

## CASE REPORT

# SUBCUTANEOUS EMPHYSEMA FOLLOWING DENTAL PROCEDURE - CASE REPORT

### ABSTRACT

Subcutaneous emphysema is an uncommon but potential complication following dental procedures. Unlike subcutaneous emphysema in medical cases where the escape of air from lung alveoli or gastrointestinal system is the common cause, in dentistry it is iatrogenic. In this article, we present a case of subcutaneous emphysema following a dental procedure that involved buccal space, infraorbital space, and periorbital region. The possible differential diagnoses, complications, and management of cervicofacial subcutaneous emphysema are also discussed.

**Keywords:** subcutaneous emphysema, dentistry, infraorbital space

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## INTRODUCTION

Commonly subcutaneous emphysema occurs from puncture of parts of the respiratory or gastrointestinal system as a result of penetrating trauma or in medical conditions that cause pressure in the lung alveoli. Infections like gas gangrene can also cause air trapped in subcutaneous tissues.<sup>1</sup> Subcutaneous emphysema due to surgical or medical procedures is known as surgical emphysema. Spontaneous emphysema is the term used to describe subcutaneous emphysema due to rupture of lung alveoli or when the cause is not clear.<sup>2</sup>

The development of soft tissue emphysema after dental treatment is not a rare complication. But with few descriptions in the literature, it appears to be under-reported and thus seem as rare as suggested.<sup>3</sup> Soft tissue emphysema following dental procedures, also known as surgical emphysema, subcutaneous emphysema, cervicofacial emphysema, and interstitial emphysema, is usually restricted to only moderate local swelling. However, the spread of larger amounts of air into deeper spaces may sometimes cause serious complications, including airway compromise due to accumulation of air in the retropharyngeal space, pneumomediastinum, and pneumopericardium. Fatal air embolism and soft tissue infections due to dissemination of oral microflora along the emphysematous aero-digestive tracts are expected complications.<sup>4</sup>



Fig. 1

## CASE REPORT

A 52-year-old male patient came to the department of oral and maxillofacial surgery with complaints of swelling over the right side of the face for one day. The swelling of the face was noticed while doing tooth preparation for the fabrication of a prosthetic crown on his right upper second molar tooth. The patient gives a history of a wound on the right buccal mucosa which happened during initial crown preparation and when final preparation was done the swelling developed immediately. Other than the swelling the patient had no other symptoms.

The patient was having medications for chronic kidney disease for 2 years. The nephrologist had given medical consent for any non-invasive dental procedures and had instructed to avoid any nephrotoxic drugs like NSAIDs. So the patient was not under any medication that could have caused an allergic reaction. But the patient's apprehension was that the swelling might have developed due to his medical condition or due to some allergy to dental materials.

On examination there was a swelling of the right face involving the right buccal and infraorbital spaces extending up to the right lower eyelid, obliterating the palpebral fissure partially [Figure 1]. The patient had no pain, itching, rashes, or any clinical signs of inflammatory changes. On palpation, the swelling was soft, non-tender, non-fluctuant and with crepitus felt over the soft tissue spaces. Intraoral examination revealed a small puncture wound over the right buccal mucosa opposite maxillary second molar, probably from an air-rotor handpiece bur [Figure 2]. The parotid duct could be appreciated close to



Fig. 2

the wound, but with no involvement. No other significant findings were observed intraorally that could be linked with the swelling.

The puncture wound, crepitus on palpation, fast-developing nature of swelling, all led to a provisional diagnosis of subcutaneous emphysema. The patient was reassured of the condition, antibiotics were prescribed and mouthwash was given for oral rinsing. As there was no dyspnea, dysphagia, or any signs of obstruction in the upper aerodigestive system the patient was sent home and was instructed to review immediately if any other symptoms occur or otherwise after 1 week. The patient did not appear for a follow-up visit but communicated over the phone that the swelling started subsiding in 3 days and completely resolved in 8 days.

