2: There was no evidence of capsular or vacuolar invasion

Fig. 3: Isoechoic mas containing hypoechoic areas

Fig. 4: Higher:rate extensive necrosis in Hurthle cell carcinoma when compared with Hurthle cell U adenoma

51. Gestational Primary Hyperparathyroidism: What is the Best Timing for Parathyroidectomy

SY Liu¹, X Lo², EK Ng³

¹⁻³Department of Surgery, Division of Endocrine Surgery, Prince of Wales Hospital, Chinese University of Hong Kong, Hong Kong

Purpose/Introduction: Gestational primary hyperparathyroidism (PHPT) is a rare condition requiring prompt parathyroidectomy to eliminate the life-threatening risks on the expecting mothers and their fetuses. Any surgery during antenatal period is similarly unsafe for the abortion risks. This study aims to evaluate the treatment outcomes of perinatal parathyroidectomy at different gestational age for PHPT.

Materials and methods: This was a retrospective cohort study of consecutive females who had PHPT diagnosed during pregnancy and underwent perinatal parathyroidectomy between 2013 and 2018 in a tertiary center. The rates of adverse maternal and neonatal outcomes at different timings of parathyroidectomy were analyzed.

Results: Six patients (range 24–38 years) had PHPT diagnosed during pregnancy (antenatal group, $n = 3$) and immediately upon delivery (postnatal group, $n = 3$). All three patients in antenatal group received bilateral neck exploration in the second trimester (20, 27 and 31 gestational weeks) after failing localization by ultrasonography and being contraindicated for other imaging. None of them developed postoperative or perinatal complications and had uneventful delivery at full term. There was no neonatal hypocalcemia or complications. For the postnatal group, all three patients received focused parathyroidectomy after successful imaging localization. Before parathyroidectomy, one patient developed hypercalcemic crisis (33.3%) and two patients had preeclampsia (66.6%) and pre-term delivery (66.6%). Severe neonatal hypocalcemia and tetany occurred in one baby (33.3%).

Conclusion: Routine antenatal calcium screening is recommended to prevent undesirable maternal and neonatal outcomes. Once gestational PHPT is confirmed, bilateral neck exploration in the second trimester is the best option for the mother and the baby.

52. The Stratification of Response to Therapy Depending on the Area Percentage of Central Lymph Node Metastatic Lesions in Papillary Thyroid Carcinoma

LiuHong Shi¹, Lei Xie²

^{1,2}Sir Run Run Shaw Hospital, College of Medicine, Zhejiang University Hangzhou, Zhejiang Province, China

Purpose/Introduction: Lymph node metastases have been strongly associated with local recurrence, especially in papillary thyroid carcinoma (PTC) patients with the area percentage of central lymph node metastatic lesions (CLNm%) $\geq 75\%$. Response to therapy focuses on an individualized risk-adapted approach to the postoperative management of PTC, which is a dynamic risk stratification adopted by the American Thyroid Association (ATA). The purpose of our study was to examine the relation between the CLNm% in PTC and ATA response-to-therapy categories, dividing PTC pN1 patients into low- and high-risk groups, and to make different therapeutic strategies, respectively.

Materials and methods: In total 355 PTC patients underwent thyroidectomy with central lymph node dissection were identified as eligible for the study. We brought forward a new concept of CLNm%, which was defined as the area ratio between the metastatic lesions and the total lymph node area on the cross section roughly. We divided CLNm% into 2 groups: $\leq 75\%$ and $>75\%$.

Results: To our study, CLNm% $>75\%$ exhibited worse clinicopathologic characteristics and a poorer prognosis. Besides, CLT, large CmlN and CLNm% $>75\%$ were independent risk factors for no-excellent of ATA response-to-therapy categories. The rate of excellent category was higher in pN1 patients with CLNm% $\leq 75\%$ (108/144, 75.0%) than patients with CLNm% $>75\%$ (27/47, 57.4%), with statistically significant difference ($p = 0.022$), but there was no difference ($p = 0.247$) between CLNm% $\leq 75\%$ and pN0 (132/164, 80.5%).

Conclusion: It is therefore suggested that PTC patients with CLNm% $>75\%$ should be regarded as high-risk. Clinicians should consider the possibility of recurrence, the decisions about the application of RAI ablation and postoperative close follow-up.

53. Pregnancy and Neonatal Outcome in Malaysian Women with Differentiated Thyroid Carcinoma

SS Mahamad¹, YL Tan², S Abdul Rahman³

¹⁻³Breast and Endocrine Surgery Unit, Hospital Putrajaya, Malaysia

Introduction: Pregnancy occurrence for women in reproductive age group with differentiated thyroid carcinoma (DTC) was reported to be lower than norm. Apart from the suppressed gonadal function, there is a preconceived opinion towards radioiodine ablation (RAI) induced teratogenic effects resulting to this event. We report the occurrence of pregnancy and its neonatal outcome in a subset of women posttreatment of total thyroidectomies and radioiodine ablation, managed in Malaysia National Endocrine Centre, Hospital Putrajaya.

Materials and methods: Data were retrieved from patients' electronic medical records between year 2016 and 2018. We analyzed a total number of 182 thyroidectomies performed for females of child bearing age (between ages 18 and 45). Out of 16 patients, five patients were pregnant at the time of diagnosis made whereas eleven patients were pregnant following bilateral thyroidectomies and radioiodine ablation. We analyzed and report the second subset of patients' demographics, the pregnancies interval from thyroidectomies and radioiodine ablation, the observed neonatal outcomes.

Results: The mean age of patients was 30-year-old. The mean interval from surgical treatment and from last radioiodine ablation to pregnancies was 24 months and 28 months, respectively. Range of RAI dose were between 100 and 240 μCi . One out of eleven patients had preterm delivery at 36 weeks. Mean fetal weight was 3.46 kg. All mothers were continued on suppressive L-thyroxine replacement throughout pregnancy. There were no birth defects seen; but one neonate had subclinical hypothyroidism diagnosed at day-17 of life.

Conclusion: Both pregnancy and fetal outcome were unaffected in our patients with DTC following treatment of total thyroidectomy and RAI.

54. Predictors of Lymph Node Metastasis in Multifocal Papillary Thyroid Cancer with Concomitant Hashimoto's Thyroiditis

Mehak Mahipal¹, Samantha P Yang², Tan W Boon³, Ngiam K Yuan⁴, Lim C Ming⁵, Thomas Loh⁶, Rajeev Parameswaran⁷

^{1,3,4,7}Department of Endocrine Surgery, National University Hospital, Singapore

²Department of Endocrinology, National University Hospital, Singapore

^{5,6}Department of Head and Neck Surgery, National University Hospital, Singapore

Purpose: The aim of this study was to evaluate the risk factors for nodal metastasis in patients with multifocal papillary thyroid cancer (PTC) and coexisting Hashimoto's thyroiditis (HT).

Materials and methods: This is a retrospective cohort study of 540 patients with PTC who underwent a total thyroidectomy (TT) during the period 2000–2017 at a tertiary referral hospital. Patients with multifocal disease, with presence or absence of Hashimoto's thyroiditis, were studied against various clinicopathological parameters.

Results: During the study period, 212 (146F:66M) patients with a mean age of 47.94 ± 16.24 years were diagnosed with multifocal papillary thyroid cancer. Lymph node metastases (LNM) were identified in 22 of 57 (39%) patients with multifocal PTC and HT vs 79/155 (51%) patients with a multifocal PTC and no HT ($p = 0.10$). Multifocal disease was identified as an independent risk factor for LNM (odds ratio, 1.85; 95% confidence interval, 1.30–2.64; $p = 0.001$), local recurrence ($p = 0.006$) and mortality (0.01). However, presence of thyroiditis in multifocal PTC was not associated with any increased risk of nodal metastasis, recurrence or mortality.

Conclusion: The presence of thyroiditis does not confer an added risk of nodal metastasis, recurrence or death in multifocal PTC, unlike other published studies.

55. Surgeon-performed Ultrasound for Preoperative Localization in Renal Hyperparathyroidism Patients

Noor E Mahno¹, Sharun NA Suhaimi², Lai J Hai³, Nani H Md Latar⁴, Rohaizak Muhammad⁵

^{1–5}University Kebangsaan Malaysia Medical Centre, Malaysia

Purpose/Introduction: Parathyroid surgery for renal hyperparathyroidism (RHPT) is indicated when patients have a progressive disease despite optimal medical therapy. An ectopic or an extranumerary parathyroid gland (PTG) is an obstacle to a successful total parathyroidectomy. Recently, surgeon-performed ultrasound (SPU) has been increasingly used for the preoperative localization of PTGs. Thus, we conducted a prospective observational single-center study to determine the accuracy of SPU for PTG localization in RHPT and the factors affecting its accuracy.

Materials and methods: This is a prospective, observational, single-center study conducted in University Kebangsaan Malaysia Medical Centre between March 2018 and March 2019. The patients' preoperative demography, clinical data, and relevant blood laboratory results, including calcium, phosphate, alkaline phosphatase, and intact parathyroid hormone, were recorded. Preoperative USG and surgery were performed by the same endocrine surgery consultant.

Results: Surgeon-performed ultrasound localization had an overall accuracy of 78.1%, sensitivity of 81.0%, and specificity of 30.0% with a positive predictive value of 94.8% and a negative predictive value of 10.5%. The SPU gland localization rate was significantly higher in patients without goiter (median = 0.88, IQR = 0.63–1.00) than in those with goiter (median = 0.50, IQR = 0.25–0.75) ($p = 0.028$).

Conclusion: Surgeon-performed ultrasound localization of the PTG in RHPT had an accuracy comparable with that in previous literature with the additional advantage of identifying concurrent unknown thyroid nodules. Considering the high prevalence of concomitant nodular thyroid disease in our RHPT population, we advocate the routine use of preoperative neck ultrasound for RHPT patients undergoing parathyroid surgery.

56. Preoperative of Parathyroid Adenoma Localization

A Matsuishi¹, M Iwate², K Shio³, Y Matsumoto⁴, S Hasegawa⁵, SA Suzuki⁶, H Mizunuma⁷, K Nakano⁸, SI Suzuki⁹

^{1–9}Department of Thyroid and Endocrinology, Fukushima Medical University, Fukushima, Japan

Introduction: Minimally invasive parathyroidectomy has become increasingly common for treatment of primary hyperparathyroidism. However, an increasing number of patients with primary hyperparathyroidism are found to have two or three enlarged parathyroid glands. Accurate localization of parathyroid adenomas is of critical importance in surgical planning for minimally invasive parathyroidectomy.

Materials and methods: One hundred and fifty five patients who underwent parathyroidectomy for primary hyperparathyroidism from 2010 to 2019 in the Fukushima Medical University. Multiple endocrine neoplasia type 1 (MEN1) cases were excluded. Sensitivity and specificity of ultrasonography (US), technetium-99 m sestamibi (MIBI) scan and CT scan were calculated for diagnostic precision and compared.

Results: Ultrasonography images detected enlarged parathyroid glands in 149 of 155 patients (96.1%) with sensitivity of 96.1% and positive predictive value (PPV) of 86.7%. Technetium-99 m sestamibi scan detected adenoma in 134 patients (86.5%) with sensitivity of 86.5% and PPV of 88.8%. CT scan detected adenoma in 126 patients (81.3%) with sensitivity of 81.3% and PPV of 88.9%.

Conclusion: Ultrasonography as an accurate method for localization of enlarged parathyroid glands in primary hyperparathyroidism, is comparable in overall utility with MIBI or CT scan. Using of methylene blue dye, radioguided parathyroidectomy, autofluorescence methods and measurement of circulating parathyroid hormone (PTH) can be to reduce the risk of unsuccessful surgery.

57. Inflammatory Myofibroblastic Tumor of the Adrenal Gland

Y Matsumoto¹, K Shio², S Hasegawa³, SA Suzuki⁴, K Nakano⁵, M Iwate⁶, H Mizumuma⁷, SI Suzuki⁸

^{1–8}Department of Thyroid and Endocrinology, Fukushima Medical University, Japan

Introduction: Inflammatory myofibroblastic tumor (IMT) is defined as an intermediate malignant tumor characterized by proliferation of myofibroblasts and infiltration of inflammatory cells such as lymphocytes, plasma cells, and eosinophils. Primary IMT of the adrenal glands are very rare, and there are only six cases reported until now.

Materials and methods: From 2009 to 2018, 136 of patients who underwent adrenalectomy for adrenal tumor at Fukushima Medical University. We had 17 cases (12.5%) of non-functional adrenal tumor.

Results: We present an interesting case of IMT of adrenal gland. A 47-year-old woman pointed out anemia at a medical checkup. Abdominal CT showed a solid tumor about 12 cm near the right adrenal gland. There was no cushing symptom in the physical finding, no abnormality in the basic

values of the function of the adrenal gland, and no abnormality urinary catecholamine level in 24-hour urine collection. MIBG scintigraphy showed no accumulation in the tumor. Suppression was observed in the 1 mg dexamethasone suppression test. It was a non-functional adrenal tumor, but the diameter was big and a malignant adrenal tumor could not be ruled out. It did not infiltrate surrounding tissue such as the inferior vena cava and could be removed without damaging the capsule. Pathological findings revealed spindle to oval shaped cells. Lymphocytes infiltrated, CD10 positive, SMA partially positive. The diagnosis was IMT of the adrenal gland.

Conclusion: Primary IMT of the adrenal glands are very rare. If an adrenal tumor is difficult to diagnose, the possibility of IMT should be considered.

58. Analytic Study on Behavior of Trainees towards Young Faculty during HT/TT

Sabaretnam Mayilvaganan¹, PRK Bharghav², C Aromal³, B Sapana⁴, Vnssvams Mahalakshmi⁵, Amit Agarwal⁶

¹⁻⁶Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

Purpose/Introduction: Formal surgical training involves the consultant scrubbing and assisting the trainees to perform surgical procedures. The younger faculty majority of them in their initial stages of career do not enjoy the privileges of professors yet have to balance their academic and surgical training and also maintain the discipline of surgical training most of the senior professors. We aimed to study the analysis of behavior of senior residents on advice of a young faculty during procedures of hemi or total thyroidectomy.

Materials and methods: It is a prospective study in a tertiary referral center where a young faculty after his formal training in superspeciality of endocrine surgery and 2-year of posttraining experience in one another Department of Endocrine Surgery was recruited and he scrubbed assisted the trainees the trainee was rated complaint based on compliance score. Residents were termed efficient or non-efficient based on efficiency score.

Results: Out of total 100 surgeries, 40% and 60% were HT and TT performed by trainee residents with maximum were males (57%). Eighty four percent residents were complaint while 81% identified as efficient. Seventy three percent residents were both complaint and efficient, 8% were both non-complaint and non-efficient, 8% were non complaint and efficient. There was significant association between compliance and efficiency (p value = 0.002) but insignificant association with gender (male: 87.7% vs female: 79.1%, p = 0.243).

Conclusion: Majority of trainees in superspeciality training are complaint and efficient when dealing with surgical procedures involving young faculty as trainer. However in this study when they reach their 3rd year of training compliance decreased and efficient behavior increased for certain residents. Training system should involve adequate protection for junior faculty involved in training and research and should include objective assessment in training rather than formal written and practical examination where junior faculty has minimal role (Tables 1 and 2).

Table 1: Compliance score

S. no.	Parameter	Score
1	Counselling of patients	
2	Reading about procedure	
3	Consent	
4	Coordination with anesthesia SR and scrub nurse	
5	Time out	
6	Antibiotic prophylaxis	
7	Peers	
8	Postoperative care	
9	Punctuality	
10	Ethical behavior	

>4 indicates compliance efficiency

Table 2:

S. no.	Parameter	Score
1	Wound related complications	
2	Hemorrhage	
3	Drain more than 100 mL	
4	Seroma	
5	Hoarseness of voice	
6	IOPH <1 pg/mL (TT)	
7	Serum calcium <8.0 mg/dL (TT)	
8	Symptoms of severe hypocalcemia (TT)	

>1 indicates non efficient

59. Intraoperative Enoxaparin for Total Thyroidectomy

Bishoy Mekaeil

The Prince Charles Hospital, Queensland, Australia

Introduction: The decision for intraoperative chemical prophylaxis for deep vein thrombosis (DVT) is directed by individual surgeons according to personal preference and experience. Thyroid surgery has characteristically been conservative and anti-coagulation is ordinarily a relative contraindication for such high risk surgery. This is a review to establish if intraoperative DVT chemical prophylaxis results in adverse outcomes.

Materials and methods: A retrospective review between January 2011 and September 2019 of total thyroidectomies was conducted at The Prince Charles Hospital. Intraoperative use of enoxaparin at time of induction was confirmed through anesthetic records. An adverse outcome was determined as a return to theater for management of postoperative hemorrhage.

Results: One hundred and twenty six patients met criteria, their mean age of 54.6 years (28–80) and male:female was 1:2.7. Indication for surgery identified as: 53% multi-nodular goitre, 20% malignancy, 16% Graves' disease and 11% thyrotoxicosis. Three cases (2.3%) had an adverse outcome requiring return to theater for hemorrhage.

Discussion: Chemical DVT prophylaxis in high risk surgery such as thyroidectomy is frequently avoided due to the theoretical increased risk of hemorrhagic complications. The quoted risk for hemorrhage in total thyroidectomies is 1–2%. This evaluation suggests the use of enoxaparin intraoperatively in total thyroidectomies does not result in an increased incidence of an acute postoperative hemorrhage. Perioperative chemical DVT prophylaxis should be considered for patients undergoing total thyroidectomy.

60. Non Differentiated Thyroid Carcinoma: How Far Should We Go?

N Mohamed Zanyuin¹, Sadhana Mahamad², MS Baharudin³, K Subramaniam⁴, NA Sulaiman⁵, Navarasi SR Gopal⁶, A Baghawi⁷, NH Abdullah⁸

^{1–8}Department of Surgery, Breast and Endocrine Unit, Hospital Putrajaya, Malaysia

Purpose/Introduction: To describe and evaluate 10-years clinical experience in managing non differentiated thyroid carcinoma (NDTC) in Putrajaya Hospital as one of center for breast and endocrine cases in Malaysia.

Materials and methods: This is a retrospective descriptive analysis of NDTC from 2008 to 2019. All records are traced using hospital patient informations system and diagnosis are pathologically confirmed.

Results: Fifty nine patients are diagnosed with NDTC. Table 1 summarized patient/tumor and treatment characteristics.

Conclusion: Non differentiated thyroid carcinoma is relatively uncommon and aggressive tumor with high mortality rate. The study described single center experience in managing NDTC and attempt evaluate prognostic and survival.

Table 1: Patient/tumor/treatment characteristic

	<i>Freq. (%)</i>	<i>Mean (SD)</i>	<i>Median (IQR)</i>
Age			
<45 years	7 (11.9)		
>45 years	52 (88.1)		
Sex			
Male	21 (35.6)		
Female	38 (64.4)		
Comorbid			
Nil	24 (40.7)		
Single comorbid	10 (16.9)		
2 or more comorbid	12 (20.3)		
Previous history of thyroid surgery	10 (16.9)		
Unknown	3 (5.1)		
Clinical presentation			
Anterior neck swelling	39 (66.1)		
Dysphagia	6 (10.2)		
Shortness of breath	6 (10.2)		
Sternal mass	1 (1.7)		
Unknown	7 (11.9)		
Duration of symptoms (months) ^a	6 (37)		

Contd...

Contd...

Hoarseness of voice		
Yes	30 (50.8)	
No	21 (35.6)	
Unknown	8 (13.6)	
Preoperative vocal cord assessment		
Normal	18 (30.5)	
Bilateral palsy	3 (5.1)	
Unilateral palsy	13 (22)	
Unknown	25 (42.4)	
Metastasis status		
Absent	11 (18.6)	
At diagnosis	32 (54.2)	
During follow-up	10 (16.9)	
Unknown	6 (10.2)	
Operation performed		
Yes	38 (64.4)	
No	17 (28.8)	
Unknown	4 (6.8)	
Types of operation performed		
Total thyroidectomy/secondary thyroidectomy	15 (25.4)	
Tumor debulking	17 (28.8)	
Tracheostomy/gastrostomy	3 (5.1)	
Hemithyroidectomy followed with completion	3 (5.1)	
Unknown	21 (35.6)	
Neck dissections		
Yes	14 (23.7)	
No	45 (76.3)	
Type of neck dissection unilateral	12 (20.4)	
Bilateral	2 (3.4)	
No	45 (76.5)	
Gross residual disease yes	20 (33.9)	
No	12 (22)	
Unknown	26 (44.1)	
Gross extension to structures esophagus	7 (11.9)	
Major vessels	9 (15.3)	
RLN	1 (1.7)	
Trachea	6 (10.2)	
Neck muscles	4 (6.8)	
Unknown/no	32 (54.3)	
Pathological tumor size <4 cm	5 (8.5)	
>4 cm	22 (37.3)	
Unknown	32 (54.2)	
Pathological lymph nodes staging N1a	4 (6.8)	
N1b	9 (15.3)	
Nx	22 (37.3)	
Unknown	23 (39)	
Duration of survival (months) ^a		2 (17.5)
Survival status alive	10 (16.9)	
Deceased	39 (66.1)	
Defaulted	10 (16.9)	

Contd...

Contd...

Adjuvant therapy RAI	16 (27.1)	
Radiotherapy	8 (13.6)	
Chemotherapy	1 (1.7)	
No	34 (57.7)	
Cumulative dose RAI		282.2 (131.4)

SD, standard deviation; IQR, interquartile range; Freq, frequency

^aThe distribution is skewed to the left

61. Delta Calcium as a Reliable Predictor of Early Postthyroidectomy Hypocalcemia for Early Safe Discharge

Ayman S Nabawi¹, Hatem F Al-Wa Gih², Waleed AH Abo ElWa fa³, Mohamed H Fayad⁴¹⁻⁴Head, Neck and Endocrine Surgery Unit (HNESU), Faculty of Medicine, University of Alexandria, Egypt

Background: Hypocalcemia is the most common complication after total thyroidectomy, it usually manifests itself (24–72 hours) postoperatively, which hinders early safe postoperative discharge. The aim of this study was to assess sensitivity and specificity of delta calcium (Ca = preoperative Ca – postoperative Ca at a specific time) in early prediction of postthyroidectomy hypocalcemia.

