

Case Report

Facial and cervical emphysema after oral surgery: a rare case

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Abstract: The purpose is to report extensive emphysema resulting from a common procedure in oral surgery. Surgical emphysema developed in a 23-year-old female after removal of a mandible third molar using a high-speed dental hand-piece. The patient was maintained in hospital room and submitted to a medical protocol with antibiotic treatment. Surgical emphysema is an uncommon but potentially serious complication of oral and maxillofacial surgery procedures. The diagnosis and differential diagnosis of surgical emphysema are discussed and the management and prevention of this complication is presented. Adequately treatment with adequately instrument should be providing in oral surgery. Emphysema has complication in oral surgery is a rare condition with future clinical and legal problem to surgeon.

Keywords: Complications, emphysema, oral surgery

Introduction

Emphysema is a well-established complication of trauma. In dentistry, it may also occur following restorative dentistry, periodontal surgery, endodontic treatment, repair of facial fractures, temporomandibular joint surgery, extraction of teeth and other procedures [1]. Surgical removal of the mandibular third molar is a frequent surgical procedure. Pain, infection, bleeding, dry socket, nerve injuries and trismus are complications associated with this operation. Subcutaneous emphysema is a relatively rare complication of lower third molar extraction [1].

Occasionally, the air may pass through the tissue spaces of the facial planes to cause extensive cervicofacial emphysema, or pneumothorax and pneumomediastinum [2-4]. Anaphylactic reactions to local anesthesia, hematoma and infection are usually included in the differential diagnosis [5]. Treatment of subcutaneous emphysema is symptomatic; antibiotic treatment and careful observation of the airway are usually required.

Subcutaneous air will resolve over time. Incision, drainage and aggressive supportive treatment, such as a chest tube, are sometimes necessary [6]. We present a case of extensive subcutaneous emphysema, which was probably caused by the use of an air-water-cooled high-speed dental handpiece to extract a mandibular third molar. We discuss the related dental procedures, diagnosis and treatment of emphysema.

Case report

A 23-year-old female presented in a hospital emergency department complaining of swelling and pain over her right face and neck, and difficulty in swallowing about two hours after third molar extraction. According to her statement, she had a right lower third molar extraction at a local dental clinic, and a conventional dental handpiece was used to cut the tooth during extraction. The procedure went smoothly and she did not notice any discomfort until she developed swelling over her left face about four hours of surgery procedure. After the extraction

