

An Unusual Complication After the Extraction of a Maxillary Third Molar: Extensive Subcutaneous Emphysema. A Case Report

Diş Çekimi Sonrası Nadir Görülen Bir Komplikasyon: Yaygın Subkutanöz Amfizem. Vaka Raporu

Subcutaneous Emphysema After Tooth Extraction

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Özet

Gömülü 3. molar dişlerin çekimi, çene cerrahisi kliniğinde sıklıkla gerçekleştirilen işlemlerin başında gelmektedir. Gömülü diş çekimini takiben ağrı, şişlik, kanama, ödem, hematoma, maksiller sinüs perforasyonu ve subkutanöz amfizem gibi komplikasyonlar görülebilir. Servikofasiyal subkutanöz amfizem, genellikle yüksek devirli ve havalı tur motorlarının kullanıldığı 3. Molar dişlerin çekimini takiben oluşabileceği gibi, lazer uygulamalarında ya da kanal tedavisi sonrasında da görülebilmektedir. Bu raporda, 42 yaşındaki sağlıklı erkek hastada, sadece elevatör ve davye kullanılarak çekimi yapılan üst 3. molar dişin çekimi sonrasında gelişen amfizemin tanı ve tedavisi sunulmaktadır.

Anahtar Kelimeler

3. Molar Diş Çekimi; Subkutanöz Amfizem; Maksiller Sinüs

Abstract

Third molar surgery is one of the most frequently performed procedures in oral and maxillofacial surgery. Various complications including pain, bleeding, infection, edema, hematoma, perforation of the maxillary sinus, and subcutaneous emphysema (SE) can occur after third molar surgery. Cervicofacial subcutaneous emphysema (CSE) most often occurs after the extraction of third molars, especially when using high-speed air-turbine drills and air syringes, or during dental laser treatment or even after endodontic treatment. This report presents the diagnosis and treatment protocol of a CSE in a 42-year-old healthy male patient that occurred after extraction of a totally erupted upper third molar with just a straight elevator and extraction forceps.

Keywords

Third Molar Extraction; Subcutaneous Emphysema; Maxillary Sinus

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Introduction

Third molar surgery is the most frequently performed procedure in oral and maxillofacial surgery. Various complications can occur after third molar surgery, including pain, bleeding, infection, edema, hematoma, perforation of the maxillary sinus, and subcutaneous emphysema (CSE) [1].

Cervicofacial subcutaneous emphysema (CSE) is described as the penetration of air into the facial layers [2]. CSE can occur after the extraction of third molars, especially in cases where the procedure was performed with high-speed air-turbine drills and air syringes, or if the procedure was performed during dental laser treatment or endodontic treatment [3,4]. CSE can also be caused by trauma, general anesthesia, vigorous nose blowing, sneezing, habitual Valsalva maneuvers, balloon blowing, and playing wind instruments [3,5].

To our knowledge, this is the first case to show CSE after the extraction of a totally erupted upper third molar, in which the extraction was performed using a straight elevator and extraction forceps.

Case Report

A 42-year-old male patient was referred to the Oral and Maxillofacial Surgery Department for the removal of an impacted lower right third molar (Fig 1). The patient provided informed consent, and his lower right third molar was removed under local anesthesia with sterile conditions. With the patient's consent, the surgeon decided to extract the totally erupted upper right third molar for prophylactic reasons. The molar was extracted without any complications. The surgeon began elevation following the administration of local anesthesia using 2 ml of 4% articaine with 1:100,000 epinephrine (Ultracaine, Sanofi Aventis, Istanbul, Turkey). When the molar became mobile, the surgeon suddenly realized that the buccal cortex was also mobile, and the procedure was stopped immediately. A straight elevator was placed between the buccal bone and the tooth, and after gentle separation, the extraction was performed with extraction forceps. The fractured buccal cortex was repositioned with bi-digital palpation, and the gingival margins of the socket were sutured with 3/0 silk sutures. The Valsalva maneuver was used to detect any maxillary sinus perforation. The patient was informed about postoperative care (e.g., try to not to sneeze, do not blow your nose, etc.) and was discharged with prescriptions for a pain-killer (flurbiporfen, 100 mg) and mouth rinse (chlorhexidine, 3x1). Two hours after the extraction, the patient returned to the clinic with complaints of swelling on the right side of his face. A clinical examination revealed that there was

swelling in the right infraorbital area, mild redness, and crepitation with palpation on the cheek, mandible angle, and submandibular area. The patient's right eye was partially closed due to swelling. There was no evidence of dyspnea or chest pain. In addition, in the two hours following the operation, the patient had not sneezed or blown his nose; however, he stated that he kept breathing nasally, instead of through his mouth. The surgeon informed the patient that he should stop breathing nasally and should try to breathe through his mouth.

