AUTOLOGOUS CONCHAL CARTILAGE-A VERSATILE TOOL FOR MANAGEMENT OF TYMPANIC MEMBRANE RETRACTION POCKETSJacob C. E¹, Sajeev M. George²**HOW TO CITE THIS ARTICLE:**

Jacob C. E, Sajeev M. George. "Autologous Conchal Cartilage-A Versatile Tool for Management of Tympanic Membrane Retraction Pockets". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 15, April 14; Page: 3951-3957, DOI: 10.14260/jemds/2014/2382

ABSTRACT: Objective: This prospective study describes the use of autologous conchal cartilage in retracted tympanic membranes in children. **METHODS:** The setting is a tertiary ENT referral centre. All patients were screened from schools, aged between 4 and 14 years, who had limited cholesteatoma of mesotympanum, not extending to the mastoid antrum. On exploration, the postero superior quadrant was exposed after trans canal drilling; the retracted TM was excised piecemeal. The resulting bony defect was reconstructed with harvested conchal cartilage, in the same setting. This cartilage prevents recurrence of retraction. The graft on contact with the stapes head gave an added benefit of hearing gain, in spite of the incus being eroded and its remnant being removed. **RESULTS:** 20 of the 24 ears operated were available for follow-up. Of these 20 cases, 15 had post op Air-bone gap (ABG) of ≤ 20 dB (75%). There was no extrusion and no case of worsening of hearing. The mean hearing gain was 11.75 dB. **CONCLUSION:** The authors are satisfied with the outcome of using conchal cartilage to reconstruct postero superior bony defect, after limited cholesteatoma surgery. This cartilage simulates the curvature of the TM. This is done in the same sitting, and in the 13.6 months follow-up available, promises to be a reliable method in our experience.

KEYWORDS: cartilage, tympanoplasty, grafts.

INTRODUCTION: Pathogenesis of retraction pockets involves a combination of poor Eustachian tube function and thinning of the drum due to loss of its middle fibrous layer.^{1,2} Most retraction pockets involve the postero superior quadrant of the pars tensa.³ Dornhoffer described a classification system for pars tensa retractions⁴ in 2000.

Grade 1: retracted drum not touching any middle ear structure.

Grade 2: retracted drum touches the incus or stapes.

Grade 3: drum touches the promontory.

Grade 4: drum retracted around the edge of scutum, all aspects of drum cannot be visualized.

Several methods can be used to prevent recurrence of retraction of the grafted tympanic membrane at surgery - use of tragal cartilage and perichondrium to produce a stiffer graft,⁵ use of temporary absorbable gelatin film, or permanent (polymeric silicon) sheeting in the middle ear, and placement of a ventilation tube.⁶

This is a prospective study which describes surgery in children with cholesteatoma limited to the mesotympanum, using autologous conchal cartilage.

PATIENTS AND METHODS: All patients were school children screened by the ENT and Community medicine departments of our institution. Children included in the study were those with limited cholesteatoma in the mesotympanum, not necessitating a full-fledged modified radical mastoidectomy. The study setting is a tertiary ENT referral centre.

ORIGINAL ARTICLE

Clinical Data: The study was performed between Oct 2004 and Oct 2005. All patients had pre-operative Pure Tone Audiometry. Of the 24 operated children 20 were available for follow up. They ranged from 4 to 14 years of age. (mean age 10.4)

There were 12 females and 8 males. The mean follow up with oto microscopy and Pure Tone Audiometry was 13.6 months (ranging from 3 months to 21 months)

Audiometric Data: Pure Tone Average (PTA) was calculated using the mean of thresholds at 500, 1000 and 2000 Hz. Air-bone gap (ABG) was calculated as the mean of values at 500Hz, 1kHz and 2kHz. Post-operative PTA and ABG were calculated at follow up.

SL. No.	Age (yrs.)	Sex
1	12	F
2	11	F
3	4	F
4	9	F
5	12	F
6	11	M
7	11	F
8	10	M
9	14	F
10	10	M
11	13	M
12	10	M
13	10	F
14	9	F
15	11	M
16	12	M
17	9	F
18	10	F
19	11	F
20	9	M
Age and sex distribution (Table 1.1)		

Surgical Technique: All patients had general anaesthesia. Postaural skin incision was used. Temporalis fascia graft was harvested. Endomeatally, tympano meatal flap was elevated, then the retraction pocket exteriorized by trans canal drilling of the postero superior bony overhang. During this process, chorda tympani was sacrificed, and the retracted TM removed piecemeal with sharp pick. Care was taken not to disrupt the stapes supra structure, stapedius tendon or second genu of the facial canal. When incus long process was found necrosed, the remnant of incus was removed.