Materials and methods: The study included 116 patients who were subjected to total or completion thyroidectomy. Postoperative corrected serum calcium levels were measured at 6, 20 and 48 hours, hypocalcemia was defined as Ca level below 8.4 mg/dL at any time point and/or patient experiencing symptoms of hypocalcemia. For patients with low levels of postoperative corrected serum calcium, serum phosphorous (P), parathormone (PTH) and vitamin D levels were measured. Postoperative Ca supplementation was never given before 20 hours assay. Ca levels and their differences between time points were compared. All hypocalcemic patients were followed up at one and 6 months postoperatively.

Results: Twenty six patients (22.4%) developed postoperative hypocalcemia, 20 patients of them (17.24%) with transient hypocalcemia and 6 patients (5.17%) with permanent hypocalcemia. The number of patients with Ca levels <8.4 mg/dL at 20 hours and 48 hours were more than at 6 hours ($p < 0.001$). The Ca20 (preoperative—20 hours postoperative) had the best area under the ROC curve (AUC = 0.87), and L1Ca20 (>0.5) was significantly more frequent in cases of hypocalcemia ($p < 0.001$) with 80.77% sensitivity and 77.78% specificity. In this study the Ca6 (preoperative—6 hours postoperative) was significant if L1Ca6 (>0.3) with (AUC = 0.82) and ($p < 0.001$) with 92.3% sensitivity and 63.3% specificity.

Conclusion: Postthyroidectomy hypocalcaemia commonly always occurs when L1Ca20 (preoperative—20 hours) > (0.5). However, 11 Ca6 (preoperative—6 hours) > (0.3) has a higher sensitivity with lower specificity compared to 20 hours one. The Ca enabled us for early detection of patients with postthyroidectomy hypocalcemia, and it can be a useful and cost-effective tool for early, safe discharge without routinely prophylactic calcium and vitamin D supplementation or PTH assay.

Keywords: Delta calcium, Hypocalcaemia, Thyroidectomy.

62. Level I Lymph Node Involvement in Patients with N1b Papillary Thyroid Carcinoma: A Prospective Study

A Nabawi

Alexandria University School of Medicine, Egypt

Purpose/Introduction: Most of the studies on the incidence, pattern, and predictive factors of lymph node (LN) metastasis with papillary thyroid carcinoma (PTC) have been performed retrospectively and no common consensus has been reached regarding the predictors for the involvement of level I LNs. This study was conducted prospectively to determine the incidence and the possible predictors of level I involvement in N1b PTC patients.

Materials and methods: All the patients underwent neck dissection (ND) including level I. The relation between involvement of level I LNs and various clinicopathological variables was studied. Unilateral neck dissection was performed in 24 patients and bilateral neck dissection in six patients leading to 36 NDs.

Results: Level I was excised in all patients, with five specimens (14%) positive for metastasis. Levels II, III, IV, V, VI, and VII were positive in 52.8, 58.3, 58.3, 33.3, 63, and 22.2%, respectively. Level I involvement was significantly related to the number of lymph node levels affected ($p = 0.003$) and macroscopic extranodal invasion ($p = 0.04$). It was not related to the involvement of other individual levels, gender, age, size of the largest thyroid nodule, size of the largest LN involved, or histo-pathological variant of the tumor.

Conclusion: This study suggests that including level I in therapeutic neck dissection for N1b PTC patients might be recommended in selected cases of multiple level involvement and macroscopic extranodal invasion requiring sacrifice of internal jugular vein, spinal accessory nerve, or sternomastoid muscle.

63. Therapeutic Effect of Dexamethasone for Graves Disease with Hyperthyroidism

Masahide Nakano¹, Nobuhiro Fukunari²

^{1,2}Showa University Northern Yokohama Hospital, Thyroid Center, Japan

Purpose/Introduction: Administering steroid is considered effective for hyperthyroidism with Graves disease. However, there are still many unclear points with appropriate use of steroid. We evaluated the outcome of dosage and dosing period of steroid for improving thyroid function and will report our method of using steroid before surgical treatment for uncontrolled Graves disease.

Materials and methods: The subject of the present study are 23 patients of Graves disease, who treated by steroid before surgery between April 2009 and May 2018. We used dexamethasone, and it was adjusted every 3 or 4 days until free T3 (FT3) decreased under 5 pg/mL. During treated with dexamethasone, the dose of anti-thyroid drugs and potassium iodide were not changed.

Results: In the patients who administered dexamethasone 8 mg/day, 6 mg/day, 4 mg/day, 2 mg/day, FT3 was decreased 9.4%, 8.3%, 5.6%, 6.8% compared with previous day. The average dose of dexamethasone was 5.04 mg/day and the average period from start using dexamethasone to surgery was 11.1 days. None of the cases had complication from surgery and side effect of dexamethasone. Even though the pre-treatment FT3 value or combined drugs, high dose dexamethasone was able to decrease FT3 value. However there were no difference between 2 mg and 4 mg. In the case of the same dexamethasone dose, the therapeutic effect was higher in the case of high pre-treatment FT3 value.

Conclusion: The results of this study show that FT3 decreased by dexamethasone in a short time without complication. We conclude that this treatment should be tried for adequate cases.

64. Thyroid Cancer and Breast Cancer: Can One Lead to Another?

Narayana SGS Mahamad¹, Noh Ashraf²

^{1,2}Department of General Surgery, Hospital Putrajaya, Malaysia

Purpose/Introduction: Thyroid and breast cancers are two malignancies with highest prevalence in women. As one of the main referral centers for Breast and Endocrine Surgery in Malaysia, Hospital Putrajaya's Breast and Endocrine Surgery Unit have treated a few patients whom have developed both these malignancies synchronously or metachronously.

Materials and methods: We conducted a retrospective study of all our breast and thyroid cancer patients operated on from 2008 to 2018 (10 years). Inclusion criteria were female patients who were diagnosed first with primary thyroid cancer (T1)—papillary or follicular thyroid cancer who underwent total thyroidectomy (n:819) and female patients who were diagnosed first with primary breast cancer (B1) who underwent curative surgery (n:1512). These two groups were then compared to determine patients who developed a second primary cancer which was either defined as breast cancer (B2)—(n:4) and thyroid cancer (T2)—(n:6). The objective of this study was to compare the clinicopathological characteristic of both the subgroups of breast cancer (B1 and B2) and thyroid cancer (T1 and T2) in an attempt to identify common etiological factors between the two subgroups.

Results: Based on our analysis, we identified 14 patients with both breast and thyroid cancer, out of which 4 patients (29%) developed it synchronously and the other 10 (71%) metachronously.

Conclusion: Patients with primary thyroid cancer are at a risk of developing second primary cancer of breast origin—B2:4/819 (0.5%) and *vice versa*—T2:6/1512 (0.4%). Potential etiological factors include familial traits (7%), hormonal factors (79%), chemotherapy and radiotherapy of the primary tumor (29%) as well as other lifestyle and environmental factors.

65. Reoperative Parathyroidectomy: Malaysia Experience

B Shahizzat Fahmi¹, A Nor Safariny², CY Muhammad Ikram Harzany³, M Mohd Izzun Nasheef⁴, N Dinesh⁵, L Sarah⁶, B Anita⁷

¹⁻⁷Department of Surgery, Putrajaya Hospital, Malaysia

Introduction: Primary hyperparathyroidism (PHPT) is the most common cause of hypercalcemia in the outpatient setting with prevalence of 0.1–0.4%. Primary hyperparathyroidism can be cured by parathyroid surgery, however about 1–6% of PHPT patients will develop persistent or recurrence disease after initial surgery which require repeat surgery. The morbidity of neck re-exploration remains a problem in endocrine surgery due to distortion of neck anatomy by fibrosis and frequently obliterated normal tissues plane. The objective of this study was to determine the causes and outcomes of patients with persistent or recurrent hyperparathyroidism.

Materials and methods: Retrospective cohort study of 383 patients with PHPT who underwent parathyroid surgery at Hospital Putrajaya, Malaysia from 2002 to 2018.

Results: Out of 383 patients, 6.3% had recurrent or persistent hyperparathyroidism. Median duration to presentation was 4.5 months and 79% of them were symptomatic. The causes of failed first surgery were multiple parathyroid adenoma (58%), parathyroid cancer (21%), adenoma in normal position missed in previous surgery (8%), ectopic positions (8%) and regrowth of previously resected tumor (4%). Cure rates following

surgical re-exploration was 98%, however one patient suffered from recurrent laryngeal nerve palsy and one patient had temporary hypocalcemia post reoperation.

Conclusion: Patient with PHPT should be follow-up more than 6 month postoperatively with clinical and biochemical assessment to detect recurrent or persistent PHPT. Bilateral neck exploration may be considered during first parathyroid surgery in view of large number of multiple parathyroid adenoma in our cohort study. Successful first operation can prevent serious complication of multiple parathyroid surgery.

66. Parathyroidectomy in the Elderly: Malaysian Experience

M Mohd Izzun Nasheef¹, A Nor Safariny², B Shahizzat Fahmi³, CY Muhammad Ikram Harzany⁴, B Anita⁵

¹⁻⁵Department of Surgery, Putrajaya Hospital, Malaysia

Purpose/Introduction: Primary hyperparathyroidism (PHPT) is more common in elderly patient (>55 years) than in younger patient. Surgery is the only curative treatment for PHPT. However, most of the elderly patients in Malaysia with PHPT were delay and deter from parathyroid surgery due to comorbidities and risk of perioperative complication. The objective of this study was to compare the clinical status and outcomes of patients with PHPT who underwent parathyroidectomy in patient above and under 65-year-old.

Materials and methods: Retrospective cohort study of 119 patients with primary hyperparathyroidism who underwent parathyroid surgery at Hospital Putrajaya, Malaysia between 2008 and 2018. Student's *t* test and Chi-square test were used to analyze and compare patient data.

Results: A total of 37 patients (31%) were in the older group (>65) with average age of 73 (range, 65–96 years) and 82 patients (69%) were in the younger group (≤65) with average age of 48 (range, 19–64). Only 29% elderly patients and 25% younger patients were asymptomatic when diagnosed with hyperparathyroidism. Ten percent of the younger patients had parathyroid cancer and none of the elderly patients had parathyroid cancer. Even though the duration of hospitalization was longer for elderly patients, the curative rates and postoperative morbidity were similar between two groups.

Conclusion: Parathyroidectomy is a relatively safe treatment option for elderly patient in Malaysia with PHPT. It provides a permanent cure with a relatively low postoperative morbidity and mortality. Advanced age alone should not deter surgical option.

67. Intraoperative Nerve Monitoring in Thyroid Surgery in Resource-limited Settings

CY Muhammad Ikram Harzany¹, A Nor Safariny², M Mohd Izzun Nasheef³, B Shahizzat Fahmi⁴, B Anita⁵

¹⁻⁵Department of Surgery, Putrajaya Hospital, Malaysia

Introduction: Intraoperative nerve monitoring (IONM) as an adjunct procedure to direct visual nerve identification in thyroid surgery is widely used in high income country to reduce the incidence of recurrent laryngeal nerve (RLN) injury. However, the used of IONM in thyroid surgery in low and middle income countries remains in its infancy in most hospitals due to its expensive cost and the controversial benefit in the literature. The objective of this study was to assess if the use of IONM during thyroid surgery is associated with a decreased risk of RLN injury in our resource-limited settings.

Materials and methods: Retrospective cohort study of 124 patients (199 nerves at risk) who underwent thyroid surgery at Hospital Putrajaya, Malaysia between 2015 and 2019 by single endocrine surgeon. The control group had 149 nerves at risk and the IONM group had 50 nerves at risk. A Fisher exact test was used to assess if nerve injury was statistically different between both groups.

Results: Transient RLN paresis occurred in 2.01% nerves at risk in the control group and 6.00% in the IONM group ($p = 0.1543$). Permanent RLN paralysis occurred in 0.67% nerves at risk in the control group and 0% in the IONM group ($p = 0.5627$). Total RLN injury occurred in 2.68% nerves at risk in the control group and 6.00% in the IONM group ($p = 0.2712$).

Conclusion: There were no statistically significant difference in RLN paralysis, paresis or total injury rates between control and IONM groups. Intraoperative nerve monitoring during thyroidectomy may not prevent injury to the recurrent laryngeal nerve.

68. Review of Acromegaly Management and Outcomes in Imperial College Healthcare NHS Trust Over Eleven Years

C Nuttall¹, C Izzi-Engbeaya², A Abbata³, N Mendoza⁴, R Nair⁵, N Martin⁶, E Hatfield⁷

¹⁻⁷Bentley House, 22 Bute Gardens, London, United Kingdom, e-mail: cnn115@ic.ac.uk

Purpose: To audit the management of acromegaly patients at Imperial College Healthcare NHS Trust (ICHNT) against the 2018 consensus statement on acromegaly therapeutic outcomes, assess subsequent remission rates compared to recently published meta-analyses and observe the effect of preoperative somatostatin analogs (SSA).

Materials and methods: All patients diagnosed with acromegaly from 2008 to 2019 at ICHNT were identified. Electronic patient records were reviewed for biochemical data at diagnosis and post-surgery. Early remission, defined as age- and gender-normalised IGF-1 and random GH <1 µg/L, was assessed 3–6 months postoperatively. Patients were categorized as presenting with microadenomas (Mic), or macroadenomas with cavernous sinus invasion (MacI) or without invasion (MacNI). Administration of preoperative SSA was recorded.

Results: Seventy-five patients were identified (Mic $n = 12$; MacNI $n = 42$; MacI $n = 21$). Ninety one percent ($n = 68/75$) underwent endoscopic trans-sphenoidal pituitary surgery as their primary intervention, 5% ($n = 4/75$) received primary medical therapy, 3% ($n = 2/75$) primary radiotherapy, 1% ($n = 1/75$) no intervention. Twenty six percent ($n = 18/68$) of surgical patients received preoperative SSA, with similar remission rates to those who did not (50% vs 49%, $p = 0.94$). Postoperative remission rates were 67% ($n = 6/9$) for Mic, 68% for MacNI ($n = 27/40$), but only 5% ($n = 1/20$) for MacI. **Conclusion:** Remission rates following surgery at ICHNT were comparable to previously reported rates (Mic: 67–83%, MacNI: 63.3–76.3%). Lower remission rates (41%) have been reported for MacI, and cavernous sinus invasion has been reported to negatively correlate with remission. Our low MacI remission rate (5%) may be due to the inclusion of debulking surgeries where remission is not expected. Preoperative SSA treatment did not alter the biochemical remission rate.

69. The Survival in Differentiated Thyroid Carcinoma: A Cohort Study

MDP Pinto¹, DS Ediriweera², DMCD Dissanayake³, R Fernando⁴

^{1–4}Department of Surgery, Faculty of Medicine, University of Kelaniya, Sri Lanka

Introduction: Differentiated thyroid carcinoma (DTC) has a good prognosis overall. Survival data is deficient in Sri Lankan patients. A study was designed to assess the survival in DTC patients in a tertiary center.

Materials and methods: A prospective cohort study on all patients undergoing thyroidectomy at the Professorial Surgical Unit, North Colombo Teaching Hospital (NCTH) for DTC, was done from 2005. Clinical, biochemical, radiological, cytological and surgical parameters were recorded in all. A single surgeon performed all thyroidectomies. Histological confirmation was done for all. Patients were followed up regularly at surgical clinic. Data were analyzed using Kaplan–Meier statistical methods.

Results: Thirty six papillary (age range 19–49 years, mean 32.38 years) and 20 follicular (age range 22–68 years, mean 34.75 years) carcinomas were assessed for 3 year and 5 years survival. In follicular carcinoma 8 (40%) were alive and 11 (55%) were lost to follow-up. In papillary carcinoma 21 (58%) were alive and 12 (33%) were lost to follow-up. Four patients of the cohort have died (1 follicular and 3 papillary carcinoma). For both carcinomas when assessed together, the 3 year and 5 year survival were 91.6% (82.7–100%). There was no significant difference in survival for both carcinomas analyzed from Kaplan–Meier survival curves.

Conclusion: The 5-year survival for papillary and follicular carcinomas is 91.6%. This is marginally lower than the global survival rate. Significant lost to follow-up may partly account for this. Improving unit protocols and patient awareness may improve survival figures in this cohort.

70. Routine Preoperative and Postoperative Supplementation of Oral Calcium and/or Calcitriol is a Cost-effective Strategy in Management of Postthyroidectomy Hypocalcaemia

Roma Pradhan¹, Manish Gutch², Navendu Mohan³, Sudhanshu Tiwari⁴, Azim Anwar⁵

^{1,3–5}Department of Endocrine surgery, Dr Ram Manohar Lohia Institute of medical Sciences, Lucknow, Uttar Pradesh, India

²Department of Endocrinology, Dr Ram Manohar Lohia Institute of medical Sciences, Lucknow, Uttar Pradesh, India

Introduction: Amongst the three different strategies in terms of efficacy and cost-effectiveness to manage transient hypocalcaemia-routine/preventive supplementation, selective supplementation and no supplementation-authors hypothesize that the routine/preventive supplementation is most cost-effective.

Materials and methods: During September 2018 to August 2019, 36 patients were analyzed who had undergone total thyroidectomy (excluding completion total thyroidectomy) by a single surgeon at a tertiary care university hospital. The preventive strategy included supplementing with calcium carbonate 1 g and calcitriol 0.25 µg before surgery and then 8 hours after surgery and continued for average of 15 days for calcium and 6 days for calcitriol. Cholecalciferol was given to all patients 60,000 IU per day for 5 days. The cost of supplementation and laboratory tests (calcium carbonate INR 1 per tablet, calcitriol 4.5 INR per softule and calcium test 65 INR) were calculated.

Results: Thirty six patients were included. Male:female ratio was 1:35. Mean age of patient was 41 years. The histopathology was benign in 84%, malignant 16%; 19% were hyperthyroid. Operations included (total thyroidectomy = 32, with central compartment lymphnode dissection = 3 and with selective neck dissection = 1.1% patients had autotransplantation of parathyroid gland. Postoperative mean serum calcium was 8.4 mg/dL (POD1) and 8.9 mg/dL (POD2), lowest calcium = 6.9 mg/dL. Fifty three percent developed biochemical hypocalcemia (calcium <8.4 mg/dL) and only 8.3% patients developed severe hypocalcemia requiring infusion. Cost of supplementation per patient was only 8 US\$ which is 1/3rd of what is required if patient develops severe hypocalcemia.

Conclusion: Our data confirmed that preventive/routine supplementation of oral calcium and/or vitamin D is a useful and a cost-effective strategy.

71. Auto-transplantation of Parathyroid Gland in Total: Thyroidectomy in Eliminating Postoperative Hypoparathyroidism

P Kundhavi¹, S Muthukumar², AM Syed Ibrahim³, D Maruthupandian⁴

¹⁻⁴Government Rajaji Hospital and Madurai Medical College, Madurai, Tamil Nadu, India

Introduction: During total thyroidectomy, routine preservation of vascularity and function of all 4 parathyroid glands (PT) is attempted. Inadvertent injury to the PT is identified only postoperatively, with hypocalcemia of varying degrees of severity and calcium dependence.

Purpose: Assess the incidence of hypocalcaemia following total-thyroidectomy, ascertain the role of selective auto-transplantation of PT in reducing the incidence of permanent hypoparathyroidism.

Materials and methods: Prospective case control study, among 58 patients aged 25–65 years at a tertiary institute over 1 year, undergoing total thyroidectomy, for benign thyroid disease with normal preoperative serum calcium. Intraoperatively, after 4 PT were identified and viability of 1 PT was doubtful, 28 patients (group I—intervention group) were subjected to auto-transplantation of one PT into sternocleidomastoid muscle, and 30 patients taken as control (group II). Patients in both groups were monitored for clinical hypocalcemia and serum-calcium, serum-PTH were measured on 2nd day, 2nd and 6th months postoperatively. Incidence of persistent hypocalcemia was evaluated.

Results: Incidence of hypocalcemic symptoms in both groups was comparable at 2nd POD but by 2nd preoperative month, group I had only 2/28 (7.1%) symptomatic patients with hypocalcemia vs 8/30 (26.7%)—group II. By 6th month nil symptomatic patients in group I with significantly higher Se PTH values ($p = 0.01$) vs 2/30 (6.7%)—group II who were still calcium dependent (Table 1).

Conclusion: Autotransplantation of 1 PT helps to preserve PTH function following total/near-total thyroidectomy, helps eliminate permanent hypoparathyroidism and long-term calcium supplementation.

Table 1:

	Serum PTH (pg/mL)		
	II-POD	2nd month	6th month
Group I	36.63	43.82	49.5
Group II	36.60	37.9	39.4
<i>p</i> value	0.1	0.01	0.01

72. A Study of Prevalence, Anatomy and Surgical Impact of Middle Thyroid Vein in Thyroidectomy Procedure

Premkumar Anandan

Bengaluru Medical College and Research Institute, India

Purpose: One of the intraoperative complications of thyroidectomy is bleed. Of which tear of middle thyroid vein (MTV) is traditionally described as a common cause. But not many studies have been done to support this. Hence It makes it very relevant for all endocrine surgeons to have clear understanding of the prevalence, location and surgical impact of the middle thyroid vein.

Materials and methods: A prospective observational study was conducted from January 2018 to August 2019. Data was collected on identification, location and the dissection of the middle thyroid vein in patients undergoing hemithyroidectomy or total thyroidectomy. Collected data was analyzed using standard statistical methods.

Results: A total of 142 thyroidectomies were studied. Middle thyroid vein was identified only in 51 (35.9%) cases. The vein was observed to usually arise from central part of the lobe. In 41 (28%) cases it was dissected and ligated on single side.

Conclusion: Middle thyroid vein is very infrequently identified. Middle thyroid vein does not pose a substantial risk of bleed. The bleed even though minimal might obscure the vision for dissection of the RLN. Identifying the MTV and ligating would be a good practice.

73. Autoimmune Thyroiditis: A Dysfunction of Melatonin Secretion?

Premkumar Anandan

Bengaluru Medical College and Research Institute, India

Introduction: Autoimmune thyroiditis represents one of the most frequent forms of thyroid disorders. Various factors like selenium deficiency, vitamin D deficiency, stress, etc., have been thought to induce the autoimmune cascade in a genetically susceptible individuals. Even though melatonin is implicated in many autoimmune disorders, there is not much data and research on its direct involvement or role in treatment of hypothyroidism due to autoimmune thyroid disease. Hence a study was much needed to understand this relationship.

Materials and methods: This was a prospective study conducted at victoria hospital, Bengaluru study period July 2018 to June 2019. Sixty two patients with subclinical hypothyroidism (serum TSH values ranging 5.0–8 mIU/L) were supplemented with a low dose of melatonin 10 mg OD for 2 months. The lifestyle modification of sleep pattern was also advised. Patients were followed for 6 months. Serum TSH was repeated every 2 months for 6 months. Data was collected and analyzed.

