Subcutaneous Emphysema as Unusual Sequelae of Orthodontic Separator Placement: A Case Report

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Abstract

Introduction: Subcutaneous emphysema refers trapped air in tissues beneath the skin that usually occurs on the chest, neck and face. Subcutaneous emphysema has a characteristic crackling feel to touch. Various dental procedures which can lead to this condition include use of high-speed, air-driven hand piece or air-water syringe, surgical tooth extraction. But emphysema due to separator placement in orthodontics has not been earlier reported to the best of our knowledge and is very rare.

Clinical Presentation: This article presents unusual sequelae of orthodontic separator placement resulting in subcutaneous emphysema. Orthodontic separators were placed between maxillary second premolars and first molars and between first molars and second molars bilaterally in a 15-year-old boy to be taken for comprehensive orthodontic treatment. He reported with a swelling on the right side of the face on the next day which extended from the cheek to the temporal region.

Management: The patient was treated with a conservative approach and was instructed not to blow. The total swelling was resolved in a week spontaneously without intervention.

Conclusion: Since orthodontic separator may lead to facial emphysema patients should be instructed not to blow air in mouth after separator placement.

Keywords: Subcutaneous emphysema; Orthodontics separator; Management

Introduction

Subcutaneous refers to the tissue beneath the skin, and emphysema refers to blow in or trapped air. Since the air generally comes from the chest cavity, subcutaneous emphysema usually occurs on the chest, neck and face, which travels from the chest cavity along the fascia [1]. Subcutaneous emphysema has a characteristic crackling feel to touch [2]. This sensation of air under the skin is known as subcutaneous crepitation and more commonly known as Macklin's Syndrome [3]. Subcutaneous emphysema can result from puncture of parts of the respiratory or gastrointestinal systems, penetrating trauma (e.g., gunshot wounds or stab wounds) or blunt trauma, infection (e.g., gas gangrene) and medical conditions that cause the pressure in the alveoli of the lung to be higher than that in the tissues outside of the alveoli [4]. When the condition is caused by surgery it is called surgical emphysema [5]. The term spontaneous subcutaneous emphysema is used when the cause is not clear. Emphysema a very common complication of trauma may occur with certain procedures in dentistry. Various dental procedures which can lead to this condition includes use of high-speed, air-driven hand piece or air-water syringe, surgical tooth extraction, root canal treatment, periodontal surgeries, prosthetic implant placement and orthodontic miniscrew insertion [6]. It can also occur spontaneously during vigorously blowing the nose, playing a wind instrument after an extraction [7,8] or puffing of the cheek following a self-inflicted bite of the buccal mucosa [9]. Medical imaging is used to diagnose the condition or confirm a diagnosis made using clinical signs [10]. Subcutaneous emphysema can also be seen in CT scans, with the air pockets appearing as dark areas which is so sensitive that scan commonly makes it possible to find the exact spot from which air is entering the soft tissues. But, subcutaneous emphysema usually does not require major medical treatment as small amount of air can be reabsorbed by the body. However, it may be uncomfortable and can interfere with breathing, and is often treated by removing air from the tissues, mainly by using large bore needles, skin incisions or subcutaneous catheterization. This article presents unusual sequelae of orthodontic separator placement resulting in subcutaneous emphysema which resolved spontaneously without intervention.
Case Presentation

