Subcutaneous and Mediastinal Emphysema after a Dental Procedure: Two Case Reports

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Abstract

Subcutaneous and mediastinal emphysema after head and neck procedures is a rare phenomenon; however, its incidence has increased alongside the development of instruments for medical procedures. We report two cases of subcutaneous emphysema and mediastinal emphysema after dental procedures. In case 1, the entry of air was a laceration in the oral floor and an emphysema developed from the submandibular space through the visceral space to anterior part of the superior mediastinum. In case 2, the entry was mandibular molar and an emphysema developed through the parapharyngeal and retropharyngeal space to posterior part of the superior mediastinum. Both patients were admitted for a few days and then discharged with conservative treatment. The development of emphysema after head and neck procedure is associated with the complex anatomy of head and neck fascia.

Keywords: Subcutaneous Emphysema; Dental Care; Mediastinal Emphysema; Compressed air; Head; Neck

Introduction

Subcutaneous and mediastinum emphysema is a rare pathology that can occur iatrogenically secondary to head and neck surgery, intubation, mechanical ventilation, esophageal perforation, and dental procedures [1]. The incidence of this condition after dental procedures is typically low; however, the prevalence of high pressure air instruments, such as high-speed hand pieces and air syringes, increases the frequency of its occurrence [2]. Here, we report two cases of head and neck subcutaneous emphysema after dental procedures, both of which developed mediastinal emphysema in the different pathway.

Case 1

A 28-year-old male was referred to our institute with a chief complaint of neck pain from a local dental clinic. He had dental calculus on his teeth that was removed by a dental hygienist in the clinic with a high-pressure air instrument. During the treatment, he felt severe pain in the right oral floor, right submandibular area, and right neck at that time. After treatment, the hygienist consulted with a dentist at the clinic, who recommended the patient to consult our institute. In the emergency department, he complained of neck pain and some shortness of breath, which disappeared before we started to examine him. There was no increase in temperature, or rigidity of the head and neck tissue, but the presence of crepitus was evident in the bilateral neck. A small laceration existed in the right side of oral floor (Figure 1). The patient had no remarkable previous medical history. A contrast enhanced computed tomography (CT) scan was performed in order to rule out neck abscess. The CT scan showed the presence of air in the bilateral submandibular space, bilateral parapharyngeal space, bilateral visceral space, superior mediastinum, and anterior mediastinum, without any sign of infection or hemorrhage (Figure 2). He was admitted for observation and was administered prophylactic antibiotics intravenously until day 3 of...
admission when his neck pain and crepitus started to improve. Another CT scan performed on day 4 showed improvements in subcutaneous emphysema and pneumomediastinum. He was discharged on day 5 and the symptoms had disappeared completely on day 12 in the outpatient setting.

**Case 2**

A 65-year-old female visited our institute with a chief complaint of left neck pain and swelling that she had noticed on her way home from the dentist. Her left mandibular molar had been drilled with a high-speed hand piece and covered with a temporary crown. She had no remarkable previous medical history other than asthma. Her first vital signs were within the normal limits. Physical examination revealed tenderness, swelling, and crepitus on her left neck and face. Oral examination showed no sign of infection around her left mandibular. Blood examination results were within the normal limits. Contrast enhanced CT scan showed the presence of some air in the left submandibular space, parapharyngeal space, retropharyngeal space, visceral space, superior mediastinum, and posterior mediastinum, without any sign of infection or hemorrhage (Figure 3). She was admitted to our institute for observation and was administered prophylactic antibiotics intravenously until day 2 of admission when her neck pain and crepitus started to improve. She was discharged on day 3. A complete cure was evident on day 17 in the outpatient setting.

**Discussion**

Here, we presented two cases of subcutaneous emphysema and mediastinal emphysema after dental procedures. Various cases of subcutaneous emphysema after head and neck procedures, especially those associated with the use of compressed air instruments, such as air turbine or syringe, and laser equipped with air, have been reported [1-8]. A transoral CO\textsubscript{2} laser surgery for carcinoma of the larynx and pharynx also caused emphysema because of the air assist to blow off the liquid of the surface. The incidence of cervical emphysema during the transoral CO\textsubscript{2} laser surgery...
is reported to be in the range of 1.1% (3/275 cases) to 7.3% (4/55 cases) [9, 10]. The professionals engaged in head and neck or dental procedures should be aware that compressed air instruments cause these complications. A procedure which caused emphysema can be noticed under local anesthesia immediately owing to the symptoms, which is overlooked during the procedure under general anesthesia. We may add a palpation of the head and neck in the postoperative survey after using compressed air instruments.

The differential diagnoses of emphysema with similar symptoms are hematoma, allergic swelling, angioedema, and infection. The patients’ present history, physical examination, blood examination, and CT scan are useful to rule out these differential diagnoses. The most specific symptom of emphysema is crepitus [6] and, in case 1, crepitus appeared immediately after the procedure; while in case 2, crepitus was detected at the visit to our institute. The crepitus sometimes comes a little later, not just after a causal wound if it works as a check bulb for the accumulation of air in the soft tissue.

The knowledge of the anatomy of the head and neck helps us to speculate the conditions how subcutaneous emphysema or abscess proceed. The head and neck is composed of complex fascia that form potential spaces, such as submandibular, parapharyngeal (lateral pharyngeal space), retropharyngeal, and visceral spaces [11-13]. The submandibular space lies under the tongue, medial to the mandible and submandibular gland, into which mandibular teeth and oral floor disease easily spreads first [11]. Disease of the submandibular space can subsequently spread into either the parapharyngeal space or the visceral space. The parapharyngeal space can lead to the retropharyngeal space, which is contiguous with the mediastinum posteriorly; on the other hand, the visceral space is contiguous with the mediastinum anteriorly. In both present case reports, the air passed through the neck spaces from the oral floor to the mediastinum, the pathways of which were a little different: the submandibular space, visceral space, and anterior part of superior mediastinum in case 1; the submandibular space, parapharyngeal space, retropharyngeal space, and posterior part of superior mediastinum in case 2.

Although a very rare case in which subcutaneous emphysema was complicated by an infection has been reported [14], an emphysema does not usually cause an infection [4]. There is insufficient evidence regarding the potential of prophylactic antibiotic therapy to reduce infection following subcutaneous emphysema; however, the administration of prophylactic antibiotics is considered to be appropriate for preventing a deep neck abscess, which sometimes develops a life-threatening condition.

Most symptoms of subcutaneous emphysema start to resolve after 2 to 3 days, and they completely disappear after 5 to 10 days [6]. In case 1, symptoms started to improve on day 3 of admission, while in case 2, symptoms started to improve on day 2. The symptoms completely disappeared on day 12 and day 17 for case 1 and 2, respectively. There are usually no sequelae after this phenomenon [4]; however, a few cases of severe sequelae have been reported [14-16]. We obtained informed consent from the 2 patients about this report.

**Conclusion**

We should be aware of the potential occurrence of subcutaneous and mediastinal emphysema after head and neck procedures, especially those associated with the use of compressed air instruments. Sequelae usually do not occur after this phenomenon; however, it can sometimes lead to severe conditions. Its pathophysiology is associated with the complex anatomy of the head and neck.

**References**