Results: Only 53 patients were compliant in the study and were followed for 6 months. Forty four (84%) patients became euthyroid with the melatonin supplement alone. Six (11%) patients showed increase in TSH values. Two patients did not show any significant change.

Conclusion: This study strongly suggests the association between the deficiency of melatonin and sleep deprivation as a probable cause of autoimmune thyroiditis and hypothyroidism.

74. A Study to Evaluate Effectiveness of Cognitive Apprenticeship Model in Enhancing Teaching-learning of Thyroidectomy Procedure for Surgery Residents

Premkumar Anandan

Bengaluru Medical College and Research Institute, India

Introduction: Thyroidectomy is one of the surgical procedures which define precision and technical ability. The right training of surgery residents in performing this procedure is very crucial. The process of training should be a standardized, but the lack of these necessities a need to assess the effectiveness of cognitive apprenticeship model in training the residents.

Materials and methods: Study period was January 2019 to August 2019. Twenty four surgical residents were enrolled. They followed a training curricula based on cognitive apprenticeship model. This involved observation of experts, watching videos of the procedure, small group instructions and sessions to clarify the doubts. A pretest and posttest survey using Google forms was conducted. The collected data was analyzed using SPSS software. Outcome measured were resident understanding of the procedure, perceived doubts, concern of complications, motivations to refine skills and expectations.

Results: All residents successfully completed the entire training protocol. Performance improved 91% ($p = 0.0001$) from pretest to posttest on the understanding of the procedure. Twenty one (87%) residents felt this module of training motivated them more than the regular classes. Results demonstrated only 3 (15%) residents' knowledge on management of complications didn't show much difference.

Conclusion: This study found that the cognitive apprenticeship model is very effective for training of advanced surgical procedures to residents. Standardization of this model is recommended for better outcome.

75. Feasibility of Intraoperative Nerve Monitoring in Endoscopic Thyroid Surgery

AD Rao¹, RM Singaporewalla^{1,2}

^{1,2}Department of Surgery, Endocrine Surgical Unit, Khoo Teck Puat Hospital, Singapore

Introduction: Most centers performing endoscopic thyroid surgery do not regularly attempt voice nerve identification by intraoperative nerve monitoring (IONM) due to technical difficulty and limitations. Many surgeons safeguard the nerves by leaving behind a rim of thyroid tissue. We studied the feasibility and accuracy of IONM in transaxillary endoscopic hemithyroidectomy and its impact on operative duration.

Materials and methods: In a prospective nonrandomized experimental study of 10 consecutive patients undergoing transaxillary endoscopic hemithyroidectomy a stepwise feasibility evaluation of IONM was performed. Nerve monitoring was carried out before and after visual inspection of the external and recurrent laryngeal nerves using a dedicated long metallic probe hook to sound the nerve through a 5 mm working port (Table 1).

Results: There was no conversions to open. Seven of ten recurrent laryngeal nerves (70%) were successfully stimulated but only 4 were visualized (40%). Six out of 10 external laryngeal nerves were successfully stimulated (60%) but only 2 could be visualized (20%). There were no cases of temporary or permanent voice change. Operative duration with positive nerve identification using IONM was significantly lower than when the nerves were not identified (mean 117 minutes vs 165 minutes; p values < 0.05).

Conclusion: Intraoperative nerve monitoring during transaxillary endoscopic thyroidectomy is feasible, significantly improves the positive identification rates for the nerves and lowers operative time.

Table 1: Patient data and results

No	Age	Sex	Diagnosis	Size of nodule (lobe dimension, $l \times b \times h$) cm	Operation type	Surgery duration (minutes)	RLN Stimulated	Visual- ized	ELN Stimu- lated	Visual- ized	Convert to open	Voice change
1	34	F	Left complex cyst	2 (5 × 3.5 × 1.5)	Endoscopic left hemithyroidectomy	110	Y	Y	Y	N	Nil	Nil
2	47	F	Right complex cyst	3 (5 × 3 × 1.5)	Endoscopic right hemithyroidectomy	122	Y	Y	Y	N	Nil	Nil
3	24	M	Left thyroid cyst	4.5 (4.5 × 2.5 × 1.7)	Endoscopic left hemithyroidectomy	155	N	N	N	N	Nil	Nil
4	37	F	Right thyroid cyst	4 (5.5 × 3 × 2.5)	Endoscopic right hemithyroidectomy	180	N	N	N	N	Nil	Nil
5	41	M	Left thyroid cyst	4.8 (4.8 × 4.5 × 3.5)	Endoscopic left hemithyroidectomy	110	Y	N	Y	N	Nil	Nil
6	44	F	Right thyroid cyst	5.3 (5.2 × 3.7 × 3)	Endoscopic right hemithyroidectomy	120	Y	N	Y	N	Nil	Nil
7	57	M	Right solid nodule L	5.5 (6.5 × 4 × 3.5)	Endoscopic right hemithyroidectomy	115	Y	Y	Y	Y	Nil	Nil
8	41	F	Left thyroid cyst	3.5 (4.5 × 3 × 2)	Endoscopic left hemithyroidectomy	125	Y	N	Y	N	Nil	Nil
9	50	M	Right thyroid cyst	5 (6 × 4 × 2)	Endoscopic right hemithyroidectomy	160	N	N	N	N	Nil	Nil
10	46	F	Right thyroid colloid nodule	6 (6 × 4 × 2)	Endoscopic right hemithyroidectomy	118	Y	Y	Y	Y	Nil	Nil

76. Comparative Study on Role of Surgeon Performed Ultrasound Neck vs FNAC in Prediction of Malignancy in Thyroid Swellings with Relation to Postoperative Histopathology Report

M Mohamed Salmon¹, S Muthukumar²

^{1,2}Department of Endocrine Surgery Madurai Medical College and Government Rajaji Hospital, Madurai, Tamil Nadu, India

Introduction: FNAC is considered as a gold standard to diagnose thyroid malignancies, ultrasound (USG) has got a significant value in diagnosis. The study is conducted to predict the malignancy outcome in thyroid swellings by using surgeon performed USG neck vs FNAC and comparing it with postoperative histopathology report.

Materials and methods: This is a prospective cohort study, which was reported as benign in FNAC. Patients presented with swellings and benign lesions in FNAC are included in the study. The sonological parameters assessed are echogenicity, calcification, vascularity, composition, margins, orientation, peripheral halo, lymph node status. FNAC proven malignancies excluded (Fig. 1).

Results: Totally 69 patients were included in the study. Of those, 22 patients had malignant features in USG and among these 20 patients had positive HPE. Microcalcification, increased vascularity, hypo echogenicity and lymph nodal presence has significant value in prediction of malignancy (p < 0.001). The overall sensitivity of thyroid USG to diagnose malignant nodule is 80%.

Conclusion: Ultrasound has become the extended arm of clinical examination in thyroid patients thereby it decreases morbidity and mortality related to thyroid carcinoma. Therefore, prediction rate of malignancy is higher if surgeon performs USG neck because the clinical history is well known to him.

Fig. 1: Study of lesions in FNAC

77. A Comparative Study on Outcome of Cardiovascular Dysfunction in Patients with Graves and Toxic Multi Nodular Goitre after Treatment

Muthukumar Sankaran¹, Ravikumar Krishnan², Dhalapathy Sadacharan³, Thalavaai Sundarram⁴, Umadevi Suresh⁵, P Chelladurai⁶, Syed Ibrahim⁷

^{1,7}Madurai Medical College, Madurai, Tamil Nadu, India

²⁻⁶Madras Medical College, Chennai, Tamil Nadu, India

Purpose: Cardiovascular dysfunction (CVD) is a well recognized complication in patients with hyperthyroidism. Since there has been no studies which had evaluated the CVD recovery pattern between patients with Graves and toxic multi-nodular goitre (TMNG) we intended to compare treatment outcomes in patients with Graves and TMNG.

Materials and methods: Patients with hyperthyroidism were grouped into, group I ($n = 133$, age <60 years, proven Graves), group II ($n = 64$, age <60 years, proven TMNG). Various cardiac parameters were evaluated, at the time of diagnosis (point A), after achieving euthyroidism (point B) with anti-thyroid drugs and 6 months after achieving euthyroidism (point C).

Results: At point A, CVD was evident in 88/133 (66.2%) in group I and 39/64 (60.9%) in group II. At point B improvement in occurred in 55/88 (62.5%) in group I and 22/39 (56.4%) in group II. At point C dramatic improvement in CVD occurred in 82/88 (93.1%) in group I, whereas only 28/39 (71.7%) improved in group II. Though incidence of CVD was more in group I, the improvements in dysfunction parameters were more pronounced in group I after treatment. At point C there was a significant decrease in all the cardiac dysfunction parameters in group I whereas the same was not observed in group II patients.

Conclusion: Cardiac dysfunction parameters improved significantly in patients with Graves after treatment than in patients with toxic MNG and hence those patients with toxic MNGs should be treated more cautiously owing to the increased morbidity due to CVD (Table 1).

Table 1

Variables	Group I	Group II	p value
End-diastolic dimension (mm)	40.12 ± 2.67	41.05 ± 5.0	0.02
End-systolic dimension (mm)	26.18 ± 3.76	26.98 ± 4.14	0.51
End-diastolic volume (mL)	69.76 ± 11.0	72.21 ± 9.2	0.04
End-systolic volume (mL)	33.23 ± 7.20	33.12 ± 6.13	0.81
Ejection fraction	63.18 ± 3.98	61.04 ± 3.23	0.01

78. Intraoperative Lymphonodal Staging of Clinically N0 Medullary Thyroid Microcarcinomas for Decision on Lateral Neck Dissection

Nada Santrac¹, Ivan Markovic², Natasa M Milijic³, Merima Goran⁴, Marko Buta⁵, Igor Djuriscic⁶, Radan Dzodic⁷

^{1,4,6}Surgical Oncology Clinic, Institute for Oncology and Radiology of Serbia, Belgrade, Serbia

^{2,5,7}Surgical Oncology Clinic, Institute for Oncology and Radiology of Serbia, Belgrade, Serbia; Medical Faculty, University of Belgrade, Belgrade, Serbia

³Department of Pathology, Institute for Oncology and Radiology of Serbia, Belgrade, Serbia

Introduction: The aim of this prospective study was to analyze accuracy of sentinel lymph node (SLN) biopsy with methylene blue dye (MBD) for intraoperative detection of lateral metastases in clinically N0M0 micromedullary carcinomas (micro-MTC) with calcitonin (Ct) below 1,000 pg/mL and selection of patients for one-time lateral neck dissection (LND).

Materials and methods: In addition to total thyroidectomy and central neck dissection, we performed bilateral SLN biopsy of jugulo-carotid regions after MBD injection to decide upon necessity of LND. Sentinel lymph nodes were examined by frozen section (FS): if benign, additional non-SLNs were extirpated from levels II to III; if malignant, one-time LND was performed. Frozen section vs standard pathohistology (sPH) on SLN were compared, and non-SLNs were evaluated for “skip” metastases to evaluate predictive value of SLNs.

Results: From 2007, 20 cN0 patients were included in this study. Hereditary disease was observed in 3/20 (15%) of patients. There were no allergic reactions to MBD and SLN identification rate was 100%. In total, 2/20 (10%) cN0 patients were reclassified to pN1b; remaining 18/20 (90%) were metastases-free. Frozen section vs sPH findings on SLNs were 100%-match. There were no “skip” metastases in SLN-negative patients, while additional non-SLN metastases were found in SLN-positive patients. Sentinel lymph nodes were 100% predictive for non-SLNs status, with accuracy of 100%.

Conclusion: Sentinel lymph node biopsy can be used for intraoperative assessment of lateral compartments and optimization of initial surgery of micro-MTCs with Ct <1,000 pg/mL. This way, cN0 patients with FS proven SLN metastases can receive one-time LND, and those without benefit from less extensive surgery.

Keywords: Medullary thyroid microcarcinoma, Methylene blue dye, Sentinel lymph node biopsy.

79. Can Hemithyroidectomy with Neck Dissection be Sufficient for Treatment of Medullary Thyroid Cancer?

Arseny Semenov¹, D Buzanakov², R Chernikov³, I Sleptsov⁴, V Makarin⁵, A Uspenskaya⁶, N Timofeeva⁷, I Chinchuk⁸, K Novokshonov⁹, J Karelina¹⁰, E Fedorov¹¹, N Gorskaya¹², I Sablin¹³, Y Malugov¹⁴, S Elcheparova¹⁵, A Bubnov¹⁶

^{1–16}Saint-Petersburg State University, North-Western Center of Endocrinology and Endocrine Surgery, Russia

Introduction: Standard initial treatment for medullary thyroid cancer (ATA) is thyroidectomy with central compartment node dissection. But is there any risk of having bilateral tumor in RET negative patients comparable with safety benefits of hemithyroidectomy? When hemithyroidectomy with neck dissection can be performed safely?

Materials and methods: Retrospective study of 229 cases of initial treatment for MTC in 2009–2017 in SPbSU clinic.

Results: Multifocal tumor was reported in 46 cases (20.1%). Bilateral in 26 (11.4%). In all cases multifocality was found and proofed by US and FNAB prior operation, except young patients undergoing “Prophylactic” thyroidectomy. In one case with RET:V804m tumor was solitary. In two cases with multifocal unilateral tumor had RET:C634F/S mutations. They were adolescents at time of diagnosis and all had relatives with MTC. But still bilateral tumor found with US was strongest predictor of familial MTC OR = 437. No difference in risk of hereditary disease related to primary tumor size was found. Patients with hereditary disease had increased risk of having local metastasis OR = 1.45 probably due to earlier development of disease. Remarkable that patients with multifocal tumors had great risk of local metastasis OR = 2.74. Probably most of unilateral multifocal tumors were due to intrathyroidal metastasis. We also found that calcitonin to size (measured by US) ratio can predict multifocal lesions. ROC: AUC = 0.92. With cut-off of 250 sensitivity was 85.7%, specificity = 87.5%. OR = 30.

Conclusion: Hemithyroidectomy with neck dissection seems to be reasonable volume of initial surgery in any patient with no suspicious nodes in contralateral side, giving absolute diminishing of hypoparathyroidism risk.

80. Is There an Association between Chronic Thyroiditis and Differentiated Thyroid Carcinoma: A Retrospective Cohort Analysis

SA Seneviratne

Department of Surgery, University of Colombo, Sri Lanka

Introduction: Chronic thyroiditis causes progressive autoimmune destruction of the thyroid gland and fibrosis which may lead to permanent hypothyroidism. Chronic thyroiditis has also been suggested to be associated with development of differentiated thyroid malignancy. We conducted this study to assess the association of occurrence of chronic thyroiditis in thyroid malignancies compared with benign neoplasms and multinodular goiters in patients undergoing thyroidectomy.

Materials and methods: A retrospective analysis of histopathology reports of patients who underwent thyroidectomy at the Professorial Surgical Unit, National Hospital of Sri Lanka from 2014 July to 2019 June was performed. All patients with a primary histological diagnosis of chronic thyroiditis ($n = 37$) were excluded.

Results: Of the total 347 thyroidectomies included, 81 had differentiated thyroid malignancies (23.3%). Of the malignant thyroids 14 (17.2%) had coexistent chronic thyroiditis while 41 (15.1%) out of 272 benign goitres had associated chronic thyroiditis ($p = 0.232$). Incidence of coexistent thyroiditis was lowest in multinodular goitres (27 out of 213, 12.6%), and 26.7% (12 out of 45) patients with benign neoplasms had associated chronic thyroiditis.

Conclusion: There was a no statistically significant association observed between malignant thyroid lesions with chronic thyroiditis. Further studies in a larger cohort is recommended to identify the association between thyroiditis and differentiated thyroid cancer.

81. A Single Institution Case Series of Medullary Thyroid Carcinoma

M Shibata¹, T Ichikawa², T Inaishi³, M Watanabe⁴, N Miyajima⁵, Y Takano⁶, D Takeuchi⁷, N Tsunoda⁸, T Kikumori⁹

¹⁻⁹Department of Breast and Endocrine Surgery, Nagoya University Graduate School of Medicine, Japan

Introduction: Medullary thyroid carcinoma (MTC) is a rare malignancy arising from C cells. Due to high prevalence of mutation of *RET* proto-oncogene, preoperative *RET* genetic test is recommended for all MTC patients in "The Japanese Clinical Guidelines for Treatment of Thyroid Tumor 2018." We report the clinical features and treatment for MTC patients in our hospital.

Materials and methods: Thirty-six MTC patients who underwent thyroidectomy from 2001 to 2018 were enrolled, and their clinicopathological features and prognosis were retrospectively analyzed using medical records.

Results: Preoperative *RET* genetic testing was performed in 24 cases. Sixteen cases and one case were diagnosed as multiple endocrine neoplasia (MEN) 2A including familial medullary thyroid carcinoma and MEN 2B, respectively. Hemithyroidectomy was performed for 6 sporadic MTC patients, and the remaining 30 cases underwent total thyroidectomy. Lymph node dissection was done in 35 cases, including prophylactic dissection. Eighteen cases were T2 or more, and 24 cases had lymph node metastasis. Preoperative CEA and calcitonin levels were significantly correlated with tumor size and number of metastatic lymph nodes. The 5-year recurrence-free survival rate was 82.0% in 33 cases, excluding three patients with distant metastasis at the time of diagnosis. Three patients, whose family members were diagnosed as probands of MEN 2A in our hospital, underwent surgeries at T1a stage, and none has recurrence.

Conclusion: About half of MTC patients were diagnosed as MEN 2. Appropriate diagnosis of probands provided opportunities of early intervention to MTC of other family members, suggesting the importance of genetic test for MTC patients.

82. Surgical Indication of the Thyroid Follicular Tumor for the Young Population

K Shio¹, M Iwade², A Matsuishi³, Y Matsumoto⁴, S Hasegawa⁵, S Suzuki⁶, H Mizunuma⁷, K Nakano⁸, S Suzuki⁹

¹⁻⁹Department of Thyroid and Endocrinology, Fukushima Medical University, Fukushima, Japan

Introduction: The diagnosis of follicular thyroid cancer cannot be made by fine needle aspiration cytology (FNAC) of a thyroid nodule. Additionally, the diagnosis of follicular thyroid cancer occurs most commonly above 40 years of age and rarely occurs in children. The thyroid ultrasound screening for children aged 0–18 was performed in Fukushima after the accident at the Fukushima Daiichi Nuclear Power Plant. In this screening, we detect thyroid nodules in the young population. This study aimed to assess the surgical indication of the thyroid follicular tumor for the young population.

Materials and methods: Thirty one patients who underwent surgery for thyroid nodules from 2012 to 2018 in the Fukushima Medical University.

Results: After thyroid surgery, pathological examination revealed, follicular adenoma (FA) ($n = 14$), adenomatous goiter (AG) ($n = 13$) and follicular thyroid cancer (FTC) ($n = 2$). Two autonomously functioning thyroid nodules was included in AG. There were 4 males and 27 females in

these cases. Median age at surgery was 20 years (range 15–29). The median tumor sizes were 32 mm. The median serum a-Tg value was 265.3 ng/mL. All cases were performed hemi-thyroidectomy and 19 patients underwent the axillar-areolar approach to endoscopic thyroid surgery (AAA-ETS). **Conclusion:** There was no reports of detailed studies of surgery for young thyroid follicular tumor that have been found by ultrasonography screening. It has been indicated that presence of subjective symptoms, increasing tumor size, suspected malignancy and desire for surgery due to lifestyle changes.

83. An Update on RAI Usage Postdifferentiated Thyroid Cancer Surgery in Accordance with ATA Guidelines

Y Sia¹, R Dave², D Nour³, AR Skandarajah⁴, JA Miller⁵, R Tasevski⁶

^{1–6}7 Chirnside Street, Kingsville, Australia, e-mail: yisia83@gmail.com

Purpose: The 2009 American Thyroid Association (ATA) three-tiered risk stratification, and its revised version in 2015, provided clearer guidance on the indications for radioactive iodine (RAI) ablation in differentiated thyroid cancer (DTC) patients. We provide updated data with the inclusion of a more contemporary cohort to demonstrate how these guidelines have impacted RAI use in our institution.

Materials and methods: Patients diagnosed with DTC during three different time periods (group I: 2002–2006, group II: 2010–2014, and group III: 2017–2018) were identified and risk stratified according to the ATA guidelines. Radioactive iodine use and extent of surgery was compared between the three groups. Categorical variables were analyzed using Fisher's exact (2×2) and Chi-square ($>2 \times 2$) tests.

Results: A total of 415 patients were included (group I = 88, group II = 215, group III = 112). The proportion of patients having total thyroidectomy were 84.6%, 84.7% and 69.6% in groups I, II and III, respectively ($p = 0.003$). Central lymph node dissection was significantly higher in the more contemporary groups compared to group I (9.1% vs 41.9% vs 64.3%, $p < 0.001$). Overall, fewer patients received RAI in more recent times (76.6% vs 54.8% vs 26.8%, $p < 0.001$), most evident in the low risk patients (70% vs 29.1% vs 5.1%, $p < 0.001$). In the high risk group, the majority received RAI, with no difference between the groups.

Conclusion: Comparing DTC patients treated in our unit before and after publications of the 2009 and 2015 ATA guidelines, more nodal surgery was performed with less RAI administered in the latter groups.

84. Total Parathyroidectomy in Patients with Chronic Kidney Disease: Identifying 4 Glands as Primary Surgical Outcome

SD Cheah¹, AI Junaidi², WJ Wan Hasmah³, AH Imi Sairi⁴

^{1–4}Breast and Endocrine Surgery Unit, Hospital Raja Perempuan Zainab II, Kelantan, Malaysia

Purpose: Many centers use intraoperative PTH monitoring and frozen section to improve operative success during total parathyroidectomy. However in low resource countries, aim of surgery is to remove four parathyroid glands based only on surgical anatomy knowledge, visual and tactile stimulation. We sought to review surgical outcome.

Materials and methods: A retrospective review of 74 patients who underwent total parathyroidectomy without autotransplantation for renal hyperparathyroidism from January 2013 to July 2019 were conducted. Data were analyzed using Chi-square and unpaired *t* test in IBM SPSS statistics software.

