

Subcutaneous and Retropharyngeal Emphysema Confirmed by CT Imaging: Report of Two Cases

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Accepted for publication on March 1, 2000

ABSTRACT. We experienced two cases of subcutaneous emphysema after tooth extraction of the lower third molar. Both patients visited the attending dentist within 24 hours after the surgical procedure complaining of an abnormal sensation in the submandibular area and the neck. On their own rather than by referral by their dentists, they visited our hospital. After subjective examinations, CT imaging proved extremely useful for diagnosis.¹⁾ Specifically, the extent of each lesion was clarified and the clinical course and the progress of its disappearance were visualized easily though the patient could not avoid exposing to radiation. The diagnosis of subcutaneous emphysema from clinical symptoms such as the sound of crepitation and typical radiographs seems easy. Management and treatment consisted of a rest cure and intravenous injection of broad-spectrum antibiotics for prophylaxis. To date, more than 100 cases of subcutaneous emphysema have been reported by both domestic and foreign authors.²⁾ Therefore, such cases following dental procedures should not be regarded as rare, and all dentists should be aware of the possible occurrence of emphysema and its management.

Key words: emphysema — postoperative complication of tooth extraction
Computed tomography (CT) — diagnostic imaging

Submandibular and retropharyngeal emphysema has been considered to be an uncommon complication after dental²⁻⁵⁾ and oral maxillofacial surgical procedures.⁶⁾ Several reports have described the reasons for its occurrence, and these have included many iatrogenic factors, such as endodontic procedures,^{7,8)} periodontal surgery and oral surgery. It presents as a swelling of the associated soft tissue and, when palpated, will demonstrate crepitation. In this report we describe two cases of subcutaneous emphysema following dental extraction of the lower third molar. Diagnostic imaging of the condition consisted of cervical X-ray and CT scanning. Air is easily detected with using CT because its tissue density is very low. CT images were especially useful for evaluating the extent of the emphysema and the course of its disappearance.

CASE REPORT

Case 1

A 24-year-old woman came to the emergency department of Kawasaki Medical School Hospital on complaining of an abnormal sensation in the right

side of her neck. She had had the third molar of the mandible extracted on November 10, 1997. The tooth was asymptomatic, but she had felt abnormal sensitiveness immediately after the extraction. She did not complain of any pain, or fever. Her oral cavity and oropharynx revealed no lesions or edema. Examination of the right side of her neck revealed crepitation in the right supraclavicular region. Lateral neck radiograph (Fig 1) was made on and CT images (Fig 2) were examined on the fourth day after extraction. The lateral neck radiograph revealed a presence of air in submandibular, temporal and supraclavicular subcutaneous spaces, but did not show retropharyngeal air that was identified by CT image. These revealed submandibular, infratemporal and retropharyngeal emphysema with widening of the subcutaneous region extending to the supraclavicular space. Panoramic radiograph revealed a



Fig 1. Lateral neck radiograph showing submandibular emphysema

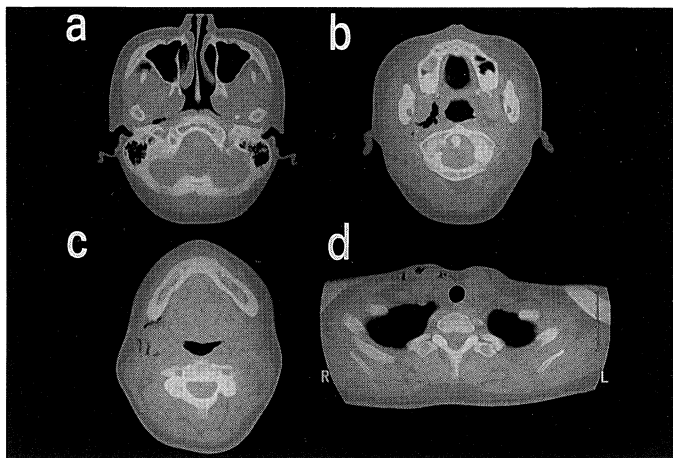


Fig 2. a) Emphysema in the pterygomandibular space at the top
 b) masticatory space
 c) submandibular space
 d) subcutaneous emphysema