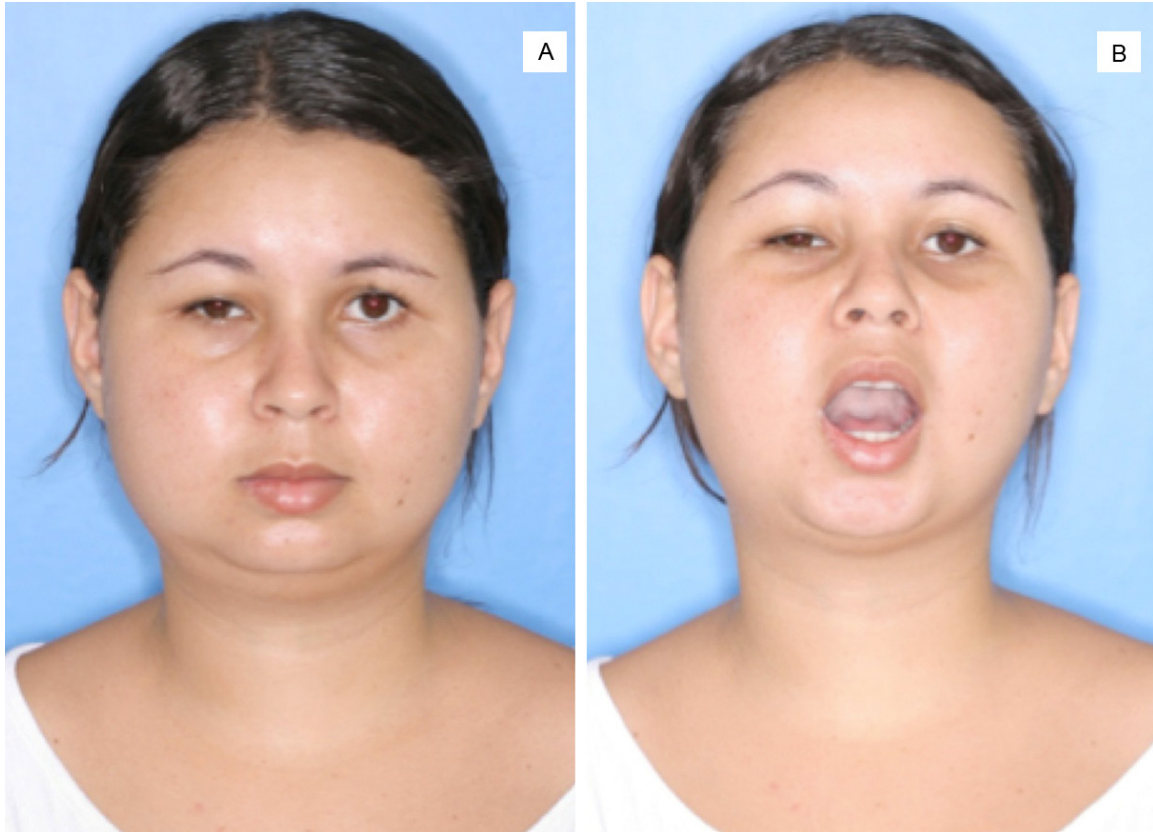


Figure 1. A: Mild erythematous swelling with crepitus over the right orbital area, cheek, submandibular area, neck and anterior the entire chest. B: Open mouth was limited to 20 mm in the emergency admission. Photo is published with the permission of the patient.

of the third left superior molar a mucoperiosteal flap elevation incision for approach to the third left inferior molar were realized during the procedure for the extraction. At that moment the use of an air-water-cooled high-speed dental handpiece developed the swelling. This progressed gradually to the neck and both chest sides. She was an otherwise healthy woman, not relating any type of health compromising or drug administration by medical prescription.

There was marked swelling and crepitus on palpation over the right infraorbital area, cheek, mandible angle, submandible area, and both upper chest wall; mild redness was also noted in these areas (**Figure 1**). Her mouth opening interincisal distance was 20 mm. There was no evidence of dyspnea, vomiting or fever. Her breathing was clear, and the cardiovascular system was normal condition. The patient was admitted to the hospital under the initial diagnosis of emphysema to observe the progression of dysphagia, dyspnea and potential infection.

Her blood pressure was 110/70 mmHg, pulse was 77 beats per minute, respiratory rate was 22 breaths per minute, and her body temperature was 36.4°C. Computed Tomography (CT) showed compatible image of air accumulation in the right infratemporal space, pterygomandibular space, buccal space, masseteric space, upper part of the parapharyngeal and retropharyngeal space, along the deep cervical fascia (not including the carotid sheath), and extending to the anterior wall of the chest, but no pneumothorax or pneumomediastinum (**Figure 2**). The treatment plan was close observation of the airway and prophylactic endovenous administration of (Cefazolin 1 g every 6 hours), analgesic (Dypirone 500 mg every 6 hours), mouth washing with chlorhexidine (0, 12% 3 times daily).

Her mouth opening was 30 mm on Day 7; on day 14, the swelling was almost completely subsided, and without any pain, crepitus, or difficulty in swallowing and breathing. The patient was advised to do mouth opening exercises. At

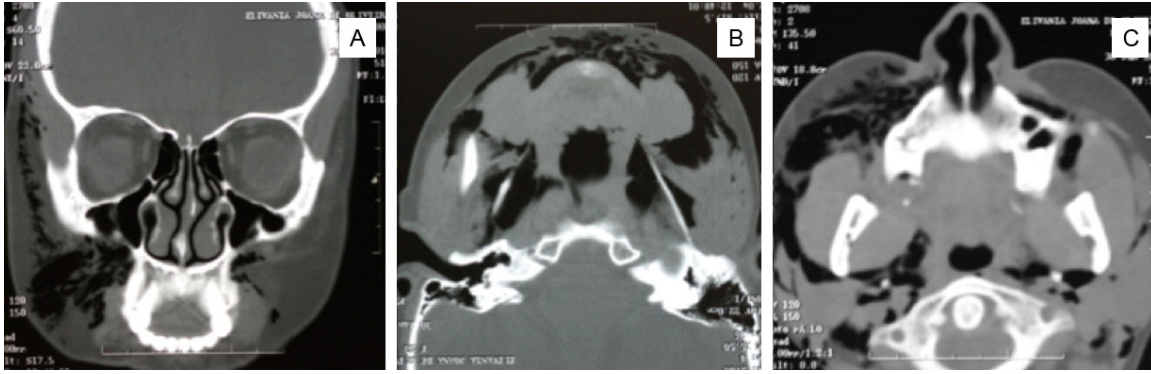


Figure 2. A: Air accumulation in the subcutaneous spaces of the infraorbital area (thin white arrow), infratemporal space (black arrow) and posterolateral area of the masseter muscle (thick white arrow). B: Air accumulation in the pterygomandibular space (black arrow), parapharyngeal space. C: Air accumulation in the retropharyngeal space (small white arrow) and masseteric space (large white arrow).



Figure 3. Day 28, the patient presenting the swelling almost completely subsided, and without any pain, crepitus, or difficulty in swallowing and breathing. The patient was advised to do mouth opening exercises. The open mouth was 40 mm in the final period. Photo is published with the permission of the patient.

the 4-week follow-up, her mouth opening was normal, 40 mm, and there were no other complaints (**Figure 3**).