Results: The parameters of age, gender, symptomatic or asymptomatic, duration of hemodialysis, ALP and PTH level did not influence the operative outcome in successfully identifying 4 glands. Intraoperatively, all 4 glands were identified in 71.6% cases. The commonest unidentified gland was right inferior parathyroid. Lymph nodes and thyroid tissue were commonly misidentified as parathyroid on HPE. Only two (3.9%) of the patients with 4 gland removal developed persistent or recurrent hyperparathyroidism. Among the 21 patients with less than 4 glands removed, 5 (9.5%) underwent second surgery to remove missing or ectopic gland after localisation by sestamibi and CT scan. Another 11 (81%) patients were followed up and monitored biochemically for a period ranging 6 months to 4 years while another 5 (9.5%) were lost to follow-ups (Tables 1 to 5).

Conclusion: Total parathyroidectomy can be successfully performed by experienced surgeons in low resource settings without additional intraoperative adjuncts. Procedure is successful if 4 glands were removed during surgery. For those with less than 4 glands removed, majority still do not need reoperation.

Table 1: Patient characteristics and biochemical values in relation to outcome of intraoperative 4 parathyroid gland identification

Characteristic	All patients	4 glands removed (n = 53)	Less than 4 glands removed (n = 21)	
Age (years)	45.5	45.5	45.2	$p = 0.925$
Sex, male/female	39/35	29/24	10/11	$p = 0.581$
Duration of dialysis (year $\pm$ SD)	8.5 $\pm$ 4.8	8.2 $\pm$ 5.1	9.3 $\pm$ 3.9	$p = 0.451$
Symptomatic (number)	56	40	16	$p = 0.948$
Asymptomatic (number)	18	13	5	
Preoperative PTH (pg/mL)	720.3	680.4	824.7	$p = 0.627$
Preoperative ALP (IU/L)	620.8	568.4	735.0	$p = 0.289$

Values are presented as mean, mean $\pm$ standard deviation or number

Table 2: Location of unidentified parathyroid gland during surgery

<i>Unidentified gland (n = 26)</i>	<i>Number (%)</i>
Right inferior	15 (58)
Left inferior	5 (19)
Right superior	4 (15)
Left superior	2 (8)

Table 3: Tissues wrongly labelled as parathyroid gland on histopathological examination

<i>Type of tissue identified as parathyroid gland</i>	<i>Number (%)</i>
Lymph node	12 (43)
Thyroid tissue	11 (39)
Fibrofatty tissue	3 (11)
Thymic tissue	1 (3.5)
Lymphoid tissue	1 (3.5)

Table 4: Reoperative surgery and location of missing gland for patients underwent a secondary procedure

<i>Patient</i>	<i>Localisation imaging</i>	<i>Location of missing gland</i>	<i>Surgery</i>
1	Sestamibi/CT neck thorax	Inferior pole of left thyroid lobe	Left hemithyroidectomy + excision of left inferior parathyroid gland
2	Sestamibi/CT neck thorax	Anterior mediastinum	Sternotomy + excision of ectopic parathyroid gland
3	Sestamibi/CT neck thorax	Anterior mediastinum	Sternotomy + excision of ectopic parathyroid gland
4	CT neck thorax	Inferior pole left thyroid lobe	Left hemithyroidectomy + excision of left inferior parathyroid gland
5	CT neck thorax	Inferior pole right thyroid lobe	Excision of right inferior parathyroid gland

Table 5: Reoperative surgery and location of supernumerary parathyroid gland for persistent hyperparathyroidism after initial removal of 4 glands

<i>Patient</i>	<i>Localisation imaging</i>	<i>Location of supernumerary gland</i>	<i>Surgery</i>
1	Sestamibi/ CT neck thorax	Anterior mediastinum	Sternotomy + excision of supernumerary parathyroid gland
2	Sestamibi/CT neck thorax	Anterior mediastinum	Sternotomy + excision of supernumerary parathyroid gland

85. Transaxillary Endoscopic Thyroidectomy: A Learning Curve Experience

RM Singaporewalla¹, AD Rao²

^{1,2}Department of Surgery, Endocrine Surgical Unit, Khoo Teck Puat Hospital, Singapore

Background: The pursuit of cosmesis has led surgeons to push the boundaries of minimal access thyroid surgery. We studied the feasibility, results, cosmesis and patient satisfaction with scarless endoscopic thyroidectomy (SET) using an axillary-breast approach with particular emphasis on initial learning outcomes.

Materials and methods: Twenty patients (M = 4, F = 16) with symptomatic unilateral benign nodules <6 cm underwent endoscopic hemithyroidectomy for unilateral disease. Nodules larger than 6 cm, substernal goiter, patients with previous neck surgery, malignancy and Graves' disease were excluded. In our approach (unilateral axillary breast approach), the 10 mm camera port was placed via the anterior axillary fold with two working 5 mm ports via the ipsilateral shoulder and circumareolar region.

Results: Mean operating time was 133 minutes (85–180), with a mean blood loss of 40 mL (25–75). There were no conversions or major complications. One patient experienced transient voice change. Two patients had chest wall seromas. Pain scores at recovery, 6 hours and on 1st postoperative day were 2, 1.8 and 2.3 (range 1–5, 1–3 and 1–4), respectively. Mean length of stay was 2.2 days. Eighty percent (16/20) patients rated cosmetic results and overall satisfaction as excellent, (good –3, unsatisfactory –1). Port insertion and flap raising times showed statistically significant improvements in the 2nd half of the series.

Conclusion: In selected patients, SET offers distinct cosmetic advantages and patient satisfaction with acceptable morbidity rates. This study is significant in terms of outcomes expected during the early learning curve of this procedure.

86. A 3-year Audit of Clinico-pathological Co-relation of Thyroid Nodule Ultrasound and Cytology using TIRADS and the Bethesda Scoring System

BWS Seet¹, RM Singaporewalla²

¹Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore

²Department of Surgery, Endocrine Surgical Service, Khoo Teck Puat Hospital, Singapore

Purpose: Thyroid imaging reporting and data system (TIRADS) is being increasing used around the world. With any new practice, it is important to audit the quality of reporting and compare results with the gold standard. We performed a 3-year audit of clinico-pathological correlation of data from two different thyroid surgeons and also compared our results with a previous audit performed in the same department.

Materials and methods: A retrospective analysis of all patients with thyroid nodules managed under 2 specialist surgeons from 2016 to 2018 comparing the pre-FNAC surgeon performed ultrasound (US) TIRADS grading with FNAC. TIRADS 2 and 3 were co-related to Bethesda 2 (benign) TIRADS 5 was co-related to Bethesda 5 and 6 (malignant). An attempt was made to co-relate TIRADS 4 category to Bethesda 3 and 4. Data was compared with our previous single surgeon audit done in 2015 (Fig. 1 and Tables 1A to C).

Results: Of a total of 254 thyroid nodules over a 3 year period, 208 cases were reported as benign disease and correlated to TIRADS 2 and 3, and 5 were reported malignant which matched the TIRADS 5 score. Overall concordance rate was 81.1%, for both surgeons with sensitivity and specificity for predicting malignancy at 71.1% and 100.0%, respectively. TIRADS 4 category had poor correlation to Bethesda III and IV lesions (24.4%) Our sensitivity rates were almost identical at 71.1% compared to 70.6% in the previous audit.

Conclusion: With training in thyroid ultrasound and TIRADS, we can achieve fairly good correlation between benign and malignant thyroid nodules by different specialists, avoiding need for FNAC in TIRADS 2 lesions.

Fig. 1: Co-relation between TIRADS and BETHESDA categories

Table showing concordance rate of 2 surgeons

Table 1A: Concordance for surgeon 1 and 2 excluding final histology

Year	Overall concordance (%)	TIRADS 2 concordance (%)	TIRADS 3 concordance (%)	TIRADS 4 concordance (%)	TIRADS 5 concordance (5%)
2016	86.1	89.7	88.1	40.0	100
2017	81.3	100	92.6	33.3	100
2018	76.2	100	93.5	11.1	100
Overall	81.8	91.7	91.9	24.4	100

Table 1B: Concordance for surgeon 1 excluding final histology

Year	Overall concordance (%)	TIRADS 2 concordance (%)	TIRADS 3 concordance (%)	TIRADS 4 concordance (%)	TIRADS 5 concordance (5%)
2016	86.2	90.0	89.5	25.0	100
2017	80.6	–	96.2	33.3	100
2018	72.9	–	94.1	11.1	100
Overall	79.7	90.0	93.7	22.5	100

Table 1C: Concordance for surgeon 2 excluding final histology

Year	Overall concordance (%)	TIRADS 2 concordance (%)	TIRADS 3 concordance (%)	TIRADS 4 concordance (%)	TIRADS 5 concordance (5%)
2016	85.7	88.9	75.0	100	–
2017	84.2	100	80.0	–	–
2018	92.9	100	90.9	–	–
Overall	87.2	93.75	83.3	100	–

A dash (–) indicates that the surgeon did not classify any nodules as that TIRADS category for that year

87. Adrenal Incidentaloma: Adrenal Schwannomas

Nneka A Sunday-Nweke¹, Suneel Mattoo², Anjali Mishra³, Saroj K Mishra⁴

^{1–4}Sanjay Gandhi Postgraduate Institute of Medical Science, Lucknow, Uttar Pradesh, India

Abstract: Schwannomas are rare benign tumors of the peripheral or cranial nerves. Visceral schwannomas are extremely rare, and only a few cases of adrenal origin have been reported. We report two cases managed this year in our center. A 50-year-old man, a known diabetic on oral hypoglycaemic agents who was referred on complaints of dyspepsia and indigestion of 2 years and an abdominal ultrasound finding of left suprarenal mass. Another is a 32-year-old female with complaints of dull aching right lower abdominal pain of 3 years with an abdominal ultrasound finding of left adrenal mass. No history of functionality or syndromic associations. At presentation CECT of the abdomen was done and it showed; left suprarenal mass close to lateral limb of left adrenal measuring 7.3 cm × 7 cm × 5.9 cm, heterogeneous with peripheral enhancement no signal wash-out in delayed phase. The second patient CECT showed a well defined left adrenal mass measuring 5 cm × 4 cm × 4 cm, heterogeneously enhancing reaching up to the renal hilum. No washout. Both tumors were found to be non-functional for both patients were normal. Left open adrenalectomies were done for both patients and histopathological examination confirmed adrenal schwannomas.

Conclusion: Adrenal schwannomas though are rare, should be suspected in cases of non-functional adrenal tumors.

88. Crowned Dens Syndrome Triggered by Transient Hypocalcemia After Total Thyroidectomy: First Reported Case

Lisa Suyama¹, Toru Yashiro²

^{1,2}Department of Breast and Thyroid Surgery, Hitachi General Hospital, Japan

Introduction: Crowned dens syndrome is defined as otherwise unexplained neck pain in the presence of radiographic atlantoaxial calcifications. This is the first report describing a patient with crowned dens syndrome induced by transient hypocalcemia after total thyroidectomy.

Case description: A 91-year-old woman presented with headaches, stiff neck and fevers of 38°C. She had undergone a total thyroidectomy 4 days earlier, to treat thyroid papillary carcinoma. All four parathyroid glands were removed and autotransplanted. Supplemental calcium and vitamin D were prescribed after the surgery. She was discharged 2 days earlier. On presentation, there were no swelling or redness around the wound. Blood tests showed a white blood cell count of 11,300/ μ L, C-reactive protein of 12.5 mg/dL and a calcium level of 7.9 mg/dL. Computed tomography of the neck revealed crown-shaped calcium deposits surrounding the odontoid process of her second cervical vertebra. She had no other cause of her high fever, and was therefore diagnosed as crowned dense syndrome induced by low calcium levels after total thyroidectomy. Oral acetaminophen was initiated, and her clinical manifestations improved markedly. Subsequently, her calcium levels returned to normal and she has not had recurrence of her symptoms.

Conclusion: Pseudogout attacks after parathyroidectomy are well known to thyroid surgeons. These episodes are related to abrupt reduction in serum calcium levels during postoperative hypoparathyroidism. Such reduction can occur as well in patients undergoing total thyroidectomy. The possibility of crowned dens syndrome should be considered when fevers, headaches, and neck stiffness occur in elderly patients after thyroid surgeries.

89. Adrenocortical Carcinoma: Experience from a Tertiary Care Center in South India

SS Thomas¹, A Marathe², AJ Cherian³, VT Thomas⁴, SS Sen⁵, MJ Paul⁶, DT Abraham⁷

¹⁻⁷Christian Medical College, Vellore, Tamil Nadu, India

Purpose: This study was conducted to highlight the clinico-pathological profile and treatment outcomes in patients diagnosed with adrenocortical carcinoma (ACC).

Materials and methods: Data of patients diagnosed and managed with ACC between January 2004 and December 2016 were retrospectively analyzed using STATA 15.0.

Results: Forty-four patients were reviewed among whom 26 (59%) were female. The mean age at diagnosis was 38 years (range: 9–74 years). The tumor was functional in 26 (59.1%), cortisol being the most common hormone secreted. Thirty seven (84%) underwent surgical resection, 29 (78.37%) being R0. Among the 37, 19 (51.3%) required resection of adjacent organs, out of which 9 had local recurrence. Adjuvant therapy included radiotherapy (15), chemotherapy (13) and mitotane (8). Disease regression was witnessed in 5 patients on mitotane and chemotherapy.

The mean duration of follow-up was 31.5 months (6–84 months) during which time 26 patients (59%) developed systemic metastasis with 15 (34%) deaths. The overall survival was 29.5 months.

Conclusion: Adrenocortical carcinoma is an aggressive malignancy with a poor prognosis. In contrast to literature, this cohort of patients presented a decade earlier with a female preponderance. Majority are functional (59%), and cortisol being the most common hormone secreted. Surgery is the main stay of treatment with excision of adjacent organs required in a subset of patients (51.3%). In spite of extensive surgery, they are associated with a risk of local recurrence (24.3%) and systemic metastasis (59%). Therefore, it is prudent to manage these patients in a multimodal fashion.

90. Primary Hyperparathyroidism: Perspective from a South Asian Country

SS Thomas¹, AJ Cherian², VT Thomas³, SS Sen⁴, MJ Paul⁵, DT Abraham⁶

^{1–6}Christian Medical College, Vellore, Tamil Nadu, India

Purpose: This study was performed to analyze the clinicopathological profile and management outcomes of patients diagnosed with PHPT from a low-middle income country.

Materials and methods: Data of patients with PHPT surgically managed between 2011 and 2018 were retrospectively collected and analyzed using STATA 15.0.

Results: Three hundred and fifty four patients (155 males and 199 females) were surgically managed for PHPT in the study period—9 (2.5%) were MEN 1 related while the remaining were sporadic. The mean age at presentation was 45.6 years (range: 15–82). 325 (91.8%) were symptomatic, the most common symptom being recurrent renal calculi (40.7%). The mean preoperative serum calcium and PTH were 11.81 ± 1.49 mg/dL (range: 9.2–18.9 mg/dL) and 1031.66 ± 524.28 pg/mL (range: 72.9–2675), respectively. 76.8% concordance was seen on preoperative localisation with USG and 99m Tc sestamibi. Two hundred and thirty six (66.6%) underwent focused parathyroidectomy while 118 (33.4%) had cervical exploration with excision of single or multiple glands. The average weight of the excised gland was 2.12 g (range: 0.03–21.4 g). Histopathology revealed 326 (92.1%) adenomas, 11 (3.1%) atypical adenoma, 12 (3.3%) hyperplasia and 3 (0.8%) carcinomas. The mean duration of follow-up was 26.2 months (1–96 months). Initial success rate following parathyroidectomy was 96.6% and cure rate including reoperations was 99.2%.

Conclusion: The majority of patients with PHPT in low-middle income countries continue to be symptomatic with large glands. USG and MIBI are good modalities for localisation with a concordance rate of 77% in this cohort. Adenoma is the most common cause for PHPT accounting for 92% in this series. Close to 100% cure rates can be achieved in high volume centers.

91. Takotsubo Cardiomyopathy in Patients with Pheochromocytoma: A Local Case Series

M Thwin¹, A Nassour², M Sywak³

^{1–3}Royal North Shore Hospital, Australia

Purpose/Introduction: Takotsubo cardiomyopathy is a form of stress cardiomyopathy with a reported incidence of 1–3% in the literature. The relationship between pheochromocytoma and Takotsubo or Takotsubo-like cardiomyopathy is a recognized phenomenon. The purpose of this study was to investigate the incidence of Takotsubo cardiomyopathy in the setting of pheochromocytoma within the population of patients seen through the Endocrine Unit at Royal North Shore Hospital, in comparison to reported incidence in the general population.

Materials and methods: A retrospective study was performed using the patient database of the Royal North Shore Hospital Endocrine Unit to identify patients treated for pheochromocytoma during the period 2009–2019. Electronic notes were reviewed to identify those patients who received perioperative cardiac workup including echocardiogram, and evidence on echocardiogram of Takotsubo or stress cardiomyopathy.

Results: Between January 2009 and May 2019 a total of 80 patients underwent surgery for pheochromocytoma through the Endocrine Unit. Of these, 24 had evidence of perioperative echocardiogram, 22 of which were preoperative examinations. Of those patients who had echocardiograms, 6 had evidence of stress cardiomyopathy (7.5% of the total number).

Conclusion: 7.5% of the study population had perioperative evidence of Takotsubo or Takotsubo-like cardiomyopathy. This is higher than the reported incidence in the literature of 1–3%. Despite the limitations of this retrospective study, even in the limited numbers presented there was evidence of higher than average incidence of Takotsubo cardiomyopathy in patients with pheochromocytoma.

92. Parathyroid Assessment by Near-infrared Imaging and Indocyanine Green Angiography in Endocrine Neck Surgery: An Australian Exploratory Study

Henry To¹, Christina Foley², Jane Harding³, Tracey Lam⁴, Jason Tan⁵, Stephen Farrell⁶

¹⁻⁶Endocrine Surgery Unit, St Vincent's Hospital, Melbourne, Australia

Purpose: This exploratory study aims to familiarize endocrine surgeons with use of near-infrared imaging (NIFI) and indocyanine green (ICG) angiography for parathyroid glands to establish its role in routine practice. Near-infrared imaging utilises intrinsic auto-fluorescence properties of parathyroid tissue to confirm its identification. Indocyanine green angiography may have an emerging role in proving vascularization and preservation of parathyroid function.

Materials and methods: Near-infrared imaging and indocyanine green angiography was performed intraoperatively after identification of parathyroid tissue. Near-infrared imaging assessed parathyroid tissue was confirmed via pathology and ICG angiography assessment was correlated with surgeon impression and postoperative parathyroid function.

Results: In 31 patients (8 males, mean age 56 years) of a variety of endocrine neck operations, 65 parathyroids were identified and 48 of these were tested with NIFI and ICG angiography. No patients had allergic reactions. Auto-fluorescence was seen in all but 2 cases (4%) of histologically confirmed parathyroid tissue, but not found to be strong enough to search for parathyroid glands. Indocyanine green angiography of parathyroid tissue was correlated to biochemical function in 8 patients where 4 parathyroids were identified: one with secondary hyperparathyroidism had parathyroid-remnant ICG vascularity but unexpectedly undetectable day 1 PTH; two total thyroidectomy patients (with parathyroid auto-transplantation) had poor parathyroid angiography with confirmed undetectable PTH on day 1; 5 patients (including one secondary hyperparathyroidism patient) had normal appearing ICG angiography of at least one gland and normal PTH.

Conclusion: Near-infrared imaging had some use in confirming parathyroid tissue but future advances may broaden its indications. Indocyanine green angiography may have relevance in predicting remnant or in situ parathyroid viability.

93. Transoral Endoscopic Thyroidectomy via Vestibular Approach: Experience from a Major Cancer Center in Vietnam

TT Truong¹, BT Diep²

^{1,2}Ho Chi Minh City Oncology Hospital, Vietnam

Purpose: Transoral endoscopic thyroidectomy via vestibular approach (TOETVA), after reported by Anuwong et al. in 2016, was found to be relatively safe while giving excellent cosmetic results. Ho Chi Minh City Oncology Hospital (HCMCOH) was the one of the first centers to perform this relatively new technique in Vietnam. This study aimed to evaluate the outcomes, rate of complications related to surgery and patients' satisfaction about cosmetic result.

Materials and methods: We reported results of all 51 patients who received TOETVA from January 2019 to August 2019 at HCMCOH. Reported outcomes included blood loss, operation time, hospitalization duration, pain score, complication rates and cosmetic satisfaction. Patients who had benign thyroid tumors or well-differentiated thyroid cancers, with thyroid volume smaller or equal to 45 mL, thyroid nodule diameter less than 40 mm (for benign tumors) and 10 mm (for malignant ones) were eligible for TOETVA. Patients who had recurrent diseases or thyroid cancers with local invasion, lymph node metastasis, or distant metastasis were excluded.

Results: Most patients were women (49/51 patients), mean tumor size 35 mm $\pm$ 9.63 mm (range 5–55 mm). Mean operation time was 108.5 $\pm$ 34.8 minutes, mean blood lost 10–20 mL, hospitalization duration: 2 days, visual analogue scale pain score: 1–2 points. We reported 3 cases of subcutaneous emphysema, 2 transient mental nerve injury. No case with hemorrhage, infection, recurrent laryngeal nerve palsy or hypoparathyroidism was reported. All patients were satisfied with the cosmetic result.

Conclusion: TOETVA were performed at HCMCOH with low complication rate and excellent cosmetic results (Figs 1 to 3).

Fig. 1: Operation with 3 trocars via vestibular approach

Fig. 2: Suture in the vestibular area

Fig. 3: No scar in vestibular area after 2 weeks

94. Do We Comply with the International Guidelines for the Management of Patients with Asymptomatic Hyperparathyroidism?

Utku E Soyaltın¹, Esmâ P Köroğlu², Murat Özdemir³, Can Uç⁴, Mehmet Erdoğan⁵, Gökhan İçöz⁶, Özer Makay⁷

^{1,2,5}Internal Medicine Department, Endocrine Division, Ege University, Turkey

^{3,4,6,7}General Surgery Department, Endocrine Surgery Division, Ege University, Turkey

Background and aims: Operating criteria for management of asymptomatic patients were updated in 2014. This study aimed to assess compliance of management of asymptomatic primary hyperparathyroidism (pHPT) cases to the guidelines and investigate possible causes for low compliance rates.

Materials and methods: Patients with pHPT, admitted to the outpatient clinics of “Endocrinology and Metabolism” and “Endocrine Surgery” between 2017 and 2019 were retrospectively reviewed.

