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*Corresponding author

Samuel Alejandro Allen, Oral and Maxillofacial Surgeon –Associate Professor Oral and Maxillofacial Surgery Woody L Hunt School of Dental Medicine, Texas Tech University, El Paso Texas, USA

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Case Report

Subcutaneous Emphysema and Pneumomediastinum after Dentoalveolar Surgery. Why does this still happen? Case Series

Samuel Alejandro Allen[1*] and Christian Farfán Gutiérrez[2]

[1]*Oral and Maxillofacial Surgeon, Associate Professor Oral and Maxillofacial Surgery, Woody L Hunt School of Dental Medicine, Texas Tech University, El Paso Texas, USA*

[2]*Oral and Maxillofacial Surgeon, private practice. Arequipa, Peru*

Summary

Some complications are frequent in dentoalveolar surgery, such as pain, hemorrhage and infection. There are other very rare complications such as subcutaneous emphysema and pneumomediastinum, which can be caused by the use of high speed dental turbines with compressed air during the third molar extraction, or any other tooth. These can lead to other more serious complications, including mediastinitis, cardiac tamponade, obstruction of the respiratory tract, simple or tension pneumothorax, and pneumoperitoneum. Severe infections can also be caused by polluted air from the turbine and oral bacterias. This report describes a series of rare cases of subcutaneous emphysema and pneumomediastinum that happened after dentoalveolar surgery, where the high-speed handpiece with compressed air was used. Although there is no scientific evidence to indicate its use, in some Latin American countries it continues to be a common practice.

Introduction

Subcutaneous cervicofacial emphysema is the abnormal introduction of air into the subcutaneous tissues of the head and neck [1] caused mainly by trauma, neck dissection, tracheostomy, general anesthesia and /or usual realization of the valsalva maneuver [2-4]. The appearance of subcutaneous emphysema after a treatment of dentoalveolar surgery and air diffusion in the mediastinum is rare, but is reported in multiple cases. The cause is the introduction of air through the turbine of the handpiece during the surgical removal of an impacted tooth [5]. Trapped air is generally limited to the subcutaneous space, but may also be deeply dispersed throughout the retropharyngeal space, facial planes, thorax and the mediastinum, resulting in mediastinal emphysema. It occurs more frequently when the first, second, or third lower molars are treated because their roots communicate directly with the submandibular spaces [6, 7]. The goal of this paper is to review the identification, diagnosis and treatment of subcutaneous emphysema and pneumomediastinum as a complication when performing third molar and a premolar extraction with a high-speed handpiece with compressed air. It is important to be aware of the use of this technique, as it is still used indiscriminately for dentoalveolar surgery in Latin America, despite not being described as a valid technique in reference oral surgery texts, nor having scientific evidence to support its use.

Presentation of Cases

Case 1

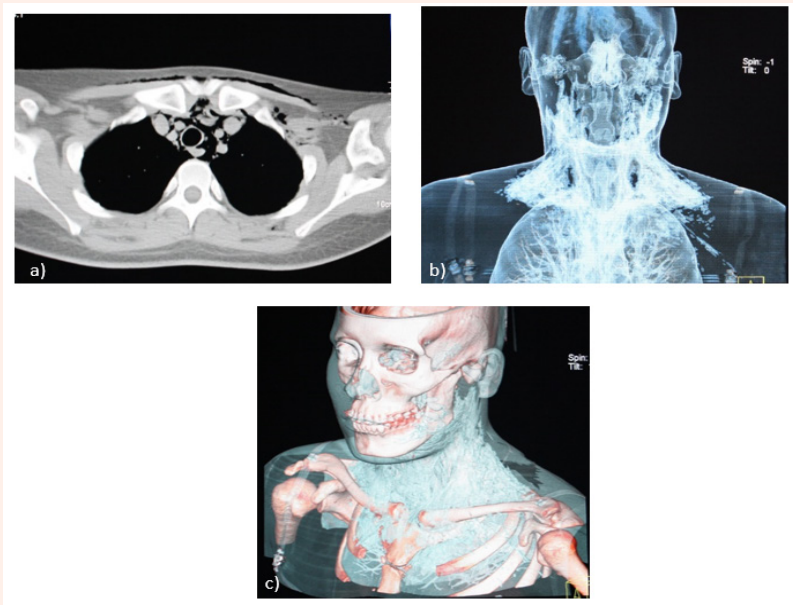

Figure 1: a, b & c (Case 1).Extensive facial subcutaneous emphysema, bilateral cervical emphysema, and pneumodiastinum.