Postoperative orthopantomograph (OPG) revealed an accumulation of air in the right side of the patient's face (Fig 2). A head and neck cone beam computed tomographic (CBCT) scan was performed for a more detailed evaluation, and it revealed an accumulation of air in the right infratemporal space, the submandibular and sublingual space, the pterygomandibular space, the buccal space, the masseteric space, and the upper part of the parapharyngeal space (Fig 3). There was no radiological or clinical evidence of pneumothorax or pneumomediastinum. However, the CBCT images revealed that the fractured part of the buccal cortex was displaced towards the vestibular-distal region, and a vertical fracture line was observed on the mesial side of the extraction socket. (Fig 4) It was hypothesized that the apical part of the displaced fragment of the fractured cortex perforated the maxillary sinus mucosa. Since the maxillary sinus communicates with the submucosal tissues, it is likely that air passed from the maxillary sinus into the facial layers, causing CSE. The patient was hospitalized so that his vital signs could be monitored and so that he could undergo prophylactic medical treatment. His vital signs were as follows: blood pressure - 110/70 mmHg, pulse - 77 beats per minute, respiratory rate - 22 breaths per minute, saturation of oxygen - 100%, and body temperature - 36.4°C. He was intravenously administered 1000 mg ampicillin+sulbactam (Duocid®, Pfizer, İstanbul, Turkey) every 8 hours to prevent any secondary infection.

Two hours into his hospitalization, the swelling on the patient's buccal and periorbital areas had extended. In addition, crepitation became positive on the right occipital area, and the right eye was fully closed (Fig 5). The patient was carefully monitored during the first 24 hours. On the following day, the patient's clinical condition had improved, and he had a noticeable reduction in swelling. The patient was able to see from his right eye, and he was discharged after 24 hours of intravenous antibiotic therapy. He was instructed to take oral ampicillin+sulbactam (375 mg) at 8-hour intervals for 7 days. The patient was followed-up every 24 hours over the following three days, and after 7 days, his CSE was completely resolved (Fig 6).



Figure 1. Pre-operative OPG.



Figure 2. Post-operative OPG. Air bubbles can be seen at the right side.

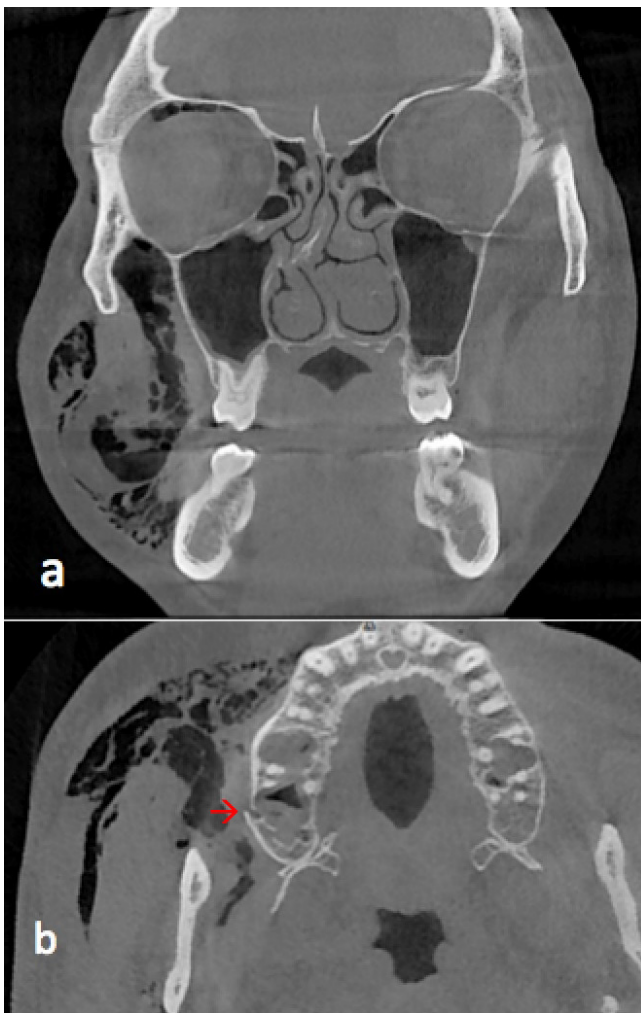


Figure 3. Maxillofacial CBCT images (coronal and axial cross-sections) shows air bubbles in facial layers. (Red arrow shows fracture line.)