Results: In total 58 patients were evaluated. Mean age was 56.7 years (<50 years 29%). Twelve percent of patients had blood calcium levels >11.5 mg/dL, 24% had osteoporosis, 5% osteoporotic fracture and 10% kidney stones. 24-hour urine calcium level was >400 mg/day in 8% and GFR <60 in 7% of patients. Nineteen (76%) of 25 (43%) patients with indication for surgery were operated. Two of 6 patients were not operated due to advanced age and negative imaging. Four cases were not operated only because of advanced age. Mean age of these 6 patients was 81 and mean blood calcium level was 11.2 mg/dL. Mean age of 19 operated patients was 51 and mean blood calcium level was 11.28 mg/dL. Cure rate in operated patients was 94.7%. Thirty-three (56.8%) patients had no indication for surgery. Mean blood calcium level of 30 non-operated patients was 10.5 mg/dL and mean age was 59 years. Imaging was negative in 6 (18%) of non-operated patients.

Discussion: In this study, the compliance rate to the guidelines was found to be 75%.

95. Clinicopathological Features of Papillary Thyroid Carcinoma with Type 2 Diabetes Mellitus

Ye-chi Wang

The First Hospital of Jilin University, Jilin, China

Purpose: The purpose of this study is to analyze the characteristics between the papillary thyroid carcinoma (PTC) patients with type II diabetes mellitus (TIIDM) and without TIIDM. So we strengthen the clinicians’ understandings of the two diseases and choose the operative methods reasonably, promote the recovery of patients and improve the prognosis.

Materials and methods: A retrospective data, which enrolled 172 patients of PTC who underwent thyroid surgery operation in 1st Hospital of Jilin University from September 2015 to March 2018, including 47 patients with TIIDM and 125 patients without TIIDM.

Results: Compared the patients without TIIDM, the average age of onset was older (53.3 ± 9.1 vs 53.3 ± 9.1) and length of stay (10 days vs 8 days) was longer to the patients with TIIDM ($p < 0.05$). Compared with the PTC patients without TIIDM, the rate of capsular invasion (72.3% vs 52.8%), vascular or nerve invasion were higher (21.3% vs 8%), and the TNM stage was later in PTC patients with TIIDM ($p < 0.05$). The levels of FT3 in PTC patients with TIIDM (4.6 ± 0.6 pmol/L) was lower than that of PTC patients without TIIDM group (4.9 ± 0.6 pmol/L) ($p < 0.05$).

Conclusion: In addition to the blood glucose level in perioperative period, we should also care about the changes of thyroid function examinations of the patients with TIIDM. After the operation, we should pay more attention to changes of PTC patients with TIIDM, to prevent the postoperative complications and promote the patient’s rapid recovery process.

96. The Separation of the Alar Fascia Promotes a Complete Dissection of the Lymph Nodes Posterior to the Right Recurrent Laryngeal Nerve Under the Endoscope

Bo Wang¹, Jing Zheng², Shao-Jun Cai³, Wen-xin Zhao⁴, Brandon Wang⁵

¹⁻⁵Fujian Medical University Union Hospital, China

Purpose/Introduction: To analyze the significance of the separation of alar fascia on the endoscopic dissection of lymph nodes posterior to the right recurrent laryngeal nerve. Provided anatomical support for the endoscopic dissection of the cervical central compartment.

Materials and methods: A retrospective study of endoscopic central compartment dissection in our hospital. Alar group and the traditional group are divided according to whether the alar fascia was separated previously. The number of lymph nodes harvested in the right central compartment and postoperative drainage was recorded.

Results: Of the 74 patients undergoing endoscopic right-side thyroidectomy and central compartment dissection. Comparing the group with the alar fascia separation (A group) and the group without the alar fascia separation (traditional group), the number of lymph node dissections in the right-side central compartment of group A and group T were 11.6 ± 5.17 and 10.77 ± 4.7 , respectively, $p > 0.05$. However, the lymph nodes harvested

in the right posterior group were 3.46 ± 1.67 and 1.86 ± 1.67 , respectively, $p < 0.05$. The lymph nodes metastasized in the right posterior group were 0.59 ± 0.91 and 0.14 ± 0.49 , respectively, $p < 0.05$, and the postoperative drainage was 162.9 ± 78.3 mL, and 131.3 ± 45.6 mL, apiece, $p < 0.05$. **Conclusion:** The separation of the alar fascia under endoscopic is a critical step in the dissection of the PrRLN lymph node, which is helpful for harvest more lymph nodes. The procedure of alar fascia separation benefit for patients with PrRLN lymph nodes metastasized. It may consider as a standard step in the central compartment dissection under the endoscope (Figs 1 and 2).

Fig. 1: Shows the surgical filed after the dissection of lymph node posterior to the right recurrent laryngeal nerve

Fig. 2: Shows the movement of apex pulmonis during the inflation of the lung

97. Surgical Technique based on Cervical Fascial Anatomy for Systematic Resection of Lymph Nodes Posterior to the Right Recurrent Laryngeal Nerve

Jing Zheng¹, Bo Wang², Wenxin Zhao³, Shao J Cai⁴

¹⁻⁴Fujian Medical University Union Hospital, China

Purpose/introduction: Neck has typical and sophisticated facial structures. A good understanding of the anatomical features of cervical fascia and fascial space around thyroid can improve the surgical operation of the thyroid cancer and reduce accompanying complications. The alar fascia was described as a complete layer of fascia between the visceral and the prevertebral fasciae, which form the anatomic basis of the dissection of cervical lymph nodes posterior to the right recurrent laryngeal nerve (LN-prRLN) for thyroid cancer.

Materials and methods: A 42-year-old woman presented with a 1.2 cm clinically node-negative papillary thyroid cancer in the right thyroid lobe. Endoscopic thyroidectomy with central compartment neck dissection is performed. Surgical technique based on cervical fascial anatomy for systematic resection of LN-prRLN is illustrated.

Results: After endoscopic thyroidectomy with dissection of prelaryngeal pretracheal lymph nodes and lymph nodes anterior to right RLN (not illustrated), we apply a six-step approach to the fascial anatomy of LN-prRLN. (1) Release the RLN from its initial segment; (2) open the alar fascia from anterior to posterior along the sympathetic trunk and carotid sheath; (3) isolate and protect the inferior thyroid artery and its branches, which is the primary blood supply of parathyroid glands; (4) disconnect the trachea and esophagus branch of the RLN; (5) dissect the alar fascia at the superior edge of the innominate artery and separate upward along the surface of the esophagus; (6) the lymphatic adipose tissue is then transferred to the lateral side of the RLN and then removed.

Conclusion: A complete dissection of LN-prRLN, requires a thorough understanding of the anatomic relationship between the RLN and cervical fascia. According to our experience, this systematic six step approach of fascial anatomy is a meticulous, complete, reproducible, and teachable approach to the endoscopic dissection of LN-prRLN with low morbidity.

98. The Origin and Course of the Blood Supply to the Inferior Parathyroid Gland

Wang Jianbiao¹, Zhou Liang², Xie Lei³

¹⁻³Department of Head and Neck Surgery, Sir Run Run Shaw Hospital, Zhejiang University School of Medicine, Hangzhou, Zhejiang, China

Introduction: Though inferior parathyroid gland (IPTG) is typically supplied by inferior thyroid artery (ITA), the origin and course of the small branches entering the gland [defined as inferior parathyroid artery (IPA)] remains unclear. The objective of this study was to investigate the anatomical characteristics and surgical significance of IPA.

Materials and methods: A retrospective review of 258 patients with papillary thyroid carcinoma who underwent thyroidectomy plus central neck dissection (CND) between May 2017 and September 2019 was authorized. After CND, the position and blood-vessels of IPTG was sketched in relation to the recurrent laryngeal nerve (RLN) and thymus.

Results: A total of 352 IPTGs were likely recovered after 352 single CND. 189 (53.7%) IPTGs were found supplied by the branches of ITA, abutting against the carotid artery and lateral to the RLN, 52.3% in the right and 55.1% in the left. 64 (18.2%) glands were supplied by the branches of ITA, traversing medial to the RLN, 26.7% in the right and 9.7% in the left. Fifty six (15.9%) glands were supplied by vessels from thymus or mediastinum, 11.9% in the right and 19.9% in the left. Twenty (5.7%) glands were supplied by the branches of superior thyroid artery (STA), 3.4% in the right and 8.0% in the left (Figs 1 and 2).

Conclusion: There is a definite pattern of the origin and blood supply of IPTG. The types of predilection of IPA are, in order of frequency, branch of ITA lateral to RLN; branch of ITA medial to RLN; origin from thymus or mediastinum; branch of STA (Table 1).

Table 1: Types of origin and course of the blood supply to the inferior parathyroid gland

Types	Total number of CND (n = 352)	CND in the right side (n = 176)	CND in the left side (n = 176)
Branch of ITA lateral to RLN	189 (53.7)	92 (52.3)	97 (55.1)
Branch of ITA medial to RLN	64 (18.2)	47 (26.7)	17 (9.7)
From thymus or mediastinum	56 (15.9)	21 (11.9)	35 (19.9)
Branch of STA	20 (5.7)	6 (3.4)	14 (8.0)
Unclear state	23 (6.5)	10 (5.7)	13 (7.4)

Values in parentheses are percentages. ITA, inferior thyroid artery; RLN, recurrent laryngeal nerve; CND, central neck dissection; STA, superior thyroid artery

Figs 1A to D: Diagram of the origin and course of the blood supply to inferior parathyroid gland; (A) The inferior parathyroid gland (IPTG) supplied by the branch of inferior thyroid artery (ITA), abutting against the carotid artery medially, lateral to the recurrent laryngeal nerve (RLN); (B) The IPTG supplied by the branch of ITA, traversing medial to the RLN; (C) The gland closely proximate to or within the thymic tongue, supplied by the vessels from thymus (TM) or mediastinum; (D) The gland supplied by the branch of superior thyroid artery (STA). SPTG, superior parathyroid gland; MTV, middle thyroid vein; ITV, inferior thyroid vein.

Figs 2A to D: Intraoperative views of the origin and course of the blood supply to the inferior parathyroid gland; (A) Branch of the inferior thyroid artery (ITA), lateral to the recurrent laryngeal nerve (RLN); (B) Branch of the ITA, medial to the RLN; (C) From thymus or mediastinum; (D) Branch of the superior thyroid artery. (1) Inferior parathyroid gland; (2) common carotid artery; (3) recurrent laryngeal nerve; (4) trachea; (5) branch of the ITA, lateral to the RLN; (6) branch of the ITA, medial to the RLN; (7) thymus; (8) branch of the superior thyroid artery

99. Male and Younger Age are Risk Factors of CLNM for Clinical N0 PTC with Strap Muscle Invasion

Shuai Xue¹, Rui Li², Hui Han³, Peisong Wang⁴, Guang Chen⁵

¹⁻⁵Department of Thyroid Surgery, The 1st Hospital of Jilin University, Changchun, Jilin, China

Introduction: Predictive factors of central lymph node metastasis (CLNM) for clinical N0 (cN0) papillary thyroid carcinoma (PTC) with strap muscle invasion (SMI) were not investigated. Whether prophylactic central lymph node dissection (CLND) should be performed for all cN0 PTC with SMI was still unknown.

Materials and methods: A retrospective cohort study was carried out in cN0 PTC patients who underwent thyroid surgery from 2009 to 2019. In total, 281 PTC patients with SMI were included.

Results: Clinical N0 was found among 152 PTC patients (54.1%, 152/281). By prophylactic CLND, CLNM were identified in 77 cases (50.7%, 77/152). Univariate and multivariate analysis showed male (OR: 6.22, 95% CI: 1.43–27.10, $p = 0.02$) and younger age (<40 years) (OR: 9.94, 95% CI: 2.79–35.44, $p = 0.00$) were risk factors of CLNM for cN0 PTC with SMI. The prevalence of CLNM was 87.5% in younger male patients while only 23.8% in older female PTCs. Large-volume CLNM (≥ 5 lymph node metastasis) was only identified among 18 cases (11.8%, 18/152). However, no predictive factors of larger-volume CLNM were found by univariate and multivariate analysis.

Conclusion: CLNM was more frequently found in male and young (<40 years) patients. These findings support the notion that prophylactic CLND may be favored in young and male cN0 PTC patients as a primary therapeutic option.

100. Predictive Factors of Large-volume CLNM in Clinical N0 PTMC

Shuai Xue¹, Li Zhang², Zhe Han³, Peisong Wang⁴, Guang Chen⁵

^{1,3-5}Department of Thyroid Surgery, The 1st Hospital of Jilin University, Changchun, Jilin, China

²Department of Nephrology, The 1st Hospital of Jilin University, Changchun, Jilin, China

Introduction: Large-volume central lymph node metastasis (CLNM) is associated with poor prognosis of papillary thyroid microcarcinoma (PTMC). Preoperatively, sensitivity of imaging in the detection of CLNM is reported to be low. The purpose of this study is to investigate the clinicopathological factors associated with large-volume CLNM in clinical N0 (cN0) PTMC patients.

Materials and methods: A retrospective cohort study was carried out in cN0 PTMC patients who underwent total thyroidectomy and prophylactic central lymph node dissection (CLND) thyroid surgery from 2009 to 2019. In total, 2,489 cN0 PTMC patients were enrolled. The correlations between clinicopathological factors and large-volume CLNM were investigated.

Results: Large-volume CLNM was found in 142 (5.7%) patients. Male, young age (<40 years) and intrathyroidal spread were identified as independent risk factors for large-volume CLNM in multivariate analyzes. The prevalence of large-volume CLNM ranged from 24.5% in male patients <40

years of age to only 2.1% in female patients aged ≥ 40 years. The prevalence of large-volume CLNM was 77.8% in male patients < 40 years with intrathyroidal spread while only 1.7% in female patients aged ≥ 40 years without intrathyroidal spread.

Conclusion: Large-volume CLNM was more frequently found in young (< 40 years), male patients with intrathyroidal spread. These findings support the notion that prophylactic CLND may be favored in young, male cN0 PTMC patients with intrathyroidal spread.

101. Routine Lateral Level V Dissection May Not Be Necessary for PTMC with LLNM

Shuai Xue¹, Li Zhang², Renzhu Pang³, Shuai Yang⁴, Xianying Meng⁵, Guang Chen⁶

^{1,3-6}Department of Thyroid Surgery, The First Hospital of Jilin University, Changchun, Jilin, China

²Department of Nephrology, The First Hospital of Jilin University, Changchun, Jilin, China

Introduction: Lateral lymph node metastasis (LLNM) is associated with distant metastasis, locoregional recurrence and cancer-specific mortality, although the prevalence of LLNM among patients with papillary thyroid microcarcinoma (PTMC) is relatively low. The potential benefits and risks of routine lateral level V dissection (LVD) for PTMC with LLNM have not been previously investigated.

Materials and methods: A total of 6,880 consecutive PTMC patients who underwent initial surgery at the First Hospital of Jilin University from January 2009 to July 2017 were retrospectively analyzed. A total of 252 N1b PTMC patients were enrolled in our study.

Results: The overall and occult metastasis rates in level V lymph nodes were 21.4% and 6.4%, respectively. Patients with N1b PTMC who received LVD did not show a significantly lower disease-free survival (DFS) than that of patients who did not receive LVD [hazard ratio = 1.11 (CI 0.38–3.21); $p = 0.85$]. Meanwhile, LVD simultaneously increased the hospital stay and cost ($p = 0.03$; 0.02). Multivariate logistic regression analysis revealed that III-level simultaneous metastasis in the lateral neck was an independent risk factor for level V metastasis [odds ratio = 8.6 (CI 1.42–51.72); $p = 0.02$].

Conclusion: Because of the low metastasis rate in level V lymph nodes, the lack of benefit for recurrence, the longer hospital stay and the higher cost associated with LVD, N1b PTMC patients without clinical level V metastasis may not need to undergo routine dissection. Prophylactic LVD may be recommended only for patients with N1b PTMC with 3-level simultaneous metastasis.

102. Potential Role of Carbon Nanoparticle in Total Thyroidectomy with Central Lymph Node Dissection

Shuai Xue¹, Li Zhang², Hui Han³, Peisong Wang⁴, Guang Chen⁵

^{1,3-5}Department of Thyroid Surgery, The First Hospital of Jilin University, Changchun, Jilin, People's Republic of China

²Department of Nephrology, The First Hospital of Jilin University, Changchun, Jilin, People's Republic of China

Introduction: Whether we should use carbon nanoparticle (CN) routinely in thyroid surgery is still controversial.

Materials and methods: Four hundred and six papillary thyroid cancer (PTC) patients who underwent total thyroidectomy (TT) with bilateral central lymph node dissection (CLND) from January 2010 to December 2012 were retrospectively analyzed.

Results: The incidence of transient hypoparathyroidism and hypocalcemia in CN group was significantly lower than the control group at second, fifth day after surgery ($p = 0.004$, 0.042, 0.002 and 0.045, respectively). However, no significant difference existed between the two groups about the permanent hypoparathyroidism and hypocalcemia ($p = 1.000$). Total number of central lymph nodes and metastatic lymph nodes in CN group were more than those in control group ($p = 0.031$ and 0.038, respectively). However, recurrence was not significantly different between the two groups after at least 5-year follow-up ($p = 0.7917$). In the subgroup of prophylactic and therapeutic CLND study, no significant difference existed between the two groups ($p = 0.5295$ and 0.8459, respectively).

Conclusion: Carbon nanoparticle significantly help in identifying the parathyroid glands in surgery and increased the number of lymph nodes in central compartment. However, we should not exaggerate the function of CN since it couldn't improve the permanent hypoparathyroidism and recurrence in PTC patients who underwent TT with bilateral CLND.

103. Serum Thyroglobulin in the Diagnosis of Follicular Thyroid Neoplasm: A Systematic Literature Review

Yuki Yamanashi¹, Yusaku Yoshida², Kiyomi Horiuchi³, Takahiro Okamoto⁴

¹⁻⁴Department of Breast and Endocrine Surgery, Tokyo Women's Medical University, Japan

Purpose/Introduction: Clinical utility of measuring serum thyroglobulin (Tg) in the differential diagnosis of follicular thyroid neoplasm has been controversial. A systematic review was conducted to determine the test performance as well as to reveal methodological issues that might be threats to validity.

Materials and methods: Medline (1966 to May 2019) was used to search for relevant studies. Bibliographies of the retrieved articles were perused for additional citations. Inclusion criteria for the overview were as follows: a study population was patients with surgically proven follicular thyroid

carcinoma or adenoma, the test examined was serum Tg, the reference standard was histopathology, and the outcomes were sensitivity/specificity. Selected studies were critically appraised their validity.

Results: Among 323 citations retrieved from the systematic search, 59 full-test articles were screened for eligibility, and two of them met the inclusion criteria. One study using the cut-off value of 1,000 ng/mL reported sensitivity of 0.55 (95% CI: 0.23–0.83) and specificity of 0.87 (0.79–0.93). Another study estimated its sensitivity and specificity to be 0.72 (0.55–0.85), 0.80 (0.66–0.91), respectively with the cut-off of 500 ng/mL. The former study limited its study population to solitary nodule while the other included multiple nodules. Neither of the studies reported reproducibility of histopathological diagnoses. It was unclear whether a high level of serum Tg was a part of indication for surgery (verification bias) in both studies.

Conclusion: The quality of evidence was unsatisfactory. Research design to overcome both variations in pathological diagnoses and verification bias needs to be developed.

104. Do Asymptomatic Retrosternal Goitres Require Surgery? Review of Literature and Management Algorithm

JWK Yau¹, JY Yeo², AD Rao³, RM Singaporewalla⁴

^{1–4}Department of Surgery, Endocrine Surgical Service, Khoo Teck Puat Hospital, Singapore

Introduction: Retrosternal goitres (RSG) can be a challenging disease, as the mediastinal extension brings it into close contact with vital structures. Typically, surgery is reserved for symptomatic patients, with no clear guidelines regarding management of asymptomatic patients.

Materials and methods: We conducted a literature review of articles from 2010 to 2019, with the aim of proposing a management algorithm for asymptomatic RSG. An institutional review of our RSG cases from 2010 to 2019 was also conducted.

Results: A total of 14 review articles were shortlisted for analysis. No definite guidelines exist in literature regarding the management of asymptomatic RSG. Some papers advocate surgery for young fit patients. About 90% of RSG can be resected trans-cervically. Only 1–3% of all RSG surgeries require a sternotomy. The remaining can usually be approached via video-assisted thoracoscopic surgery (VATS), with only 8% requiring conversion to sternotomy. Vast majority of surgical patients have no significant morbidity or mortality. These findings were consistent with our experience of 20 operated RSG cases (18 trans-cervical: 1 combined VATS: 1 sternotomy). All patients made an uneventful recovery. A management algorithm was designed based on above findings (Tables 1 and 2).

Conclusion: With advances in surgical techniques and minimally-invasive approaches, early resection can be considered for asymptomatic RSG patients who are young and fit. This is as opposed to waiting for symptoms to develop, which entails a potentially higher surgical risk later on due to patients' increased age, new comorbidities and significant increase in size/complexity of goiter anatomy (Fig. 1).

Fig. 1: Proposed management algorithm when approaching a retrosternal goitre

Table 1: Conduct of RSG surgeries performed in our institution from 2010 to 2019

Extent of thyroid surgery	
Total thyroidectomy	13
Hemi-thyroidectomy	6
Excision of ectopic nodule	1
Use of intraoperative nerve monitoring	
12	
Approach for dissection of retrosternal goitre	
Trans-cervical approach	18
Combined VATS	1
Midline sternotomy	1

Table 2: Postoperative complications and length of stay of RSG surgeries performed in our institution from 2010 to 2019

Postoperative complications	
None	17
Transient voice hoarseness	1
Hypocalcaemia requiring IV replacement	2
Hospital stay >7 days	0
Re-admission	0
Patient was discharged on:	
POD 1	2
POD 2	3
POD 3	8
POD 4	6
POD 6	1

105. The Characteristics of Central Metastatic Lymph Node in PTMC with cN0

Sun Yayu

Hangzhou, China

Purpose: The incidence of papillary thyroid carcinoma (PTC) increased rapidly in recent decades. Many researchers suggest that some low-risk papillary thyroid microcarcinoma (PTMC) patients can be under active observation instead of have surgery immediately. But there is still a lot of controversy. Majorly there are three worries, local invasion, local regional lymph node metastasis and distant metastasis. In PTMC patients, about 40% of them have central lymph node metastasis. The purpose of these article is to study the metastasis lymph nodes' characters of low-risk papillary microcarcinoma.