Conchal cartilage graft was harvested from the posterior aspect of the pinna. This was trimmed to fit the bony defect in the postero superior quadrant, at the same time in contact with the

ORIGINAL ARTICLE

stapes head. Temporalis fascia graft was placed underlay style, medial to the TM remnant and lateral to the cartilage sliver placed in the middle ear. Middle ear space and external auditory canal were packed with gelfoam.

INTRA OP FINDINGS:

SL. No.	TM finding	Ossicular abnormality	Remarks
1	Subtotal perforation with minimal scutum erosion.	Incus long process necrosed	
2	Subtotal perforation, cholesteatoma pearl in PSQ.	Incus long process necrosed	
3	PSRP (grade2) with few flakes of cholesteatoma.	Incus long process necrosed	
4	PSRP (grade 3) with few flakes of cholesteatoma.	Incus long process necrosed	
5	PSRP (grade3)with few flakes of cholesteatoma	Nil (normal ossicles)	
6	Cholesteatoma sac from posterior attic dipping into the PSQ of mesotympanum	Malleus head and incus long process necrosed	One cartilage to obliterate atticotomy, another cartilage to reinforce PSQ
7	PSRP (grade 2)– no obvious cholesteatoma	Incus long process necrosed	
8	PSRP (grade1) with debris only.	Nil (normal ossicles)	
9	Large central perforation with secondary acquired cholesteatoma in facial recess, hypotympanum	Incus long process necrosed	Trans canal Facial recess and hypotympanum area exposed
10	PSRP (grade2)with few flakes of cholesteatoma	Incus long process necrosed	
11	Grade 4 retraction of PSQ	Incus long process necrosed	
12	PSRP (grade2) with pus, no cholesteatoma.	Nil (normal ossicles)	
13	PSRP (grade2)with few flakes of cholesteatoma	Incus long process necrosed	
14	PSRP (grade2)with few flakes of cholesteatoma	Incus long process necrosed	
15	PSRP (grade 3) with few flakes of cholesteatoma	Incus long process necrosed	
16	PSRP (grade 2)– minimal flakes of cholesteatoma	Incus long process necrosed	
17	PSRP (grade 3) with few flakes of cholesteatoma	Incus long process necrosed	
18	PSRP (grade 3) with few flakes of cholesteatoma	Incus long process necrosed	

ORIGINAL ARTICLE

19	PSRP (grade 2)– with pus, no cholesteatoma	Incus long process necrosed	
20	PSRP (grade 2)– with pus, no cholesteatoma	Incus long process necrosed	
Cartilage tympanoplasty technique – intra op findings (Table 1.2)			

Abbreviations:

PSRP – postero superior retraction pocket.

PSQ – postero superior quadrant.

TM – tympanic membrane.

Patient No.	Follow up (months)
1	12
2	11
3	12
4	12
5	17
6	16
7	21
8	21
9	3
10	7
11	11
12	20
13	6
14	10
15	16
16	12
17	10
18	12
19	18
20	12
Follow up in months (Table 1.3)	

RESULTS:

	Pre-op. (dB)	Post-op. (dB)
1	35	10
2	40	10
3	35	15
4	28.3	20
5	20	18.3
6	20	20 *

ORIGINAL ARTICLE

7	33.3	23.3
8	28.3	13.3
9	31.6	31.6 *
10	20	13.3
11	28.3	20
12	30	25
13	35	15
14	35	15
15	28.3	20
16	33.3	23.3
17	28.3	20
18	28.3	20
19	33.3	23.3
20	20	13.3

A B G (air bone gap) (Table 1.4)

*ABG status quo in two patients

Post op ABG of ≤ 20 dB was observed in 15 cases (75%). ABG was status quo in 2 cases (10%). Mean gain in hearing threshold was 11.75dB