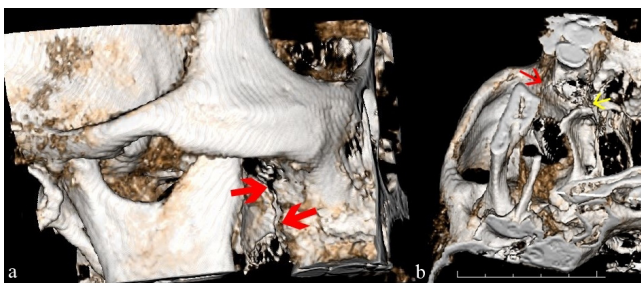


Figure 4. 3D Reconstruction of the CBCT image shows fracture line. (Red arrows show sinus perforation and fracture line.) (a), 3D Reconstruction (Axial view) of the CBCT image. Palatal bone and pterygoid plates seems intact. (Red arrow shows fracture line, and yellow arrow shows pterygoid plate.)(b)

Discussion

The very first case of CSE associated with a dental procedure was published in the year 1900 by a physician, Alexander Turnbull. His patient was a bugle player who experienced facial swelling while playing his instrument immediately after tooth extraction [3].

CSE is a rare but life-threatening complication that can occur after tooth extraction. CSE can also be caused by maxillofacial trauma, general anesthesia, vigorous nose blowing, sneezing, habitual Valsalva maneuvers, balloon blowing, and playing wind instruments [3,5]. In the present case, the patient did not blow his nose or sneeze in the two hours following the extraction, but he stated that he kept breathing from his nose, rather than through his mouth.



Figure 5. Extra-oral view of two hours after the hospitalization. Note that the right eye is fully closed.



Figure 6. Complete resolution of the emphysema on the seventh day.

Aside from nose blowing and sneezing after extraction, the use of air-turbine drills or air syringes during oral surgery can also cause CSE. If CSE spreads to the parapharyngeal and retropharyngeal tissues, it may lead to a life-threatening airway compromise, including pneumothorax, pneumomediastinum, pneumopericardium, optic nerve damage, air embolism, and even death by air embolism, all of which have been reported in the literature [8-11].

CSE is most often seen after the extraction of impacted third molars, especially in cases where the extraction was performed with high-speed air-turbine drills and air syringes. Other dental procedures, including implant surgery, endodontic treatment, crown preparation, periodontal treatment, or dental laser treatment may also cause CSE [4, 6]. Arai et al. reviewed 47 CT-documented cases of subcutaneous emphysema with pneumomediastinum following dental treatment that were reported between 1994 and 2008. Of the 47 patients, 18 underwent tooth extraction, 15 underwent tooth restoration, five underwent root canal treatment, 3 underwent periodontal treatment, 2 underwent apicectomy, and three underwent other dental treatments. The specific dental treatment was unknown for three patients. Based on that data, Arai et al. concluded that CSE most frequently occurs after the extraction of mandibular third molars, especially in cases where the tooth was sectioned with an air-turbine drill [7]. Further, An et al. reported that third molar extraction is the main cause of CSE in nearly half of the reported cases [3].

In our case, the tooth was extracted using conventional hand pieces (straight elevator and extraction forceps). A survey of the literature revealed that this is the first case of CSE following the extraction of the upper third molar in which no high-speed turbine or air syringe was used.

CSE typically begins cervicofacially, but it may spread to the parapharyngeal and retropharyngeal tissues, which can cause a life-threatening airway compromise. In the current case, CSE began at the buccal and periorbital areas, and spread to the infratemporal space, the submandibular and sublingual space, the pterygomandibular space, the masseteric space, the upper part of the parapharyngeal space, and the occipital space. Because the patient did not experience airway compromise or any life-threatening condition, he was followed-up in the first 24 hours with hospitalization, and then was monitored every day after discharge.

The differential diagnosis of CSE is very important, as the possibility of angioedema, anaphylactic reaction, hematoma, and cellulitis must be determined [6]. The differential diagnosis in CSE cases is crepitation, which is positive on palpation. In cases with pneumomediastinum, there are some diagnostic symptoms, including dyspnea with a brassy voice, chest or back pain, and Hamman's sign [12].