Materials and methods: Four hundred and sixty seven patients who have CN0 thyroid papillary microcarcinoma underwent thyroidectomy with prophylactic lymph node excision in Department of Head and Neck Surgery of Zhejiang University, Sir Run Run Shaw Hospital from January 2014 to December 2015. We observed their pathological section. Observed and analyzed the central metastasis lymph nodes' number, excisional lymph nodes' number, size of metastasis and lymph node, area proportion of metastasis, major diameter of metastasis.

Results: In 467 patients, women 373 (79.9), men 94 (20.1%), average age is 44.1. The postoperative pathology found the average tumor size is 0.58 cm, 138 (29.6%) patients have central lymph node metastasis, 55 (11.8%) have extrathyroid extension, 190 (40.7%) patients have more than one original tumor, 7 (1.5%) patients have intrathyroid spreading, 123 (26.3) patients have Hashimoto disease. Among 138 patients who have central lymph node metastasis, 108 (78.3%) patients' largest metastasis's largest dimension <2 mm, 106 (76.8%) patients are low risk papillary thyroid carcinomas.

Conclusion: Although low-risk papillary thyroid carcinoma has a risk of central cervical lymph node metastasis, but most of them is only micrometastase, can be active observed instead of surgery.

106. Distribution of the Renal Calcium Creatinine Clearance Ratio among Patients with Primary Hyperparathyroidism

Yusaku Yoshida¹, Kiyomi Horiuchi², Takahiro Okamoto³

¹⁻³Department of Breast and Endocrine Surgery, Tokyo Women's University, Japan

Purpose: The renal calcium creatinine clearance ratio (CCa/CCr) is used to differentiate primary hyperparathyroidism (PHPT) from familial hypocalciuric hypercalcemia (FHH). The distribution of CCa/CCr among a large number of patients with PHPT, however, has rarely been reported. **Materials and methods:** A retrospective study was conducted on 688 patients with surgically proven PHPT treated between 2007 and 2018. The main outcome was the distribution of CCa/CCr. The following variables were also collected for each patient: age, gender, laboratory data, signs/symptoms, pathological diagnosis, and familial history.

Results: Female/male ratio was 496/192, and the median age was 68 years old (range, 15–87). Six hundred and forty seven patients were sporadic while 41 patients were familial form of PHPT. Histopathological diagnoses of the parathyroid lesions included adenoma (635 patients), atypical adenoma (10 patients), hyperplasia (34 patients), and carcinoma (9 patients). Preoperative median (range) values of serum calcium, intact PTH, 24-hour renal calcium excretion, and CCa/CCr were 10.7 mg/dL (7.1–14.4), 164 pg/mL (45–3,826), 220 mg/day (10–620) and 0.0172 (0.0021–0.0671), respectively. Number (%) of patients with CCa/CCr < 0.01 and those with CCa/CCr > 0.02 were 83 (12%) and 247 (36%), respectively.

Conclusion: About one-tenth of patients with PHPT shows their CCa/CCr values in the range of suspecting FHH. Documenting apparent parathyroid lesions by imaging studies would corroborate the diagnosis.

107. Analysis of Predictors for Early Recurrence of Papillary Thyroid Carcinoma

Qiang Zhang¹, Li Zhang², Xianying Meng³, Guang Chen⁴

¹⁻⁴Department of Thyroid Surgery, The First Hospital of Jilin University, Changchun, Jilin, China

Objective: We aim to find the clinical predictors of early recurrence in PTC patients to find a reasonable intraoperative and postoperative treatment for PTC patients.

Materials and methods: We retrospectively reviewed the clinic-pathological characteristics of 1,792 PTC patients operated at the First Hospital of Jilin University between January 1, 2015 and December 31, 2015, all underwent thyroid lobectomy or total thyroidectomy with uni/bilateral prophylactic central/lateral neck dissection. Kaplan–Meier analysis was used to observe the early recurrence, univariate and multivariate analysis were used to identify the clinical predictors of early recurrence in PTC patients.

Results: Nine hundred and fifty eight out of 1,792 patients were followed, 28 of which had early recurrence. Univariate analysis found early recurrence to be associated with family history, tumor size (≥ 2 cm) multifocality, lymph node metastases number ≥ 5 , lateral node metastasis, and capsular invasion ($p < 0.05$), but not associated with age, gender, body mass index, TNM stage, operation pattern and Hashimoto disease coexistence ($p > 0.05$). COX regression analysis showed lateral lymph node metastasis ($p < 0.001$, OR = 9.55) and family history ($p < 0.001$, OR = 5.59) to be independent predictors for early recurrence in PTC patients (Fig. 1).

Conclusion: Lateral lymph node metastasis and family history should be considered to have a high risk of early recurrence in PTC patients.

Keywords: Early recurrence, Papillary thyroid carcinoma, Risk factors.

Figs 1A to D: Survival rate under different clinicopathological characteristics: (A) Tumor size; (B) Capsule invasion; (C) Number of lymph node metastasis; (D) Lymph node metastasis type

Table 1: Clinicopathological characteristics of the PTC patients

<i>Clinic-pathological characteristics</i>		<i>Control group (n = 300) (%)</i>	<i>Recurrence group (n = 28) (%)</i>	<i>p value</i>
Gender	Male	44 (14.7)	6 (21.4)	0.341
	Female	256 (85.3)	22 (78.6)	
Age	<55	257 (85.7)	24 (85.7)	0.995
	≥55	43 (14.3)	4 (14.2)	
Family history	Yes	25 (8.3)	10 (35.7)	0.000
	No	275 (91.7)	18 (64.3)	
Body mass index	<23.9	140 (46.7)	10 (35.7)	0.266
	>24	160 (53.3)	18 (64.3)	
Size	≤1 cm	228 (76)	13 (46.4)	0.000
	1–2 cm	54 (18)	7 (25)	
	≥2 cm	18 (6)	8 (28.6)	
Multifocality	Multi foci	142 (47.3)	21 (75)	0.005
	Uni focus	158 (52.7)	7 (25)	
Hashimoto coexistence	Yes	93 (31)	7 (25)	0.510
	No	207 (69)	21 (75)	
Lymph node metastasis	Yes	112 (37.3)	17 (60.7)	0.015
	No	188 (62.7)	11 (39.3)	
Neck metastasis	N1a	97 (86.6)	7 (41.2)	0.000
	N1b	15 (13.4)	10 (58.8)	
Number of node metastasis	≤3	255 (85)	15 (53.6)	0.000
	4	9 (3)	0 (0)	
	≥5	36 (12)	13 (46.4)	
Capsular invasion	No	99 (33)	5 (17.9)	0.004
	Micro invasion	172 (57.3)	14 (50)	
	Macro invasion	29 (9.7)	9 (32.1)	
Operation pattern	Lobectomy	72 (24)	8 (28.6)	0.590
	Total thyroidectomy	228 (76)	20 (71.4)	
TNM stage	I	233 (77.7)	19 (67.9)	0.096
	II	5 (1.6)	0 (0)	
	III	39 (13)	1 (3.6)	
	IV	23 (7.7)	8 (28.5)	

Table 2: COX regression analysis for independent risk factors of early recurrence of papillary thyroid carcinoma

	<i>B</i>	<i>SE</i>	<i>P</i>	<i>OR</i>	<i>95% OR</i>	
Tumor size	−0.306	0.262	0.242	0.736	0.440	1.230
Multifocality	0.044	0.401	0.913	1.045	0.476	2.290
Non capsule invasion			0.229			
Micro invasion	1.037	0.708	0.143	2.821	0.704	11.307
Macro invasion	0.182	0.557	0.744	1.199	0.403	3.570
Node metastasisnumber	0.004	0.042	0.922	1.004	0.924	1.091
Node metastasis			0.001			
N1b	2.257	0.681	0.001	9.554	2.514	36.309
N1a	0.088	0.516	0.865	1.092	0.397	3.003
Family history	1.721	0.421	0.000	5.590	2.447	12.770

108. Clinical Analysis of Risk Factors Attributing to Lateral lymph Node Metastases of Papillary Thyroid Microcarcinoma

Qiang Zhang¹, Qiyu Lu², Xianying Meng³, Quan-Yang Duh⁴, Guang Chen⁵

¹Department of Thyroid Surgery, The First Hospital of Jilin University, Changchun, Jilin, China; Department of Surgery, University of California, San Francisco, San Francisco, California, USA

^{2,3,5}Department of Thyroid Surgery, The First Hospital of Jilin University, Changchun, Jilin, China

⁴Department of Surgery, University of California, San Francisco, San Francisco, California, USA

Background and objective: Although most papillary thyroid microcarcinoma (mPTC) carries an excellent prognosis, it still has some severe aggressive biological behavior such as lateral lymph metastases (LLNM) in a few patients. We aim to find the risk factors of LLNM in mPTC patients, further to help finding a proper surgical strategy for these patients.

Materials and methods: Clinicopathological and genetic characteristics of 102 mPTC patients with LLNM were retrospective analyzed, controlled with 1,129 mPTC patients without LLNM, all the data were from the patients of the First Hospital of Jilin University between May 2014 and May 2016.

Results: There existed a significant differences in gender, age, tumor size, multifocality, bilaterality, capsular invasion, extrathyroidal infiltration, lymphovascular invasion, central lymph node metastases (CLNM) between the two groups by univariate analysis, while BRAF mutation, preoperative TSH and anti-thyroglobulin level, Hashimoto diseases showed no statistic differences between the two groups. Multivariate logistic regression indicated male gender (OR = 2.588), tumor size >0.5 cm (OR = 2.586), multifocality (OR = 2.384), extrathyroidal infiltration (OR = 2.533), lymphovascular invasion (OR = 17.925) and CLNM number >3 (OR = 8.123) were the independent risk factors of LLNM of mPTC patients.

Conclusion: mPTC patients with male gender, tumor size >0.5 cm, multifocality, extrathyroidal infiltration, lymphovascular invasion and CLNM number >3 should be considered to have a high risk of LLNM. BRAF mutation is not a predictor for LLNM in mPTC patients.

Keywords: BRAF, Lateral lymph node metastases, mPTC, Risk factors.

109. Thyroid Abscess: A Rare Endocrine Emergency. A Case Series and Literature Review

MS Baharudin¹, S Abdul Rahman², SS Mahamad³, A Baghawi⁴, NH Abdullah⁵

¹⁻⁵Breast and Endocrine Surgery Unit, Hospital Putrajaya, Malaysia

Introduction: Thyroid abscess can become a life-threatening endocrine emergency. The thyroid gland is very resistant to infection due to its anatomy, being surrounded by a capsule, has an extensive blood supply and excellent lymphatics drainage. Infection is almost unheard of as it has a high iodine content. The incidence for thyroid abscess is less than 1% of all thyroid diseases and most are seen in immunocompromised patients. We present the cases of thyroid abscess in four cases who were admitted in our center between 2000 and 2019.

Materials and methods: A report on thyroid abscess cases seen in our center from January 2000 to August 2019.

Results: We highlight the difficulties in diagnosing thyroid abscess as ultrasound or computed tomography could be inconclusive. This has resulted in delay in management. Fortunately, all four cases were successfully treated with intravenous antibiotics and drainage.

Conclusion: In conclusion, a high index of suspicion is needed to confidently diagnose a thyroid abscess, in order for a prompt action to be taken, for example surgery to drain the abscess to prevent further complications.

110. Oral Manifestations in Primary Hyperparathyroidism a Retrospective Study

D Dahiya¹, P Singh², SK Bhadada³, A Behera⁴

¹⁻⁴Department of General Surgery and Endocrinology, Postgraduate Institute of Medical Education and Research, Chandigarh, India

Purpose: Brown tumors are sequelae of abnormal bone metabolism in primary hyperparathyroidism (PHPT) with rare involvement of maxillofacial bones. Oral manifestation may be the only presenting feature of PHPT and patient generally report first to maxillofacial surgeon with a diagnosis of giant cell tumor which is very similar in clinical, radiological and histological features to brown tumor. Therefore, we aim to evaluate the prevalence of oral manifestations in PHPT patients in a tertiary care center in North India.

Materials and methods: In the present study, 579 subjects from Indian PHPT registry from a tertiary center in North India were included. Patients were analyzed for the prevalence of oral manifestations in PHPT.

Results: Thirteen of 579 patients (2.24%) presented with maxillofacial brown tumor. Six of these 13 patients (1.03%) had oral manifestation as a first presentation of PHPT; four patients presented with facial asymmetry and two had difficult mouth opening. Maxillary and mandibular involvement was present in 6 patients each, and one patient had maxillary sinusitis.

Conclusion: The prevalence of oral manifestations in PHPT signifies the awareness of underlying parathyroid pathology among maxillofacial surgeons. The presence of underlying PHPT should be sought in all unexplained mandibular and maxillary lesions as the surgery for parathyroid gland alleviates oral symptoms avoiding unnecessary oral surgery. It also saves the patient from developing other systemic manifestations of hyperparathyroidism.

111. Obstructed Locally Advance Thyroid Carcinoma: Curative or Palliative Surgery?

I Azlinda¹, NA Hakim², EN Aina³, RA Rafli⁴, S Narasimman⁵

¹⁻⁵Breast and Endocrine Surgical Unit, Hospital Kuala Lumpur, Jalan Pahang, Kuala Lumpur, Malaysia

Introduction: Most of patients with thyroid carcinoma have well differentiated histology and intrathyroidal tumors will carry an excellent prognosis. Adverse prognostic factors include age, primary tumor size, extrathyroidal extension and distant metastases have been well established. Extrathyroidal extension has the greatest negative impact on prognosis. The reported incidence of extrathyroidal extension in well differentiated thyroid carcinoma ranges from 6% to 13%. Complete gross disease resection with insignificant morbidity is a fundamental goal for locally advanced thyroid cancer. Various considerations in extent of surgery and treatments are remained individualized.

Case description: We report a case of 78-year-old, gentleman, with gradually difficulty in breathing, stridor, hoarseness of voice and dysphagia for two months duration. He was clinically euthyroid. He had right vocal cord palsy and pharyngeal phase dysphagia. He was intubated due to airway compromised. CECT neck showed right thyroid mass with retrosternal component and tracheal extension causing severe narrowing at level T1. He underwent emergency total thyroidectomy and tracheal excision and reconstruction. Postoperative bronchoscopy showed intact anastomotic site. He needs ryle tube feeding. Histopathology result showed papillary thyroid carcinoma involving thyroid with tracheal invasion and present of macroscopic tumor at margin. He was scheduled for radioiodine ablation as adjuvant therapy.

Conclusion: Critical consideration in extent of surgery in an elderly patient with obstructed locally advance well differentiated thyroid carcinoma is still in a dilemma in most of surgeons. However successful resection can be done with minimum morbidity in an expert hand followed by appropriate adjuvant treatment will provide better outcome.

112. Manubrium Infiltration from Thyroid Carcinoma in Putrajaya Hospital a 15-year Evaluation

Dhiauddin H Ismail¹, Norhasniza M Zanyuin², Sadhana S Mahamad³, Anita Baghawi⁴, Nor H Abdullah⁵

¹⁻⁵Department of General Surgery, Breast and Endocrine Unit, Hospital Putrajaya, Malaysia

Purpose/Introduction: The objective of our study is to evaluate the clinical experience in managing sternal metastasis from the thyroid carcinoma in Putrajaya Hospital in the past 15 years.

Materials and methods: This is a retrospective analysis of sternal metastasis from thyroid carcinoma managed in Putrajaya Hospital from January 2004 to December 2018. Looking at the postsurgical outcome including length of survival and total dosage of RAI (radioiodine ablation).

Results: The gender distribution showed that a preponderance of male:female ratio of 2.67:1. The mean age at diagnosis as 61 years (SD 9.85). The duration of sternum swelling presented (mean = 11.8 months), where the neck swelling is preceded only by (mean = 29.4 months). Majority of our patient are euthyroid (72.7%). The pathological diagnoses showed a ratio of 1.67:1, of metastasis are either from papillary compared to follicular thyroid carcinoma. The mean size of sternal metastasis at diagnoses as 3.48 cm × 4.79 cm × 6.3 cm. Majority received a total thyroidectomy and neck dissection with 54.5% of patient received a sternal resection or debulking. 54.5% of patient received radioiodine ablation post surgery with mean total dosage 575 µCi (SD 457.94). Postsurgical intervention survival has a mean value of 23.1 months (SD 25.12 months).

Conclusion: Manubrium infiltrated metastasis from papillary thyroid carcinoma is relatively uncommon. Despite presented with advance disease, patient have been managed to receive a complete treatment modality which include total thyroidectomy, neck dissection, sternal resection with or without reconstruction and radioiodine ablation. This study can be used as a benchmark for future studies.

113. Robust, Quick and Convenient Intraoperative Method to Differentiate Parathyroid Tissue with Point of Care Testing Device

T Kikumori¹, T Ichikawa², T Inaishi³, N Miyajima⁴, M Shibata⁵, D Takeuchi⁶

¹⁻⁶Nagoya University Hospital, Japan

Purpose: Confirmation of parathyroid tissue is necessary to reduce the incidence of hypoparathyroidism (HP) by autotransplantation of sufficient parathyroid tissue (PT) during thyroid surgeries. We recently reported that the aspartate aminotransferase (AST)/lactate dehydrogenase (LDH) ratio

in the suspension of trace amount of tissue can accurately differentiate normal PT from other tissues (article in press). In that study, suspended minced tissue was handled similarly to routine clinical blood samples. Therefore, results took 30–40 minutes. However, in order to apply this method to actual clinical practice, it is necessary to minimize turnaround time to be equivalent to frozen sections. Thus, we are conducting a confirmatory study using a point of care testing (POCT) device (FUJIFILM NX500 (NX500)); NX500 can analyze these enzymes of blood sample in less than 10 minutes) which can be set in the operation theater to verify whether actual turnaround time and accuracy is equivalent to frozen sections.

Materials and methods: We are analyzing various specimens (parathyroid, cancerous, normal lymph nodes, adipose, and thyroid, etc.) from patients who undergo thyroid/parathyroid surgery between October 2019 and February 2020 in our institution. Trace amounts of excised tissue were minced by scissors and suspended in 1 mL of normal saline and measured for AST and LDH by NX500. Accurate differentiation of PT by the AST/LDH ratio which is calculated using values measured by NX500 is being validated. As of this writing, the cases are being enrolled.

Results and conclusion: If accuracy of this method is validated, this method will be a cost- and labor-effective solution to reducing HP incidence, both in low-resource countries with pathologist shortages and in developed countries, by providing an alternative to frozen sections, at minimal cost. A video of the actual procedure for this method will be presented.

114. Modified Version of Minimally Invasive Open Thyroidectomy using a Unilateral Incision

Soo Y Kim¹, Hak H Jun², Hee J Kim³, Yong S Lee⁴, Hang-Seok Chang⁵, Cheong S Park⁶, Hojin Chang⁷

^{1,3–7}Department of Surgery, Thyroid Cancer Center, Gangnam Severance Hospital, Institute of Refractory Thyroid Cancer, Yonsei University College of Medicine, Seoul, Korea

²Department of Surgery, Division of Breast and Thyroid Cancer Center, CHA Bundang Medical Center, CHA University, Gyeonggi-Do, Korea

Background: We aimed to describe our modified technique of minimally invasive open thyroidectomy (MIT) and to compare the results with those of conventional thyroidectomy.

Materials and methods: This study included 880 patients who underwent surgery at the Thyroid Cancer Center at Gangnam Severance Hospital between January 2016 and December 2016. Modified MIT was performed in 249 patients (28.3%), and conventional thyroidectomy was performed in the remaining 631 patients.

Results: Lobectomy was performed in the majority of cases [MIT 204 (81.9%) vs conventional 429 (67.9%)]. There were no significant differences regarding complications between the two approaches [6 (2.4%) vs 8 (1.3%)]. Operative time was shorter (77.99 ± 34.5 vs 91.23 ± 36.58 minutes) and they could be discharged earlier (2.4 ± 0.8 vs 3.2 ± 0.8) in the minimally invasive approach.

Conclusion: The modified MIT is a safe alternative to the standard open thyroidectomy which allows performance of bilateral total thyroidectomy with proper central compartment neck dissection.

115. Multiple Endocrine Neoplasia Type I Combined with Papillary Thyroid Carcinoma and Nodular Goiter: A Case Report and Review of the Literature

Jia Liu

Changchun, China

Introduction: This is the first report of multiple endocrine neoplasia type I (MEN1) combined with papillary thyroid carcinoma (PTC) and nodular goiter in China. Multiple endocrine neoplasia type I is a rare hereditary tumor syndrome inherited in an autosomal dominant manner and presented mostly by tumors of the parathyroid, endocrine pancreas (such as gastrinoma) and anterior pituitary. But PTC and nodular goiter were never regarded as its component before.

Patient concerns: Here we present a 35-year-old female MEN1 patient who was accompanied with coinstantaneous PTC and nodular goiter.

Diagnosis: The pathological diagnosis was PTC with cervical lymph node metastasis, nodular goiter, parathyroid cyst and adenomatoid hyperplasia. Gene analysis was performed and a germ-line MEN1 gene mutation was consequently detected.

Interventions: The patient underwent unilateral lobectomy of thyroid gland and surgical removal of the tumors of parathyroid glands.

Outcomes: After 6 months of follow-up, ultrasonic examination of the patient's neck showed no abnormality. Serum calcium and serum parathyroid hormone levels were normal.

Conclusion: As we have first experienced a case of MEN1 combined with PTC and nodular goiter in China, we report it with the review of literature. It could be assumed that MEN1 syndrome may have possibly predisposed the present patient to PTC and nodular goiter. Is there a possibility of PTC and/or nodular goiter as a new component of MEN1? More cases and further studies are required to demonstrate this association.

Keywords: Case study, Multiple endocrine neoplasia type I, Nodular goiter, Papillary thyroid carcinoma, Thyroid cancer.

116. Dedifferentiated Thyroid Cancer: An Overview for Management

A Nabawi¹, H Al Wagih², T Ezzat³, T Koraitim⁴, A AlSherif⁵, A Ali⁶

¹⁻⁶Head and Neck and Endocrine Surgery Unit, Alexandria Main University Hospital, Alexandria School of Medicine, Egypt

Objectives: In the literature most of the articles discussing advanced thyroid cancer focus on major aero digestive system or vessel involvement and management. In this study our aim was to look at the patients who present with fungating thyroid cancers as regards pathology, possible reasons behind such an aggressive presentation and the outcome of managing these patients by different modalities including radical resection and reconstruction, radio active iodine ablation or external beam radiation.