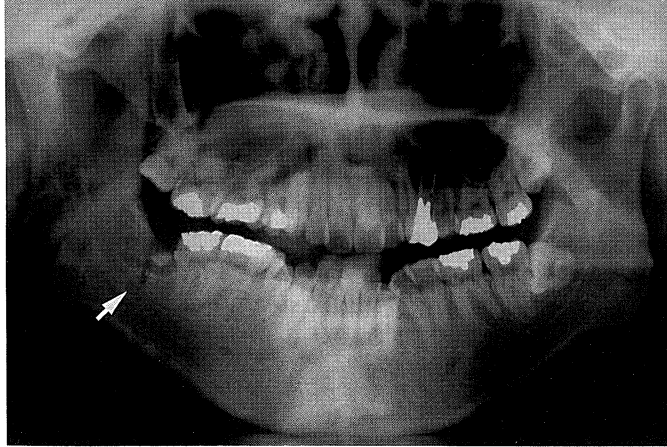


Fig 3. Panoramic radiograph revealed traumatic wound in the extraction cavity



Fig 4a. CT imaging on 10 days after tooth extraction



Fig 4b. CT imaging on 33 days after surgery

traumatic wound that seemed undoubtedly to have been caused by air-turbine on the alveolar bone of the third molar (Fig 3). Other laboratory results were within normal limits. After admission on the day after her first visit, intravenous antibiotic (sulbactam cefoperazone , 2g per day) was administered for three days and she discharged on the fifth day. Later CT images revealed slow resolution of the submandibular and subcutaneous emphysema (Fig 4a, 4b).

Case 2

A 22-year-old woman visited our clinic complaining of tenderness and an abnormal sound on palpation in the right side of her mandible and neck to the presternum. She had had the third molar of the mandible extracted of the July 17, 1998, because of mild pericoronitis. A few hours after extraction of tooth, her previous symptoms appeared. Laboratory examinations revealed no abnormal data. Frontal neck radiographs revealed connection of linear radiolucent lesions in the right side of the neck (Fig 5). Panoramic radiograph revealed no remarkable findings in the extraction cavity. CT images within 24 hours of tooth extraction revealed abnormal air in the sublingual, submandibular, pterygomandibular space and parapharyngeal spaces extending to the presternum space that was unable to definitively determined the emphysema by frontal neck radiograph (Fig 6a, 6b). After admission, intravenous antibiotic (sulbactam cefoperazone 2g per day) was administered for five days and she rested in bed. Her symptoms, including tenderness, pain with jaw movement and crepitation had been decreased gradually. On the fifth day after

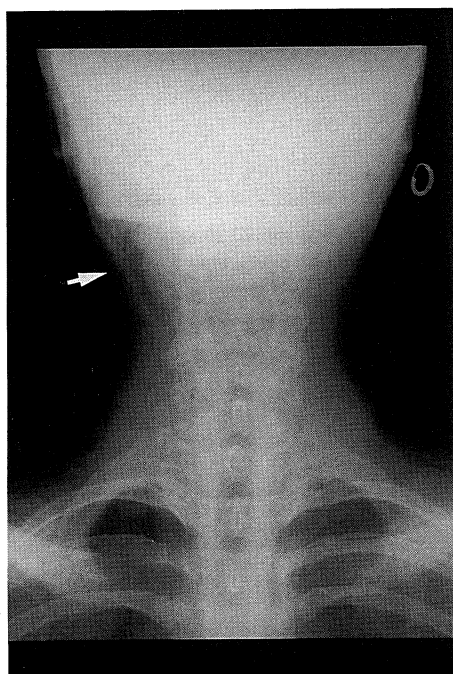


Fig 5. Posteroanterior neck radiograph revealing upper neck emphysema of the right side.