Discussion

The most important immediate step in the management of emphysema is a correct diag-

nosis. The clinical diagnosis is established by the sudden onset of neck swelling, crepitus sound, the lack of significant tenderness, erythema and edema [7].

The first report of subcutaneous emphysema related to a dental procedure (a third molar extraction) was published by Turnbull in 1900 [8]. Facial traumas and orthognathic surgery performed in the mandible and maxilla had also been related to initiate a subcutaneous emphysema. The pressure that increases air diffusion can be raised by blowing the nose, coughing, sneezing, rinsing the mouth, playing a musical instrument, air-generating dental instruments, and air travel. Postoperative surgical emphysema may even arise following the use of continuous positive airway pressure or a peak flow meter [9].

The most important factor is the use of an air-water-cooled high-speed dental handpiece, particularly for mandibular third molar extraction. Subcutaneous emphysema associated with dental extraction usually results from using air-water-cooled high-speed dental hand pieces, which let the air penetrate the soft tissue through the reflected flap and invade the adjacent tissues. When the mucoperiosteal flap is reflected, and the tooth is excised with a standard dental handpiece, air penetrates the soft tissue through the reflected flap. It usually only invades the spaces around the tooth, but sometimes it may spread along the fascial planes to distant areas as reported in this case [6].

Papers have reported that air can penetrate the deeper tissues from the root apex and pri-

marily involve the submandibular and sublingual spaces [3, 5], but this is quite different from lower third molar extraction, where air invades from mucoperiosteal flap. In our case, the air passing through the flap for a lower third molar extraction may have spread by three possible routes. The first route is into the pterygomandibular space and ascending to the infratemporal space; the second route is descending to the submandibular and parapharyngeal spaces, then extending to the upper part of the chest and possibly migrating downwards into the mediastinum; and the third route is into the masseteric spaces and extending to the buccal and infraorbital areas. The air that invaded the primary spaces might move into loose, deeper spaces on function (i.e. during chewing, swallowing or speaking). This offers one possible reason why the swelling of this patient might have extended to the supraclavicular area about 24 hours after the operation.

Diagnosis of subcutaneous emphysema can be made by comprehensive history assessment, physical examination and imaging studies. The presenting symptoms and signs of our patient, including trismus, dysphagia, swelling and crepitus, can be explained by the widespread presence of air on CT scan. It is difficult to ascertain the extent of gas invasion without such imaging examinations. Therefore, we would like to emphasize the importance of early detection of air extension to make an appropriate treatment plan. Subcutaneous emphysema is usually resorbed spontaneously without complications, which explains why treatment of subcutaneous emphysema is usually symptomatic [7]. Prophylactic antibiotics, close observation of the airway and monitoring the progression of the extension of the gas are recommended. We administered antibiotics and observed the patient because there were evidence pneumomediastinum. If migration of the accumulated gas is reported, if imaging shows pneumothorax or pneumomediastinum, or if the patient is in significant distress during the observation time, aggressive treatment such as drainage or chest tubing are necessary [7].

Cervicofacial emphysema can result from several dental procedures, including tooth extraction [2, 3, 5], restorative dentistry [10], prosthodontics [6], root canal [4] or periodontal treatment [7]. The use of air-water-cooled high-speed handpieces, air syringe or spray devices,

and irrigants for root canal (particularly hydrogen peroxide) [6] are all possible causes of emphysema. The knowledge of such possible complications is extremely necessary by the dentists. Surgical procedures with mucoperiosteal flap elevation should use surgical handpieces that vent the air away from the operation field [3]. When a dental high-speed handpiece is used, the dentist should cut the tooth before flap elevation, or elevate a smaller flap and avoid directly ejecting the air into the pocket of the flap. If emphysema does occur, differential diagnosis from angioedema, hematoma or infection should be made first, which should be followed by observation to detect the spread of the gas. If the extension is limited, the patient may be given hospital antibiotics. The patient must be told how to watch for extension of the emphysema and be advised to go to the emergency hospital if such extension occurs. Two weeks after the emphysema treatment the surgery for removal of the other third molar were realized in our institution without complications and no absolute clinical symptoms and signs of emphysema occurred.

This case report showed an extensive emphysema of facial spaces during a third inferior molar extraction surgery procedure. The emphysema is an uncommon complication but it is possible to occur during an oral and maxillofacial surgery. Its characteristics should be observed to not mistake with post operative edema or rapidly expanding hematoma. CT is ideal for demonstrating the presence and passage of air in tissue-space emphysema. We believe that patients with emphysema symptoms should be routinely seen to exclude the possibilities of further complications.

Disclosure of conflict of interest

None.

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