Materials and methods: Collection of clinical, laboratory, imaging and pathological data of all patients admitted to the head and neck and endocrine surgery unit, Main University Hospital, Alexandria School of Medicine, during the period between April 2005 and April 2019.

Results: Incidence, clinical imaging and pathological data together with the operative procedure and patient follow-up will be tabulated and statistically analyzed.

Conclusion: If there is no distant metastasis, a curative resection should be the goal unless complete tumor excision results in unwanted per operative morbidity and mortality. Patients with gross residual disease, after surgical resection, may benefit from postoperative external radiotherapy for local control of complications, namely bleeding.

117. Familiar Medullary Cancer in Pediatric Surgery. Reality vs Idea

Arseny Semenov¹, R Chernikov², N Gorskaya³, I Sleptsov⁴, V Makarin⁵, A Uspenskaya⁶, N Timofeeva⁷, I Chinchuk⁸, K Novokshonov⁹, J Karelina¹⁰, E Fedorov¹¹, D Buzanakov¹², I Sablin¹³, Y Malugov¹⁴, S Elcheparova¹⁵, A Bubnov¹⁶

¹⁻¹⁶Saint-Petersburg State University, North-Western Center of Endocrinology and Endocrine Surgery, Russia

Most of FMTS probands diagnosed in North–West center of endocrinology and endocrine surgery of SPbSU clinic are adults 43.43 ± 14.53 y.o. So nearly all of their descendants are adolescents or adults too. For last 2 decades we have treated or observed 17 pediatric patients with FMTS. Twelve (70.6%) of them operated and 5—observed. They are 12.75 ± 3.70 and 6.20 ± 6.61 y.o., respectively. Mutations in 634 codon are most frequent among our cohort—9 (52.9%), 2 (11.8%) with 620 and 2 V804I. Rest had v804I, e768d, c 609. One refused evaluate RET status. Of those 5 all have normal serum calcitonin. Two of them (17, 8 y.o.) have v804I mutation with low penetration rate and normal serum calcitonin. Rest of observed 3 y.o. planned for surgery. Of all operated 10 (13.00 ± 3.68) had already medullary cancer with serum calcitonin of 107.38 ± 186.99 pg/mL. Nine had multifocal disease. Tumour was 7.40 ± 8.38 cm. Central compartment dissection was performed in 5 cases. Three had already lymphnode metastases. In 8 cases calcitonin dropped to zero. One had progressive disease with calcitonin doubling time 14 months. Last one had too short follow-up period. Temporary hypoparathyroidism rate was 50%. RLN injuries in 20% cases.

Conclusion: Even with late discovery time most of young RET mutation carriers have favorable prognosis. Traditionally pediatric thyroid cancer surgery associated with higher risk of complications.

118. Inferior Thyroid Artery Preservation in Central Neck Dissection

L Zhou

Sir Run Run Shaw Hospital, Zhejiang University School of Medicine, China

Purpose/Introduction: The inferior thyroid artery (ITA) should be preserved in the central neck dissection to maintain the parathyroid glands blood supply. The current study aims to develop a novel dissection protocol to preserve the ITA by investigating the lymph nodes (LNs) distribution around the ITA.

Materials and methods: One hundred and twenty patients with papillary thyroid carcinoma were enrolled, and the carbon nanoparticle was used to stain the regional LNs. The para-tracheal regions were divided into the upper part and lower part by the trunk of the ITA, and were dissected separately. The harvested LNs number and the metastatic status in the upper part was recorded, as well as the efficiency of carbon nanoparticle, the length of the upper part, and the parathyroid glands situation.

Results: One hundred and twenty patients accepted 141 sides of the para-tracheal dissection and totally harvested 63 LNs in the upper part, which were all stained by carbon nanoparticle. These LNs belonged to 27 (22.5%) patients and distributed in 39 (27.66%) sides, while metastases were found in 9 (7.5%) patients and 10 (7.1%) sides. The length of the upper part ranged from 0.4 cm to 2.5 cm with a mean length of 1.24 ± 0.66 cm. Furthermore, 30 patients encountered the parathyroid glands injury during the upper part dissection.

Conclusion: The upper part of the para-tracheal region was a limit zone and barely had LNs. Compared to the en-block dissection, carbon nanoparticle guided LNs pick-up in this part was feasible to gain the equal clearance and much better parathyroid glands preservation.

119. Is One-week Self-managed Low Iodine Diet Sufficient for Preparation of Low Dose Iodine Ablation for Papillary Thyroid Carcinoma in Iodine-rich Areas?

Shogo Nakano¹, Takahito Ando², Kimihito Fujii³, Yukako Mouri⁴, Junko Kousaka⁵, Mirai Ido⁶, Manami Goto⁷, Yukie Ito⁸, Hirona Bando⁹

¹⁻⁹Department of Surgery, Division of Breast and Endocrine Surgery, Aichi Medical University, Japan

Purpose/Introduction: Low iodine diet (LID) for one or two weeks in preparation for radioactive iodine ablation therapy (RAIT) after total thyroidectomy is recommended. However, a two-week self-managed LID (s-LID) is too long for Japanese to tolerate because Japan is one of the prominent countries consuming large quantity of the dietary iodine intake. We aimed to evaluate relationship between body iodine pool levels and ablation efficacy using spot urine analyzes in low dose RAIT (1,110 MBq) with one-week s-LID.

Materials and methods: A total 24 papillary carcinoma with thyroglobulin (Tg) antibody negative after total thyroidectomy were enrolled in this retrospective study. All patients underwent one-week s-LID. Prior to RAIT, urine iodine to creatinine ratios (I/Cr) were measured. Successful ablation was two defined: (1) no visible uptake on a follow-up diagnostic 131I scans, and (2) no visible uptake on a follow-up diagnostic 131I scans and stimulated serum Tg levels <1 ng/mL.

Results: Median urinary iodine excretion (UIE) before and after s-LID were 225 µg/gCr (range 57–881) and 68 µg/gCr (range 31–216), respectively. UIE of 19 patients (79%) were <100 µg/gCr. Based on the first criterion for successful ablation, 19 of 24 (79%) patients were successfully ablated. Based on the second criterion for successful ablation, 9 of 24 (38%) patients were successfully ablated. In either case, there were no significant differences in UIE level between the successful and non-successful ablated groups.

Conclusion: One-week s-LID was sufficient to achieve UIE for RAIT preparation in iodine-rich areas.

120. Fluorescein Imaging as a Surrogate Marker for Parathyroid Hormone in Predicting Post Total Thyroidectomy Hypocalcaemia: A Novel Method

Ramakant Pooja¹, Enny Lorenzo², Garg Surubhi³, Rana Chanchal⁴, Singh KulRanjan⁵, Mishra Anand⁶

¹⁻⁶Department of Endocrine Surgery, King Georges' Medical University, Lucknow, Uttar Pradesh, India

Purpose/Introduction: Postoperative hypocalcaemia after TT is a common complication. Parathyroid hormone (PTH) is one of the most accurate predictors of postoperative hypocalcaemia but is costly and cannot be used to evaluate viability of vascularity of the parathyroid glands. Fluorescein green dye has been used to study viability of various organs, but studies on parathyroid are limited. Visualization of parathyroids using fluorescein green dye may enable early discharge and avoid unnecessary calcium supplementations. We aim to assess utility of fluorescein green dye in determining parathyroid viability and predicting postoperative hypocalcaemia.

Materials and methods: Fifty three patients undergoing TT between January and July 2019 were included. Intravenous fluorescein dye (2 mL) was administered after thyroidectomy. A numerical score was given according to number of parathyroids visualised (0–4, 1 for each parathyroid). Clinical/biochemical postoperative hypocalcaemia, intact-PTH and corrected calcium were evaluated on POD-1. SPSS version 24 was used for data analysis.

Results: No parathyroid blood vessels were visualized under blue light as green fluorescence in 6 patients, 1 in 10, 2 in 22, 3 in 10 and 4 in 5 patients. Mean PTH was 6, 21.1, 25.4, 32 and 51.1, respectively. Corrected-calcium was 7.08, 7.6, 7.9, 8.4 and 8.51, respectively. Patients with score 0 received supplementary calcium, while 40% (score-1), 34.6% (score-2), 0 (scores-3, 4) received the same. On Spearman's correlation analysis, visualised parathyroid was inversely correlated with postoperative calcium supplementation ($-0.297, p = 0.03$).

Conclusion: Fluorescein dye visualization of parathyroids post TT may be used as a cheaper alternative method to predict postoperative hypocalcaemia accurately.

121. Changes of Voice Quality, Airway Invasion during Swallowing and Pulmonary Functions after Parathyroidectomy for Secondary Hyperparathyroidism

F-F Chou¹, S-Y Chi², Y-C Chan³, Y-J Wu⁴, C-C Lai⁵, H-C Chang⁶, J-B Chen⁷

¹⁻⁴Department of Surgery, Division of General Surgery, Kaohsiung Chang Gung Memorial Hospital, Taiwan

⁵Department of ENT, Kaohsiung Chang Gung Memorial Hospital, Taiwan

⁶Department of Internal Medicine, Division of Chest Medicine, Kaohsiung Chang Gung Memorial Hospital, Taiwan

⁷Department of Internal Medicine, Division of Nephrology, Kaohsiung Chang Gung Memorial Hospital, Taiwan

Purpose/Introduction: To investigate changes of voice quality, airway invasion during swallowing and pulmonary functions after parathyroidectomy for secondary hyperparathyroidism.

Materials and methods: We recruited 38 patients who underwent successful parathyroidectomy for secondary hyperparathyroidism in this study. The indications for parathyroidectomy were serum Ca >10.1 mg/dL, P >5.5 mg/dL, alkaline phosphatase >94 µ/L and intact parathyroid hormone >800 pg/mL and with symptoms. Voice quality was evaluated using voice handicap index (VHI-10) and eating assessment tool (EAT-10) and using voice impairment and grades, roughness, breathiness, asthenia, strain (GRBAS). Acoustic and aerodynamic measurements included fundamental frequency (Fo), maximal phonation time, high pitch, jitter, s/z, shimmer and noise-to-harmonic ratio. Vocal cord mobility and vocal cord closure were examined using laryngoscope and premature spillage, penetration–aspiration scale levels and the pharyngeal residue severity scale using fiber-optic endoscope. Pulmonary function tests included forced vital capacity, forced expiratory volume in 1 second, bronchodilatation test, total lung capacity, diffusion capacity of the lung for carbon monoxide, alveolar volume, and distance and O₂ desaturation of the 6 minutes walking test (6MWT).

Results: Four months after parathyroidectomy, voice quality of VHI-10 and ETA-10 improved significantly ($p < 0.001$ and $p = 0.003$). Incomplete vocal cord closure decreased significantly ($p = 0.005$), pharyngeal residue severity scale of vallecula and pyriform sinus improved significantly ($p = 0.008$ and $p = 0.005$), Fo and high pitch increased significantly ($p = 0.007$ and $p = 0.002$), O₂ desaturation (<4%) of 6MWT improved significantly ($p = 0.008$).

Conclusion: Parathyroidectomy can improve voice quality, incomplete vocal cord closure, air-way invasion during swallowing and O₂ desaturation of 6MWT and increase Fo and high pitch.

122. Clinical and Ultrasonic Risk Factors for Lateral Lymph Node Metastasis in PTMC

Shuai Xue¹, Zhe Han², Qiyu Lu³, Peisong Wang⁴, Guang Chen⁵

^{1–5}Department of Thyroid Surgery, The First Hospital of Jilin University, Changchun, Jilin, People's Republic of China

Introduction: Clinical and ultrasonic risk factors for lateral lymph node metastasis (LLNM) in papillary thyroid microcarcinoma (PTMC) are not well defined. Herein, a systematic review and meta-analysis were conducted to investigate clinicopathologic and ultrasonic risk features for LLNM in PTMC. **Materials and methods:** A systematic search of electronic databases (PubMed, Embase, Cochrane Library, and Web of Science) for studies published until April 2019 was performed. Case-control studies and randomized controlled trials that studied clinical and ultrasonic risk factors of LLNM in PTMC were included.

Results: Fourteen studies involving 43,750 patients met final inclusion criteria. From the pooled analyzes, younger age <45 (OR, 1.55; $p = 0.003$), male patients (OR, 1.94; $p < 0.00$), ETE (OR, 3.63; $p < 0.00$), tumor multifocality (OR, 2.24; $p < 0.00$), tumor >0.5 cm. (OR, 2.24; $p < 0.00$), CLNM (OR, 5.61; $p < 0.00$), tumor contact >25% thyroid membrane (OR, 6.66; $p = 0.002$), tumor calcification (OR, 2.90; $p < 0.00$), upper tumor (OR, 3.18; $p < 0.00$) were significantly associated with increased risk of LLNM in PTMC, while HT and other ultrasonic features (solid tumor, hypoechoic tumor, smooth margin and taller than wide tumor) were not significantly associated with LLNM in PTMC (all $p > 0.05$).

Conclusion: Our analysis identified several clinicopathologic and ultrasonic factors associated with LLNM in PTMC. This finding highlights the necessity of more cautious monitoring and frequent following up in lateral neck postoperatively for higher-risk PTMC patients. Moreover, high-risk ultrasonic features also need to be considered during selection of PTMC for active surveillance.

123. Prognostic Risk Revision of Papillary Thyroid Carcinoma based on Intra and Postoperative Findings

Y Takabe¹, K Horiuchi², T Okamoto³

^{1–3}Department of Breast and Endocrine Surgery, Tokyo Women's Medical University, Japan

Introduction: The clinical practice guidelines for thyroid tumors developed by the Japan Association of Endocrine Surgeons (JAES) defines prognostic risk classification of papillary thyroid carcinoma (PTC) as follows solely based on preoperative evaluation; very low-risk, low-risk, intermediate-risk, and high-risk. Revising the risk profile considering intra- as well as postoperative findings would be useful in the management decisions.

Materials and methods: Seven hundred and seventeen patients who underwent initial curative surgery for any T any N M0 PTC between 2010 and 2018 were enrolled. The risk classification of each patient was revised according to the guidelines proposed by the American Thyroid Association (ATA). The primary outcome was recurrence of the disease. The probability of disease-free survival (DFS) was estimated using the Kaplan–Meier method.

Results: Female/male ratio was 527/190. The median age was 51 years (15–89), and the median follow-up period was 37.3 months (0.1–111.6). DFS at three years for each risk group was given in the Table 1.

Conclusion: The dynamic revision using the ATA criteria might refine the prognostication of the JAES high-risk group, whereas it adds little information to the JAES very low/low- and intermediate-risk groups. A relative short period time of follow-up might be a limitation of the present study.

Table 1:

		Revised risk (ATA)		
		Low (%)	Intermediate (%)	High (%)
Preoperative risk (JAES)	Very low/low	100	99	100
	Intermediate	100	96	94
	High	100	83	76

124. The Influence of Body Mass Index on Surgical Outcome of Bilateral Axillo-breast Approach Robotic Thyroidectomy

Hye R Shin¹, Jin Yoon², Keunchul Lee³, Hyeong W Yu⁴, Su-jin Kim⁵, Young J Chai⁶, June Y Choi⁷, Kyu E Lee⁸

^{1–4,7}Department of Surgery, Seoul National University Bundang Hospital, South Korea

^{5,8}Department of Surgery, Seoul National University Hospital, South Korea

⁶Department of Surgery, Seoul National University Boramae Medical Center, South Korea

Purpose/Introduction: The purpose of this study was to analyze the impact of body mass index (BMI) on surgical outcomes of the bilateral axillo-breast approach (BABA) robotic thyroidectomy from high-volume, single institutions.

Materials and methods: The medical records of 1,050 patients who underwent BABA robotic thyroidectomy between 2008 and 2018 in Seoul National University Bundang Hospital were reviewed. Patients were categorized into 5 groups BMI based on: normal (18.5–24.9), overweight (25–29.9), obese (30–34.9), and morbidly obese (>35). Clinicopathological data, surgical outcomes, and postoperative complications were evaluated (Tables 1 and 2). **Results:** Of the 1,050 patients, 764 patients were normal, 232 were overweight, 43 were obese and 11 were morbidly obese. The operation times of the four groups were 165.3, 156.6, 169.5, and 60.9, respectively ($p = 0.769$). There was no statistically significant difference between the 4 groups in terms of transient and permanent hypocalcemia and vocal cord injury according to BMI.

Conclusion: We do not observe any significant difference in postoperative complications and operation times in BABA robotic thyroidectomy. Bilateral axillo-breast approach robotic thyroidectomy can be performed safely with similar operation time in overweight and obese patients.

Table 1: The demographics and clinical characteristics of patients (1,050 patients)

	Normal (<25 kg/m ²) (n = 764)	Overweight (BMI ≥25 but <30 kg/m ²) (n = 232)	Obese (BMI ≥30 but <35 kg/m ²) (n = 43)	Morbidly obese (BMI ≥35 kg/m ²) (n = 11)	p value
Sex, male (%)	75 (9.8%)	73 (31.5%)	9 (20.9%)	1 (9.1%)	<0.001
Age, years, mean ± SD	38.7 ± 0.35	41.3 ± 0.62	38.0 ± 1.6	39.3 ± 0.30	0.315
Thyroid nodule					0.133
Malignant	733 (95.9%)	214 (92.2%)	41 (95.3%)	10 (90.9%)	
Benign	31 (4.1%)	18 (7.8%)	2 (4.7%)	1 (9.1%)	
Operation type					0.024
Total thyroidectomy	361 (47.3%)	119 (51.3%)	21 (48.8%)	8 (72.7%)	
Lobectomy	389 (50.9%)	106 (45.7%)	18 (41.9%)	3 (27.3%)	
Isthmectomy	11 (1.4%)	5 (2.2%)	4 (9.3%)	0 (0%)	
Others	3 (0.4%)	2 (0.9%)	0 (0%)	0 (0%)	
Operation time	165.3 ± 1.79	156.6 ± 3.16	169.5 ± 9.21	160.9 ± 9.84	0.769

Table 2: The postoperative complication and recurrence in 1,050 observed patients

	Normal (<25 kg/m ²) (n = 764)	Overweight (BMI ≥25 but <30 kg/m ²) (n = 232)	Obese (BMI ≥30 but <35 kg/m ²) (n = 43)	Morbidly obese (BMI ≥35 kg/m ²) (n = 11)	p value
Hypocalcemia					
Transient	127 (32.6%)	25 (23.6%)	3 (16.7%)	1 (33.3%)	0.181
Permanent	9 (2.3%)	3 (2.8%)	0 (0%)	0 (0%)	0.892
RLN palsy					
Transient	23 (3%)	8 (3.4%)	0 (0%)	0 (0%)	0.604
Permanent	1 (0.1%)	0 (0%)	0 (0%)	0 (0%)	0.945
Bleeding	2 (0.3%)	0 (0%)	0 (0%)	0 (0%)	0.980
Chyle leakage	1 (0.1%)	0 (0%)	0 (0%)	0 (0%)	
Recurrence	1 (0.1%)	3 (1.3%)	0 (0%)	0 (0%)	0.088

125. Characteristics of Central Neck Lymph Node Metastasis in Papillary Thyroid Carcinoma Suitable for Active Surveillance

Lei Xie

Sir Run Run Shaw Hospital, College of Medicine, Zhejiang University Hangzhou, Zhejiang Province, China

Purpose/Introduction: The purpose of this study is to retrospectively analyze the characteristics of metastatic lymph nodes in central neck of low-risk PTC in detail, such as the size, the number and extranodal extension.

Materials and methods: Eighty-five patients with PTC in 2015 suitable for observation were recruited in this study. Among them 48 patients were with pN0 while 37 ones were with pN1a. The size of each lymph node and metastatic foci of pN1a PTC patients, and the area proportion of metastatic lesion in metastatic lymph node were measured microscopically. Chi-square test was used.

Results: According to 2015 ATA guideline, central neck lymph node greater than or equal to 8 mm in smallest dimension should be treated with therapeutic dissection. In 428 non-metastatic lymph nodes no one was greater than or equal to 8 mm in smallest dimension, and only 3.4% of 118 metastatic lymph nodes were greater than or equal to 8 mm in smallest dimension. Two indexes to assess the metastasis extent of lymph node: one is the long diameter of metastatic deposit, the other is the area proportion of metastatic lesion in metastatic lymph node. In 80% of 118 metastatic lymph nodes, the metastatic lesions were less than or equal to 2 mm (micrometastasis). In 78% of 118 metastatic lymph nodes, the area proportion of metastatic lesion were less than or equal to 50%. As to the metastasis extent, there was no significant difference between the primary tumors with the long diameter less than or equal to 1 cm and longer than 1 cm. The rates of excellent response to therapy in 48 pN0 patients and 37 pN1a patient were 77.1% and 81.1%, respectively, and there was no significant difference between them.

Conclusion: For the most of central neck metastatic lymph nodes, the metastasis extent was not serious, and the prognosis was good.

126. Can an Increased NRL Predict Introduction of Molecular Target Drugs for the DTC Recurrence?

Dai Takeuchi¹, Ikumi Soeda², Takahiro Ichikawa³, Manabu Watanabe⁴, Takahiro Ichikawa⁵, Noriyuki Miyajima⁶, Masahiro Shibata⁷, Yuko Takano⁸, Nobuyuki Tsunoda⁹, Toyone Kikumori¹⁰

¹⁻¹⁰Nagoya University Hospital, Japan

Purpose/introduction: When there is no indication of resection and radioactive iodine therapy for the recurrence of differentiated thyroid cancer (DTC), molecular target drugs are introduced. However, DTC can progress slowly even after recurrence, so it is difficult to determine the timing of the drug introduction. However, some studies have suggested that the therapeutic effect on the recurrence of DTC related to NLR (neutrophil-to-lymphocyte ratio). In this study, we examined whether it is possible to predict the necessity and effects of molecular target drugs by the trend of NLR.

Materials and methods: We compared the average NLR value of the last five examinations in non-drug group with that of drug group prior to the introduction of drugs. And we compared the NLR average value before and after the introduction of molecular target drugs in drug group. Moreover, the latter was divided into two groups according to the effect of drugs.

Results: The average NLR value in drug group was significantly higher than that of drug group prior to the introduction of drugs. (3.6 vs 2.1, $p = 0.02$.) There was no difference in the NLR values before and after the introduction of drugs (3.6 vs 3.0, $p = 0.47$), and there was no difference in the NLR values before and after the introduction even in drug-effective cases (3.4 vs 2.6, $p = 0.49$) (Mann-Whitney U test).

Conclusion: The transition of NLR was considered useful as a guideline for the introduction of drugs. In addition, NLR tended to decrease after the administration of drugs.