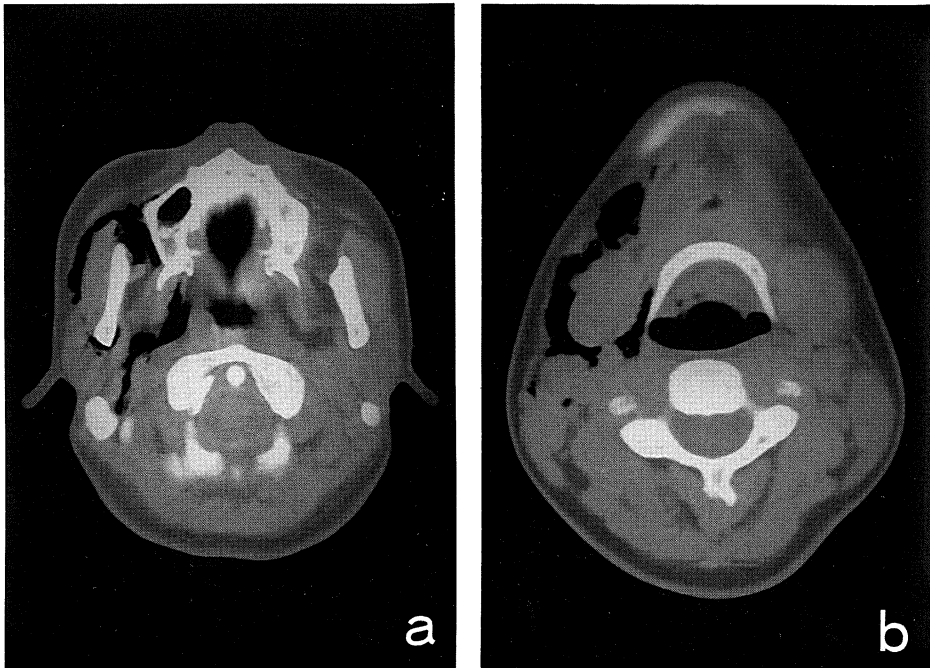


Fig 6. CT image showing emphysema in the perimandibular region, parapharyngeal region(a) and emphysema in the submandibular region(b) on the patient's first visit.