24-year-old woman, without relevant medical history. It is reported that 4 days before admission, a third lower molar extraction is performed with a high-speed handpiece. She goes to the emergency service, with bilateral chest and cervical pain. At the examination, crackles are auscultated at the pulmonary bases, palpated at the cervical and sternal area, accompanied by pain. Stable vital signs. Leucocytes of 8600 mm3, neutrophils of 73% and lymphocytes of 19%. A facial cervical CT scan is performed, evidencing extensive facial subcutaneous emphysema, bilateral cervical emphysema, and pneumodiastinum (Figure 1). She is hospitalized by of oral and maxillofacial surgery. The patient was given antibiotic and empirical therapy with cefepime 1gr c /12 hours EV and metronidazole 500 mg c/6h EV. Treatment with oxygen at 50% x 30 minutes 3 times a day. Consultations are made for her, to the pneumology and thoracic surgery services, where she has being transfered later, continuing with medication and supplemental oxygen. The control tomography shows infiltrative lesions in the left lung (apical zone) and in the right lung (basal zone). Patient evolves favorably and is discharged when clinical examination is normal, and CT scans are within normal limits.

Case 2

28 years old male without contributory medical history. He states that 10 hours before admission, a third lower molar extraction is performed, with the use of a high-speed dental handpiece. During surgery, he experiences retrosternal pain and increased volume of the right facial. The procedure is cancelled inmediately and the patient is transferred to the emergency service of the British American Hospital. He is evaluated by oral and maxillofacial surgery, indicating his hospitalization. At physical examination, the patient shows an increase of volume of the right facial side, crackles in the neck and anterior thorax. Hemoglobin 15.5 gr / dl, hematocrit 45.1%, leukocytes 14.580 mm3, segmented 90% lymphocytes 5%. A facial cervical CT scan is requested, where the presence of a subcutaneous emphysema at the facial level is shown in the right buccal region, showing air content at the level of the right masticatory space, right orbital region, and cervical region (superficial and deep planes) with extension to the presternal region and in the scapulothoracic spaces (Figure 2). Consultations are requested to thoracic surgery and infectious diseases. Treatment was started with oxygen therapy and empirical antibiotic therapy, with levofloxacin 750 mg every 24 hours. The antibiotic is changed to clindamycin 600 mg c / 8h EV, suggested by infectious diseases. In the next few days, the patient is afebrile, initially with tachycardia, crackles on auscultation and rubbing. Cracklings are decreasing until they disappeared. CT scan control shows a marked decreased of emphysema. Patient is discharged with a favorable evolution.

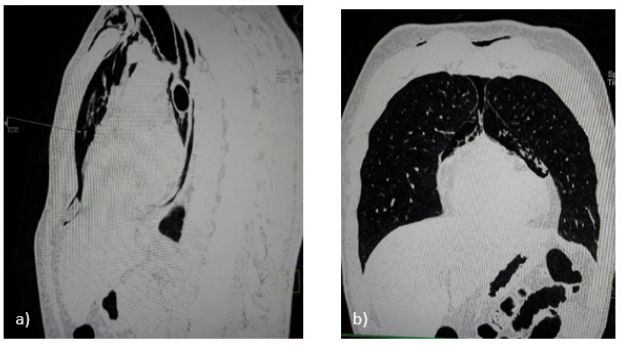

Figure 2: (Case 2). Extension of emphysema in the presternal region and in the scapulothoracic spaces.