127. Efficacy of Subtotal Parathyroidectomy for Renal Transplant Recipients

KA Black¹, JG Hubbard²

^{1,2}King's College Hospital London, UK

Purpose/Introduction: Secondary hyperparathyroidism is a common complication of chronic kidney disease, but there is no consensus on the best surgical approach for managing this condition, including for kidney transplant candidates. This study reviews the outcomes of subtotal parathyroidectomy in patients who subsequently received a kidney transplant, compared to those who remained on dialysis.

Materials and methods: Patients who underwent subtotal parathyroidectomy for renal related secondary hyperparathyroidism by a single surgeon were identified over a ten-year period (2008–2018). A retrospective chart review was performed to analyze the relevant demographics and biochemical data, to assess this technique in patients who received a renal transplant and in those who continued on long-term dialysis.

Results: Fifty six patients underwent subtotal parathyroidectomy, 22 of which went on to receive a kidney transplant (between 3 months and 56 months postparathyroidectomy). Across all patients, preoperative PTH level was an average of 1,615 ng/L, with an appropriate decrease to an average of 67 ng/L on the first postoperative day. All four parathyroid glands were identified and confirmed on histology in 92% of cases. After mean follow-up of 58 months, in the patients who remained on dialysis, there were five patients (14.7%) with recurrent hyperparathyroidism (defined as PTH above five times the upper normal value) and two (5.8%) with hypoparathyroidism. In the transplant recipients, there were no patients with recurrent hyperparathyroidism and one with hypoparathyroidism (4.5%).

Conclusion: Subtotal parathyroidectomy is an effective surgical approach for secondary hyperparathyroidism in renal failure, particularly in patients awaiting or likely to receive a renal transplant.

128. Rapid Disease Progression after Discontinuation of Lenvatinib in Thyroid Cancer

H Yamazaki¹, K Sugino², K Matsuzu³, R Ono⁴, K Mori⁵, J Akaishi⁶, C Masaki⁷, KY Hames⁸, C Tomoda⁹, A Suzuki¹⁰, T Uruno¹¹, K Ohkuwa¹², W Kitagawa¹³, M Nagahama¹⁴, K Ito¹⁵

^{1–15}Ito Hospital, Japan

Purpose/Introduction: Some thyroid cancer patients experience a rapid disease progression after the discontinuation of tyrosine kinase inhibitors (TKIs), which is called flare phenomenon. The incidence of the flare phenomenon after the discontinuation of EGFR-TKI ranged from 4% to 23% and the median time to occurrence ranged from 7 days to 12 days in previous reports. Herein, we investigate the timing and incidence of the flare phenomenon in thyroid cancer patients treated with lenvatinib.

Materials and methods: The records of patients treated with lenvatinib were retrospectively reviewed. The flare phenomenon was defined as death, hospitalization attributable to tumor progression, or unexpected event (e.g., pleural drainage) within 1 month of lenvatinib cessation. We excluded patients with progression of underlying diseases other than thyroid cancer or infection, those in whom the disease progressed, or those who died without achieving a clinical response (stable disease, partial response, or complete response).

Results: In total, 11 of the 56 patients experienced disease progression after discontinuation of lenvatinib, and 8 (14.3%) of 56 patients matched the definition of flare phenomenon. The median time from lenvatinib cessation to the flare phenomenon was 9 (range, 4–30) days. Three patients died within 1 month of lenvatinib cessation without an imaging evaluation. The without remaining 5 patients had dyspnea and pleural effusion, and pleural drainage was performed in 3 of the 5 patients.

Conclusion: Some patients experienced rapid disease progression after discontinuation of lenvatinib like previous reports, and the incidence and timing of that were similar to observed with other TKIs.

129. Prognosis of Anaplastic Thyroid Cancer based on UICC 8th Edition

N Onoda¹, I Sugitani², K Ito³, S Suzuki⁴, A Suzuki⁵, T Higashiyama⁶, T Fukumori⁷, H Hara⁸, K Masudo⁹, A Uno¹⁰, H Iwasaki¹¹, K Yane¹², S Yoshimoto¹³, N Nakashima¹⁴, Y Kawasaki¹⁵

^{1–15}Osaka City University, Anaplastic Thyroid Cancer Research Consortium of Japan, Japan

Introduction: Anaplastic thyroid cancer (ATC) is a rare, refractory disease showing dismal prognosis.

Materials and methods: Using a large cohort of ATC patients, revised TNM classification 8th edition was evaluated and compared with 7th edition.

Results: A nationwide study accumulated 757 ATC patients (M305: F452, median age: 71). T4a tumor of 7th edition was subdivided into T1 (8: 1%), T2 (43: 6%), and T3a (117: 16%) by revision. T4b tumor was to T3b (438: 58%) and T4 (151: 20%). The median overall survival (OS) for each T-category was 13, 11, 6, 4, and 5 months, respectively. OS for N0 (224: 30%) and N1 (533: 70%) patients were 5.9 and 4.3 months ($p = 0.00$). OS for M0 (467: 62%) and M1 (290: 38%) patients were 6.6 and 2.8 months ($p = 0.00$). Sixty-three (58.3%) patients migrated from stage IVA of 7th edition to IVB of 8th edition and the proportion of stage IVA patients was decreased from 14% to 6%. These migrated patients showed significantly worse survival (8.7 months) than revised stage IVA patients (15.8 months, $p = 0.02$). OS for stage IVA improved from 10.6 months to 15.8 months by revision. Number of patients with stage IVB increased by revision without influencing OS (6.0–6.1 months). Stage IVC did not change (290: 38%, OS: 2.8 months).

Conclusion: Subdivision of T-category showed little meaning. A small proportion of ATC patients with fair prognosis could be extracted as revised-stage IVA without influencing prognosis of stage IVB patients (Table 1).

Table 1:

	Stage	Number (%)	3 months (%)	6 months (%)	12 months (%)	Median OS
7th ed.	IVA	108 (14)	86.5	67.7	43.6	10.6 (7.7–13.3)
	IVB	359 (47)	74.5	48.8	24.6	6.0 (5.2–6.6)
8th ed.	IVA	45 (6)	90.7	74.0	52.5	15.8 (8.5–27.6)
	IVB	422 (56)	76.0	50.8	26.6	6.1 (5.7–6.8)
7th and 8th ed.	IVC	290 (38)	46.0	21.1	6.5	2.8 (2.3–3.3)

130. Operative Outcomes of Substernal Thyroidectomy: What Factors Predict the Need of Sternotomy

X Lo¹, SYW Liu², TK Tam³, EKW Ng⁴

¹⁻⁴Department of Surgery, Division of Endocrine Surgery, New Territories East Cluster Hospitals, Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong

Purpose/Introduction: This study aims to evaluate the outcomes of substernal thyroidectomy and to identify factors predicting the need of sternotomy.

Materials and methods: This is a retrospective cohort analysis of consecutive patients who received total substernal thyroidectomy by either the trans-cervical (TC) or transthoracic (TT) approach between November 2008 and September 2019. Clinical and pathological data were collected and the perioperative outcomes between the approaches were compared.

Results: One hundred and thirty one patients (87 females, mean age 59.6 ± 14.2 years) received total substernal thyroidectomy by TC approach ($n = 125$, 95.4%) and TT approach ($n = 6$, 4.5%). Forty-eight patients (36.3%) presented with stridor or dysphagia preoperatively. Twenty four patients (18.3%) had thyrotoxicosis. Mean operating time was 167.7 ± 65.7 minutes. Histopathology revealed malignancy in 17 patients (13.0%), including 10 (7.6%) incidental papillary microcarcinomas, 4 (3.1%) follicular carcinomas, and 3 (2.3%) poorly-differentiated carcinomas. Excessive blood loss (>100 mL) occurred in 37 patients (28.2%). For operative morbidities, postoperative hematoma necessitating reoperation occurred in 8 patients (6.1%). Seroma was present in 14 patients (10.6%). The rates of transient and permanent recurrent laryngeal nerve (RLN) palsy were 8.4% ($n = 11$) and 2.3% ($n = 3$), respectively. Transient hypoparathyroidism occurred in 68 patients (51.9%) while 24 patients (18.3%) had permanent hypoparathyroidism. Between TT and TC approaches, significantly longer operating time (279.8 minutes vs 161.0 minutes, $p = 0.005$) and higher transient RLN palsy rate (33.3% vs 7.7%, $p = 0.023$) were found in TT group. Other perioperative outcomes were similar. Substernal goitre extending below aortic arch was the only independent factor predicting the need of sternotomy ($p < 0.001$).

Conclusion: Substernal thyroidectomy by transthoracic approach was associated with higher transient RLN injury risk. Better preoperative planning for sternotomy should be undertaken for goitres extending below aortic arch.

131. MEN1 Related PHPT: A Coming of Age

AJ Cherian¹, MH Martis², SS Thomas³, R Pai⁴, MT Manipadam⁵, HS Asha⁶, TV Paul⁷, S Rajaratnam⁸, N Thomas⁹, MJ Paul¹⁰, DT Abraham¹¹

¹⁻¹¹Christian Medical College, Vellore, Tamil Nadu, India

Purpose: This study was conducted to analyze the clinico-pathological profile and outcomes of surgical management for patients with MEN-1 related PHPT (MPHPT).

Materials and methods: Data regarding patients surgically managed for PHPT between 2011 and 2017 was retrospectively collected following Institutional Ethical Committee clearance. This cohort was grouped into two—sporadic PHPT (SPHPT) and MPHPT and compared using one-way ANOVA test and Chi-square test.

Results: 13/308 (4.2%) patients managed for PHPT were MEN-1 related. The clinical and biochemical profile of patients with SPHPT and MPHPT are compared in Table 1. All patients with MPHPT underwent cervical exploration and excision of either 3 (76.9%), 3½ (15.4%) or 4 glands (7.7%), histopathology revealing parathyroid hyperplasia in 10/13 (77%). An additional cervical thymectomy was performed in all patients with MPHPT—an ectopic parathyroid tissue being seen in two and a carcinoid tumor in one. All MPHPT patients witnessed an immediate postoperative biochemical cure. Immediate postoperative hypocalcaemia was seen in 5/13 (38.5%) while permanent hypocalcaemia developed in 2/13 (15.4%). The mean duration of follow-up was 40.7 months with no recorded persistence or recurrence of hypercalcaemia.

Conclusion: The presentation of PHPT at young age (<40 years) with multiglandular disease should prompt one to suspect and look for other manifestations of MEN-1 syndrome. Subtotal parathyroidectomy is a safe surgical option in MPHPT as it ensures a decreased risk of permanent hypocalcaemia. Cervical thymectomy is advisable along with parathyroidectomy in MPHPT, as the thymus may harbor a parathyroid gland or a carcinoid.

Table 1: Depicting a comparison between the clinical and biochemical profile of patients with SPHPT and MPHPT

Characteristics	SPHPT (n = 295)	MPHPT (n = 13)	p value
Mean age (years) $\pm$ SD (range)	45.47 $\pm$ 13.57 (17–80)	36.69 $\pm$ 11.56 (21–54)	0.02
Gender distribution (male:female)	131:164	7:6	0.70
Symptomatic	265 (90%)	13 (100%)	0.46
Musculoskeletal symptoms	160 (54.24%)	5 (38.46%)	0.41
Renal calculi	121 (41.02%)	3 (23.08%)	0.32
GI symptoms	35 (11.9%)	4 (30.7%)	0.11
Mean S. calcium (mg/dL) $\pm$ SD (range)	11.48 $\pm$ 1.33 (9.1–17.7)	11.40 $\pm$ 2.30 (9.8–18.9)	0.84
Mean S. PTH (pg/mL) $\pm$ SD (range)	509.7 $\pm$ 546.91 (91–2,131)	391.6 $\pm$ 391.64 (124.9–1572.9)	0.32
BMD at neck of femur mean Z score $\pm$ SD (range)	n = 134 –1.8 $\pm$ 1.52 (–6 to 0.9)	n = 9 –1.67 $\pm$ 1.45 (–3.7 to 0.5)	0.87
BMD at lumbar spine mean Z score $\pm$ SD (range)	n = 145 –2.09 $\pm$ 1.59 (–5.6 to 1.9)	n = 9 –2.24 $\pm$ 1.32 (–3.7 to 0.1)	0.66
BMD at radius mean Z score $\pm$ SD (range)	n = 130 –2.7 $\pm$ 2.22 (–8.6 to 1)	n = 9 –2.35 $\pm$ 1.81 (–5.6 to –0.5)	0.72

132. Recurrent Laryngeal Nerve Liberation Technique for Phonation Recovery

Radan Dzodic¹, Nada Santrac², Ivan Markovic³, Marko Buta⁴, Predrag Stankovic⁵

^{1,3,4}Medical Faculty, University of Belgrade, Belgrade, Serbia; Surgical Oncology Clinic, Institute for Oncology and Radiology of Serbia, Belgrade, Serbia

²Surgical Oncology Clinic, Institute for Oncology and Radiology of Serbia, Belgrade, Serbia

⁵Medical Faculty, University of Belgrade, Belgrade, Serbia; Surgical Oncology Clinic, Institute for Oncology and Radiology of Serbia, Belgrade, Serbia; Clinic for Otorhinolaryngology and Maxillofacial Surgery, Clinical Center of Serbia, Belgrade, Serbia

Background: Recurrent laryngeal nerve (RLN) palsy is one of major complications in thyroid surgery. The aim of this study was to show improvement in phonation after RLN liberation in patients with RLN paresis/paralysis.

Materials and methods: From 2000 to 2018, 19 patients with RLN paresis/paralysis had RLN liberation (Dzodic et al., 2016) by removal of misplaced ligation or liberation and reposition of RLN from the enlarged lobe. In patients with bilateral paralysis, we performed two-step redo surgery. Patient's recovery was assessed by laryngoscopy and qualitative scoring scale (QSS) at 4 time points: preoperatively, in 1st, 6th and 12th postoperative month. All patients had voice rehabilitation after RLN liberation.

Results: One patient had nerve distension by a large follicular adenoma, and restored normal vocal cord mobility after lobectomy and RLN liberation (score 5). Remaining 18 patients had RLN liberation in a redo surgery 2 months to 16 years after initial operation: 12/18 patients had surgeries due to incomplete initial thyroid cancer surgery; in 6/18 a reoperation was performed for alleviating symptoms. Fifteen patients with redo surgeries scored 4 (normal phonation, no vocal cord movements), while 3/18 had RLN liberation 6 months, 3 and 16 years after primary surgery and scored 5, with normal vocal cord mobility.

Conclusion: Liberation technique may provide significant improvement in phonation in patients with RLN paresis/paralysis, even a complete voice recovery and vocal cord mobility many years after RLN injury.

Keywords: Injury, Nerve liberation, Recurrent laryngeal nerve.

133. Comparison of Surgical Outcomes between Endoscopic and Open Thyroidectomy in Patients with Differentiated Thyroid Carcinoma: A Propensity Score Matching Study

Kwangsoon Kim¹, Ja S Bae², Jeong S Kim³

^{1–3}Department of Surgery, College of Medicine, The Catholic University of Korea, Seoul, Korea

Background: Endoscopic thyroidectomy (ET), including robotic thyroidectomy, has been increasing to avoid postoperative scars on the anterior neck. The objective of this study was to compare the surgical outcomes of ET or open thyroidectomy (OT) for differentiated thyroid carcinoma (DTC).

Materials and methods: A total of 4,129 patients with DTC who underwent thyroid lobectomy using were reviewed at Seoul St. Mary's Hospital (Seoul, Korea) from January 2009 to December 2014. Propensity score matching analysis was performed, with 546 patients matched in two different surgical method groups. The mean follow-up duration was 90.4 ± 21.0 months.

Result: The mean operation time in the ET group was significantly longer than in the OT group (101.2 ± 26.2 minutes vs 86.4 ± 27.0 minutes, $p < 0.001$). The number of harvested lymph nodes was significantly smaller in the ET group (5.5 ± 4.2 vs 8.3 ± 6.2 , $p < 0.001$). However, there was no significant difference in recurrence rate between the two groups ($p = 0.817$). In Kaplan–Meier analysis, there was no statistically significant difference in the DFS ($p = 0.811$).

Conclusion: Endoscopic thyroidectomy, including robotic thyroidectomy using a trans-axillary approach for DTC was safe and feasible alternative with excellent cosmetic outcome to OT. Further studies must be conducted to support our results.

Keywords: Differentiated thyroid carcinoma, Endoscopic, Robotic, Thyroidectomy.

134. Efficacy of Intraoperative Neuromonitoring of Recurrent Laryngeal Nerve in Reoperation for Recurred Thyroid Cancer Patients

Jang-il Kim¹, Su-jin Kim², Zhen Xu³, Safa A Musa⁴, Hyeong W Yu⁵, Young J Chai⁶, June Y Choi⁷, Kyu E Lee⁸

^{1,3,4}Department of Surgery, Seoul National University College of Medicine, Seoul, Republic of Korea

^{2,8}Department of Surgery, Seoul National University College of Medicine, Seoul, Republic of Korea; Cancer Research Institute, Seoul National University College of Medicine, Seoul, Republic of Korea; Division of Surgery, Thyroid Center, Seoul National University Cancer Hospital, Seoul, Republic of Korea

^{5,7}Department of Surgery, Seoul National University Bundang Hospital, Seongnam, Republic of Korea

⁶Department of Surgery, Seoul National University Boramae Medical Center, Seoul, Republic of Korea

Purpose: Although IONM (intraoperative neuromonitoring) in thyroid surgery has been widely accepted procedure to preserve recurrent laryngeal nerve (RLN) function, there are little information on usefulness of IONM in re-do operation for recurred thyroid cancer patients. We aimed to evaluate usefulness of IONM in re-operation for recurred thyroid cancer patients to prevent RLN palsy.

Materials and methods: We retrospectively analyzed results of 246 consecutive patients (with IONM group: 105 patients vs without IONM group: 141 patients) who underwent re-operation for recurred thyroid cancer from January 2009 to March 2019 in our institution, without vocal cord palsy due to previous operation. We reviewed data including extent of operation, pathologic information, number of previous operation, operation time, RLN palsy, and other complications. Laryngoscopic evaluation was performed preoperatively, and postoperatively to evaluate RLN function.

Results: Recurrent laryngeal nerve palsy was observed in 21 (14.9%) patients without IONM vs 6 (5.8%) patients with IONM ($p = 0.024$). Transient and permanent RLN palsy were found, respectively in 14 (9.9%), and 7 (5.0%) patients without IONM group vs 3 (2.9%) and 3 (2.9%) patients with IONM group.

Conclusion: Our study showed that IONM of RLN for recurred thyroid cancer patients is useful to reduce RLN palsy.

Keywords: Intraoperative neuromonitoring, Palsy, Recurrent laryngeal nerve, Re-operation, Thyroid cancer.

135. Prediction of Recurrence in Thyroid Cancer Patients using Plotkin's Least General Generalisation LGG as a Method of Inductive Logic Programming ILP

Soo Y Kim¹, Hee J Kim², Seok-Mo Kim³, Hojin Chang⁴, Yong S Lee⁵, Chiyung Lim⁶, Hang-Seok Chang⁷, Cheong S Park⁸

^{1–5,7,8}Department of Surgery, Thyroid Cancer Center, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

⁶National Health Insurance Service Ilsan Hospital, Goyang-si, Gyeonggi-do, Korea

Background: Although thyroid cancers are known to have a relative low risk of recurrence, there are factors associated with a higher risk of recurrence. However, predicting disease recurrence and prognosis in patients undergoing thyroidectomy is clinically difficult. To detect new algorithms to predict recurrence, inductive logic programming was used.

Materials and methods: From January 2009 to June 2010, 797 cases of thyroid cancer patients who underwent bilateral total thyroidectomy with following radio-iodine treatment from our database were studied. Six hundred and thirty eight (80%) cases were used to create algorithms to detect recurrence. One hundred and fifty nine (20%) cases were analyzed for validation of created rules. Least generalized generalization LGG was chosen as a method of inductive logic programming to extract rules which represents algorithms to predict recurrence. Delmia PRD was used for analysis.

Results: Of the 638 cases, there were 46 (7.2%) cases with recurrence. There were 4 rules detected which could predict all of the cases with recurrence. Postoperative thyroglobulin was the most powerful variable which correlated with recurrence. When the 4 recognized rules were applied to 159 cases for validation, it was possible to predict 72.7% (8 cases among 11 of the recurrences). When factors known for high and intermediate risk were selected for creating rules, the most optimal combination could only predict 66.7% of the recurrence cases.

Discussion and conclusion: From our database, rules to predict recurrence were identified which were able to predict recurrence more precise than already known high and intermediate risk factors.

136. Higher TERT mRNA Expression is Correlated with Papillary Thyroid Carcinoma Patients' Survival

Jae H Kwon¹, Jae H Kim², Jong H Ahn³, Jin W Yi⁴, Min H Hur⁵

¹⁻⁵Department of Surgery, Inha University Hospital, Incheon, Republic of Korea

Purpose/Introduction: Telomerase reverse transcriptase (TERT) promoter mutation is recently identified worse prognostic factor in papillary thyroid carcinoma (PTC). However, little is known that correlation between TERT mRNA expression and patients' prognosis. We analyzed TERT mRNA expression level and clinical features from the Cancer Genome Atlas (TCGA) database.

Materials and methods: We obtained 492 PTC patients' somatic mutation, RNA sequencing and clinical information from TCGA. Linear regression was used to find correlation between mRNA expression and clinicopathologic variables. Recursive partitioning regression trees was applied to find cutoff value to predict survival. Kaplan–Meier and Cox proportional hazard regression was applied to survival analysis. Differentially expressed gene (DEG) analysis was performed by “edgeR.” Database for Annotation, Visualization and Integrated Discovery (DAVID) 6.7 was used to find significantly enriched pathway.

Results: Telomerase reverse transcriptase mRNA expression was positively correlated with age, stage IV and high MACIS risk. Telomerase reverse transcriptase mRNA level 2.854 was proposed as cutoff value for survival prediction (AUC 0.823). According to this, higher TERT expression group showed poor overall survival. Hazard ratio of higher TERT expression group was 20.730 (6.295–66.163, p value < 0.001). Total 2,255 genes were upregulated in higher TERT group and associated with carcinogenesis related pathways.

Conclusion: Higher TERT mRNA expression was associated with poor survival in thyroid cancer patients. This can predict patient survival more strongly than TERT promoter mutations (HR 10.174). Therefore, measuring TERT mRNA expression in thyroid cancer tissue will allow early identification of thyroid cancer patients with poor prognosis.