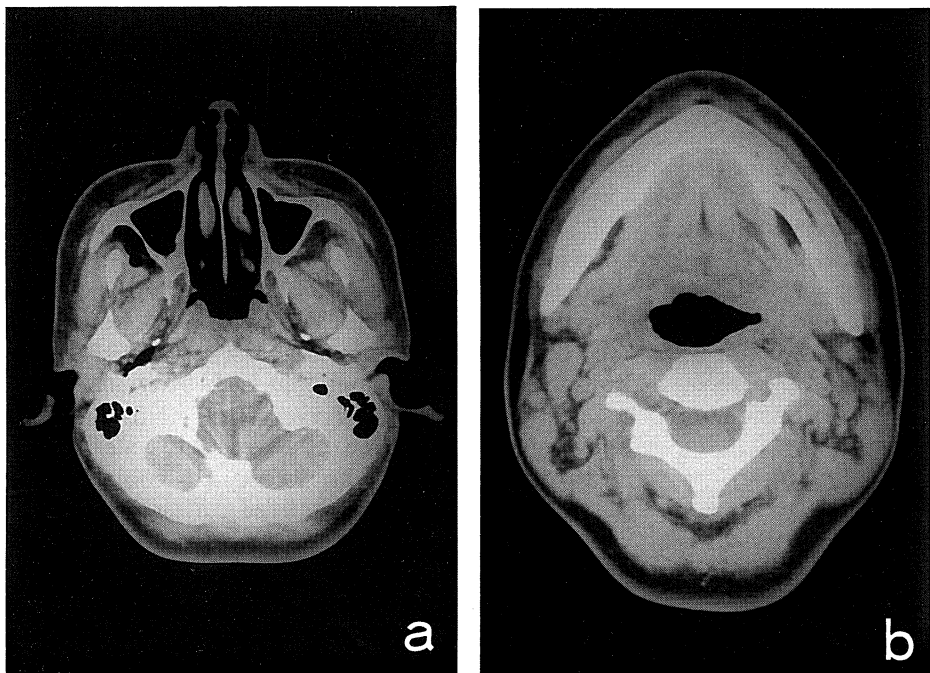


Fig 7. Emphysema was decreased gradually five days later(a) and three weeks later(b).

admission, crepitation was not palpated clinically and CT images (Fig 7a) showed that the subcutaneous emphysema was disappeared but emphysema still remained in the temporal, pterygomandibular, masticatory muscular and parapharyngeal spaces. With her consent, CT images made three weeks after surgery showed that the fields of residual emphysema had almost disappeared (Fig 7b).

DISCUSSION

Subcutaneous emphysema has been occasionally reported in the dentistry,^{3,5,9)} oral surgery and medicine.^{10,11)} The causes have included head and neck operations such as orthognathic surgery,¹²⁾ trauma,¹³⁾ lacerations of the trachea or esophagus and foreign bodies or neoplasms within the upper aerodigestive tract. In most cases, it has been considered to have been caused by iatrogenic procedures. The main clinical symptom is local discomfort relatively immediately after dental procedures. Crepitation is palpable in the local skin, neck, submandibular region and subclavicular area.⁹⁾ Furthermore, subcutaneous emphysema may be associated with mild localized cellulitis with a low grade fever. Generally, in cases without severe clinical symptoms, treatment and management are rest and prophylactic antibiotics. Prophylactic antibiotics should be used effective for oral pathogenic bacterias, both Gram-positive coccus such as *Staphylococcus epidermidis* and Gram-negative rods such as *Bacteroides* and *Fusobacterium*. Subjective and objective symptoms usually decrease spontaneously within a week.¹⁴⁾ However some life-threatening cases following dental implant surgery¹⁵⁾ have been reported. These cases involved air embolisms and essentially differed from subcutaneous emphysema. The spreading pattern of subcutaneous emphysema was via the fascial plane to its deeper tissue space.^{3,8,12)} These findings were demonstrated in the clinical course by CT images. Consequently, air from the periodontal tissue entered pterygomandibular space at the top and under the sternum at the bottom. Emphysema in the lower portion disappeared in the relative early stage but that in the upper portion remained for several days. We emphasize the point that clinically absence of crepitation was not the equivalent of disappearance of air. CT scanning is invaluable in the evaluation of subcutaneous and retropharyngeal, parapharyngeal emphysema, for this single radiologic examination provides information on the presence or absence of air, its size, and its location, particularly in the parapharyngeal or retropharyngeal space. Incidentally, as to the cause of subcutaneous emphysema, tooth extraction procedures are considered to be predominant.²⁾ In routine dentistry, a high-speed air-turbine handpiece is used almost every day. This instrument avoids the risk of air entrainment by utilization of a separate water drip for cooling purposes, as opposed to relying on the forced air coolant at the burr-tooth interface of high-speed dental drills as outlined earlier.⁸⁾ Especially, when an impacted tooth is going to be extracted, an air-turbine handpiece is surely very useful equipment when need in the appropriate manner. It is considered impossible to carry out modern dental treatment without the use of such instruments as air-turbine handpieces and air-way syringes.^{3,16,17)} However, to date, more than 100 cases of surgical emphysema have been reported by both domestic and foreign authors.²⁾ Therefore, we should not regard these cases

following dental procedures as rare. Subcutaneous emphysema is recognized an iatrogenic disease and when life-threatening condition as mediastinitis is diagnosed, immediate treatment is necessary undoubtedly. Also, every dentist should be aware of the possible occurrence of emphysema and its following disadvantage for the patient and its management.

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