A 15-year-old boy reported to the department of orthodontics of the institution with the chief complaint of irregularly placed teeth. Patient was advised comprehensive fixed orthodontic treatment and consent was taken for the same from patient’s parents as patient is below 18 years of age. Pretreatment records were taken and the treatment plan was explained to the patient after departmental case discussion. As a routine procedure, orthodontic separators were placed between maxillary second premolars and first molars and between first molars and second molars bilaterally. Patient was appointed for banding and bonding on the third day. He reported with a swelling on the right side of the face on the next day which extended from the cheek to the temporal region. The patient admitted blowing of air within mouth along with the friends while playing at home. The swelling kept on enlarging with more blowing till the patient was instructed not to do so and was painless which could be displaced on pressure. The buccal space swelling could be shifted to the temporal region and vice versa. On clinical palpation crackling was felt suggesting subcutaneous crepitation. The patient could himself demonstrate increase in swelling with blowing and shift the swelling to temporal region by pressing the buccal region (Figure 1). The separators were removed and oral mucosa was thoroughly inspected and examined for any discontinuity but no lesion could be detected. CT scan was advised to confirm the presence and extent of emphysema and report confirmed the presence of emphysema. The report suggested the diffuse emphysema in subcutaneous and intramuscular plane in right cheek region extending into temporal-parietal region. It also extended into right masticatory space, right parotid gland and perceptual compartment of right orbit (Figure 2).

Management

The patient was treated with a conservative approach and precautions were explained to the patient. The patient was instructed not to blow air and create positive pressure in the oral cavity that could worsen the emphysema. The patient was explained that the swelling should disappear in a few days and advised to report immediately if it increases in size. Antibiotics were prescribed for 5 days to avoid any infection in the tissues involving emphysema. The patient was reviewed after 24 hours, 48 hours and 1 week. There was improvement in the swelling after 2 days and the total swelling resolved in a week (Figure 3). The patient did not require surgical intervention for the condition. After 3 weeks the patient was again asked to blow to understand the possible etiology of emphysema. Since there was no repetition of the condition, patient was again motivated for the orthodontic treatment and it was started without separators using bondable molar tubes.

Discussion

It was Turnbull in 1900 who first reported subcutaneous emphysema after dental extraction [6]. But, subcutaneous emphysema is a common entity in the patients suffered from traumatic injuries, but a rare complication during the dental procedures while using high-speed, air-driven surgical drills and compressed air syringes and rarer during the orthodontic treatment [9]. This condition in dentistry occurred during extractions of teeth [6,11-14], conservative and endodontic procedures [8,15-17], periodontal surgeries and prosthetic implant placement. Various other etiological factors can also be implicated in causing subcutaneous emphysema such as cheek biting, nose blowing and puffing the air through mouth, but
are rare [18]. From orthodontics perspective, insertion of miniscrews [19] and facebow injury can lead to this condition. But, emphysema due to separator placement has not been reported to the best of our knowledge and is very rare. The most probable cause of emphysema was placement of separators in this particular case that is difficult to believe and very rare. The separation of teeth caused by separators may have allowed a space for air at pressure to enter buccal space. The explanation is based on the clinical findings though the etiology may be something else coincident with placement of separators. There was no repetition of the condition after removal of separators even on blowing air after 3 weeks. The most important aspect of subcutaneous emphysema is its timely diagnosis. Proper history with meticulous palpation of the involved structures is essential to make a correct diagnosis. Proper palpation will show crepitus as its most important sign that differentiates subcutaneous emphysema from other pathologies. It is also important to have proper differential diagnosis of this complication from other conditions that produce a volume increase such as hematoma, allergic reaction, and angioedema [8,20]. Radiographic modalities such as CT scan of the affected area are helpful in locating the exact presence of air in the soft tissues. Treatment of this condition generally varies with the severity of emphysema. Subcutaneous emphysema starts resolving within first 3 days of appearance of the condition and takes one week to get fully resolved. Complete airway assessment should be undertaken and chances of infection can be suspected as the air entering the tissues may contain oral microflora. Antibiotics and analgesics are prescribed as necessary to the patients and they should be informed about the nature of course of the condition. If not resolved within due course of time or reappears after complete resolution, physician should be consulted as early as possible. In the presented case the emphysema swelling showed crepitus and the presence was confirmed on the CT scan. Though the antibiotics were prescribed to avoid infections the emphysema resolved itself within a week.

**Conclusion**

Though rarely, separator placement may be a cause of facial emphysema. The patients may be instructed to avoid blowing air in mouth when separators are placed.

**References**