In the diagnosis of CSE via radiological examination, conventional radiographs can show air bubbles and probable pneumomediastinum or pneumothorax. A CBCT scan can also be used to detect air accumulation in the subcutaneous tissues.

CSE is a self-limiting condition, but emergency surgical decompression is required if there is cardiovascular collapse or obstruction of the airway. If the patient is asymptomatic, they should be hospitalized and monitored; further, intravenous prophylactic antibiotics are recommended to prevent secondary infections [13].

The symptoms of CSE can be detected immediately or up to a few hours after dental procedures such as tooth extraction. However, CSE can also occur within 1-2 days after the procedure [7].

Prevention strategies for CSE depend on the surgeon/dentist and the patient. The surgeon/dentist must be aware of the pos-

sible complications of the tooth extraction from the posterior part of the maxilla or mandible, should avoid using equipment such as high-speed air-turbine drills and air syringes that may cause CSE, and should inform the patient about post-operative care (e.g., try not to sneeze, do not blow your nose, etc.). In addition, the patient must follow the advice given by the surgeon/dentist to ensure an uneventful healing period.

This case report documents an extensive CSE following the extraction of the upper third molar without the use of a high-speed turbine or air syringe. CSE is an uncommon complication, but it can occur during routine dental treatments, such as tooth extraction. In this case, we assume that air penetration to the facial layers was caused by the fractured buccal bone of the extraction socket, which perforated the maxillary sinus. It is important to make a differential diagnosis to eliminate angioedema, anaphylactic reaction, hematoma, and cellulitis. Therefore, dental practitioners must comply with the rules of tooth extraction, including bi-digital support of the extraction socket during the extraction procedure, and they should be familiar with this uncommon complication and its signs.

Competing interests

The authors declare that they have no competing interests.

References

- Kunkel M, Kleis W, Morbach T, Wagner W. Severe third molar complications including death-lessons from 100 cases requiring hospitalization. *J Oral Maxillofac Surg* 2007;65:1700-6.
- Kullaa-Mikkonen A, Mikkonen M. Subcutaneous emphysema. *Br J Oral Surg* 1982;20:200-2.
- An GK, Zats B, Kunin M. Orbital, Mediastinal, and Cervicofacial Subcutaneous Emphysema after endodontic retreatment of a mandibular premolar: A Case Report. *J Endod* 2014;40:880-3.
- Mitsunaga S, Iwai T, Kitajima H, Yajima Y, Ohya T, Hirota M et al. Cervicofacial subcutaneous emphysema associated with dental laser treatment. *Aust Dent J* 2013;58:424-7.
- Durukan P, Salt O, Ozkan S, Durukan B, Kavalci C. Cervicofacial emphysema and pneumomediastinum after a highspeed air drill endodontic treatment procedure. *Am J Emerg Med* 2012;30:2095;3-6.
- Bilecenoglu B, Onul M, Altay OT, Sakul BU. Cervicofacial emphysema after dental treatment with emphasis on the anatomy of the cervical fascia. *J Craniofac Surg* 2012;23:544-8.
- Arai I, Aoki T, Yamazaki H, Ota Y, Kaneko A. Pneumomediastinum and subcutaneous emphysema after dental extraction detected incidentally by regular medical checkup: a case report. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2009;107:33-8.
- Karras SC, Sexton JJ. Cervicofacial and mediastinal emphysema as the result of a dental procedure. *J Emerg Med* 1996;14:9-13.
- Buckley MJ, Turvey TA, Schumann SP, Grimson BS. Orbital emphysema causing vision loss after a dental extraction. *J Am Dent Assoc* 1990;120:421-2.
- Campbell LA, Davies JM. Fatal air embolism during dental implant surgery: a report of three cases. *Can J Anesth* 1990;37:112-21.
- Rickles NH, Joshi BA. A possible case in a human and an investigation in dogs of death from air embolism during root canal therapy. *J Am Dent Assoc* 1963;67:397-404.
- Hamman L. Spontaneous mediastinal emphysema. *Bull Johns Hopkins Hosp* 1961;54:46-56.
- Guillén-Paredes P, Novoa-Juiz V, Carrasco-González L. Asymptomatic pneumomediastinum after wisdom tooth extraction. *Arch Bronconeumol* 2012;48:217-8.

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