Case 3

A 74-year-old male patient with a history of hypertension and benign prostatic hyperplasia reports that exodontia of the lower left premolar was performed 2 days ago. During the procedure he notes increase on the volume on the left side of the face. He was transported to the emergency service of the British American Hospital, where he is evaluated by oral and maxillofacial surgery. The physical examination reveals mild edema of the left side of the face, crackles in the face, neck and pretracheal area. The facial cervical CT scan shows a subcutaneous emphysema that compromises the left scalp, masticatory spaces bilaterally, bilateral buccal region, left periorbital and retropharyngeal space. It goes from the neck region bilaterally, to the anterior mediastinum, and the peritracheal and periaortic region. Due to the compromise of anatomical structures and an eminent danger of infection, hospitalization is decided. Internal medicine, pneumology and thoracic surgery consultations are requested. Laboratory tests show hemoglobin 14.9 gr/dl, hematocrit 46.5%, leukocytes 7.190 mm3, segmented 67%, lymphocytes 19%. Oxygen treatment is initiated with 15 liters x min., and antibiotic therapy with ampicillin sulbactan 1.5 g c/8h EV and ciproxin 500 mg c / 12 h EV. Later it is changed to moxifloxacin 400 mg c / 24h EV, ampicillin sulbactan 1.5 g c / 8h EV, suggested by internal medicine. Patient continues afebrile and has a favorable evolution. Control CT scan shows small bubbles in suborbital and maxillary left facial region. Emphysema is not visualized at the level of the neck, or chest. Patient is discharged with a favorable evolution.

Discussion

The clinical presentation of emphysema is the result of the communication of the surgical site with the related facial spaces. The facial spaces of the masticatory muscles and the parapharyngeal space continue laterally in the perivisceral spaces. These spaces in the neck, such as the retropharyngeal, vascular and pretracheal spaces, are in direct communication with the mediastinal spaces of the thorax [8,9]. Therefore, the air under positive or negative pressure can find its way from the face down to the neck and the mediastinum [10]. The use of high-velocity air turbine dental handpiece, with compressed air, can introduce air into the facial spaces and cause emphysema, pneumomediastinum, severe infections and even death [11-13]. Negative pressure can be created at the same time by the intrathoracic effect of inhalation. The most common clinical signs are correlated with the degree of subcutaneous air dissection. As the air continues inferiorly in the neck, retropharyngeal and axillary regions, new symptoms emerge. The clinician should be concerned if there is respiratory distress due to air constriction in the upper respiratory tract. The patients are generally uncomfortable and there is palpable crackle along the extension of the subcutaneous air. Signs of sepsis should always be considered, including fever / chills, erythema, heat. It is very important to exclude a diagnosis of mediastinal emphysema. Clinical signs and symptoms include dyspnea, chest and back pain, Hamman's sign (crunching sound with each heartbeat) and positive radiographic findings (widened mediastinum).10 In 25% of cases, there are changes in the electrocardiogram. Most cases of subcutaneous emphysema, although alarming, usually resolve spontaneously, with patient being monitored between 5 to 7 days without complications or morbidity. The patients recovered completely in 2 weeks. The administration of 100% oxygen can accelerate the resolution of emphysema because oxygen, which replaces other gases in room air, is more easily absorbed [14]. The reason for antibiotic administration is that the air introduced from an intraoral site probably contains bacteria that could lead to a rapidly disseminated cellulitis or a necrotizing fasciitis. The aerosol that is used in the dental turbine is rich in streptococcus, staphylococcus and pseudomonas [15]. With all these complications described, though caused accidentally and without scientific support, we firmly believe that there is no justification for the use of regular high speed handpiece activated by compressed air in dentoalveolar surgery. There are more than 40 case reports in PUBMED, which warn about the complications that occurred when performing dentoalveolar surgery with high-speed dental turbine [16,17]. Lack of training in the use of techniques involving the use of equipment and suitable instruments such as electric units, handpieces for oral surgery activated by nitrogen with rear exhaust gas, electric handpiece [18], instruments and equipment that complies with international parameters, allows these complications to continue to happen. It is true that they are rare cases, but this proportion is inversely proportional to the severity and potential for complications. It is necessary that in Latin America and throughout the world, constant training in relation to instruments and equipment suitable for dentoalveolar surgery for the benefit of patients and to improve our specialty in different areas of the world. In conclusion, we present case series of patients with subcutaneous emphysema and pneumomediastinum, after third molar extraction and a case of lower premolar extraction performed with a high speed handpiece with compressed air. Although these patients were treated satisfactorily with no serious or fatal complications, it is still important to acknowledge the increase in subcutaneous emphysema and pneumomediastinum after third molar and lower premolar extraction with use of a high speed handpiece with compressed air. Despite the lack of scientific evidence of absolute proof, cases such as the ones mentioned above are concerning enough to make the dental community, especially the Latin America countries where this practice is still used, aware of these complications.

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