SL. No.	Pre op (dB)	Post op (dB)	Gain (dB)
1	55	30	25.0
2	48.3	26.6	21.7
3	43.3	23.3	20.0
4	30	21.6	8.4
5	30	28.3	1.7
6	25	25 *	0*
7	36.6	25	11.6
8	31.6	18.3	13.3
9	41.6	41.6 *	0*
10	30	23.3	6.7
11	33.3	25	8.3
12	35	30	5.0
13	40	21.6	18.4
14	40	21.6	18.4
15	31.6	23.3	8.3
16	36.6	25	11.6
17	38.3	25	13.3
18	33.3	30	3.3
19	38.3	23.3	15
20	48.3	23.3	25

Pure Tone Average (Table 1.5)

*PTA status quo in two patients

ORIGINAL ARTICLE

DISCUSSION: A series of 20 cases of use of cartilage graft to reconstruct the defect in postero superior quadrant of middle ear is described in a pediatric population with limited cholesteatoma.

All the cases were performed by the first author JCE, and the authors find that the conchal cartilage has many advantages: it is easy to harvest, it involves no expenditure, can be accomplished in the same sitting of surgery, graft being autologous has no risk of extrusion, and it conforms well to the concavity of the TM, avoiding further retraction in the area operated.

In these ears (except 3 cases with normal ossicles), the long process of incus was necrosed. The remnant incus was removed, and cartilage fashioned to suit the defect in the PSQ was made to sit in contact with the stapes head. Only one case had malleus head necrosed. Here, the atticotomy was reconstructed with a second piece of cartilage (case no. 6).

At least in the short term follow up that we have, this gives very satisfactory results. There was no deterioration of hearing threshold, and no case of SN loss. In the 12.95 months of follow up (3 – 21 months), post op ABG was 20dB or less in 15 cases (75%), although hearing remained status quo in 2 cases (10%).

One patient had granulation tissue of the fascia graft over the cartilage for 9 months, then resolved. Though posterior cartilage TM reconstruction can delay the diagnosis of a residual cholesteatoma, the disease will manifest either anteriorly or as a recurrence of conductive hearing loss, and there should be no major complications as a result of this delay in diagnosis.^{7, 8, 9}

REFERENCES:

1. Yoon TH, Schachern PA, Paparella MM, Aeppli DM. Pathology and pathogenesis of tympanic membrane retraction. *Am J Otolaryngol* 1990; 11:10-17.
2. Wells MD, Michaels L. Mode of growth of acquired cholesteatoma. *J Laryngol Otol* 1991 April; 105(4):261-7.
3. Mills RP. Management of retraction pockets of the pars tensa. *J Laryngol Otol* 1991 Jul; 105(7):525-8.
4. Dornhoffer JL. Surgical management of the atelectatic ear. *Am J Otol* 2000; 21(3):315-21.
5. Glasscock ME 3rd, Jackson CG, Nissen AJ, Schwaber MK. Postauricular undersurface tympanic membrane grafting: a follow-up report. *Laryngoscope* 1982; 92:718-27.
6. Charles W. Cummings. *Otolaryngology Head & Neck Surgery* 3rded. St. Louis, Missouri: Mosby; 1998. Chapter158, Tympanoplastic surgery for chronic ear disease; p.3113.
7. Dornhoffer J L. Cartilage tympanoplasty. *Otolaryngol Clin North Am* 2006; 39:1161-76.
8. Parisier S, Hanson M. Pediatric cholesteatoma: results of individualized single surgery management. Presented at the Fifth International Conference on Cholesteatoma and Mastoid Surgery. Alghero-Sardinia, Italy, September 1- 6, 1996.
9. Hirsch BE, Kaosmerer DB, Doshi S. Single-stage management of cholesteatoma. *Otolaryngol Head Neck Surg* 1992; 106(4):351-4.

ORIGINAL ARTICLE

Fig. 1: Conchal cartilage being harvested

Fig.2: Cart sliver in place

AUTHORS:

1. Jacob C. E.
2. Sajeev M. George

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of ENT, MOSC Medical College, Kolenchery, Kerala, India.
2. Professor and HOD, Department of ENT, MOSC Medical College, Kolenchery, Kerala, India.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Jacob C. E,
Associate Professor,
MOSC Medical College,
Kolenchery, Ernakulam District – 682311,
Kerala, India.
E-mail: jacobchundamannil68@gmailcom

Date of Submission: 19/03/2014.
Date of Peer Review: 20/03/2014.
Date of Acceptance: 25/03/2014.
Date of Publishing: 09/04/2014.