## DISCUSSION

Subcutaneous emphysema refers to the entrapment of gas or air in the subcutaneous tissue. Subcutaneous emphysema due to medical reasons is not a rare finding. It is usually associated with endotracheal intubation, especially retrograde intubation, tracheostomy, positive pressure ventilation, improper placement of chest drains, endoscopic procedures like laparoscopy, trauma, prolonged surgical procedures like on-surgeries or head and neck surgeries, soft tissue infections like gangrene, rupture of lung alveoli as in spontaneous emphysema, neoplasms involving the aerodigestive tract, cryotherapy procedures, etc.<sup>5-8</sup>

Subcutaneous emphysema associated with dental procedure was first reported by Turnbull, which was emphysema of the face following a premolar extraction. Open soft tissue flaps, extraction sockets, soft tissue wounds, implant sites, periodontal pockets, or open root canals are usual entry points for subcutaneous air in dental procedures. Use of air syringes directly, use of drills involving pressurized jets of air and water, or use of gas liberating agents like hydrogen peroxide in the above mentioned vulnerable areas carry great risk for development of subcutaneous emphysema.<sup>3,4,7-13</sup> In addition to iatrogenic causes, subcutaneous emphysema can also be patient-induced. This typically occurs after extrac-

tion in situations in which the patient begins to smoke, cough, exhale forcefully, or vomit before any healing has taken place. In the case of endodontic treatment, sodium hypochlorite accidents, the use of air-driven syringes, and misuse of rubber dams or not using a rubber dam have been documented as causing subcutaneous emphysema.<sup>8</sup>

Subcutaneous emphysema following dental procedures in most cases manifests with mild to moderate local swelling and symptoms when the spread of air is limited to nearby tissue spaces like the buccal, infraorbital, sublingual, or submandibular spaces. However, displacement of air into deeper spaces in the neck like parapharyngeal, retropharyngeal, Infratemporal, and orbital spaces can lead to severe and sometimes fatal complications.<sup>9-12</sup> Some of them include necrosis of subcutaneous tissue, airway compromise, pneumomediastinum, pneumopericardium, pneumoperitoneum, auditory disturbances, retinal artery collapse, optic nerve damage, loss of vision, cerebral air embolism, secondary fascial space infections, etc.<sup>10-14</sup>

Proper diagnosis of the condition is therefore crucial in managing this complication. Differential diagnoses include angioedema, hematoma, soft tissue infections, and contact dermatitis.<sup>10,11</sup> As in any diagnosis, an appropriate case history along with a thorough examination of the swelling is essential in this condition also. A recent history of dental treatment, a clinically appreciable disruption in the mucosal barrier, and a sudden developing swelling with no other symptoms can lead to a diagnosis of surgical emphysema associated with dental treatment.<sup>13</sup> The pathognomonic sign of subcutaneous emphysema is crepitus upon palpation of the affected area.

Subcutaneous emphysema is usually a self-limiting condition and resolves in 3 - 10 days, as the gas is resorbed into the bloodstream for eventual excretion via the lungs. The patient should be observed until the clinician is sure that the air has not involved any dangerous space and is no longer advancing. At this point, the patient can be successfully managed on an outpatient basis with close follow-up. The administration of antibiotics for potential infections and corticosteroids to reduce swelling have been reported in the literature. But the administration of

such agents should be based on clinical evaluation of potential infection, the severity of the swelling, and the general condition of the patient.

Confirmation of the clinical diagnosis is sometimes necessary in severe cases. Investigations like routine radiographs, ultrasound scans, CT scans, MRI, or even histopathological examination of the tissue had been performed by different authors. Radiographs of the involved region, ultrasound imaging, CT, and MRI help identify the air-filled spaces. A multidetector CT is preferred over conventional CT in identifying air spaces. A chest radiograph is needed to rule out mediastinal involvement.<sup>13</sup> Anteroposterior chest radiographs usually show a radiolucent outline parallel to the margin of the heart. Lateral chest radiographs are often more helpful because they show retrosternal radiolucency with outlining of the aorta and mediastinal structures. Histopathologic examination of specimens from the region usually shows an extensive separation of attenuated collagen bundles, suggestive of interstitial air. Adipose tissue shows fragmentation of cell membranes. Inflammatory cells, an increase of fibroblasts, or mucin deposits will not be appreciated.<sup>14</sup>

Depending on the extent, patients should be monitored closely before discharge for any respiratory or cardiac distress. If left untreated, there have been instances of subcutaneous emphysema spreading to the mediastinum and thoracic regions, causing pneumomediastinum, pneumothorax, and pleural effusion. There have been reports of arrhythmias and electrocardiogram alterations after the spread of air into the pericardial space, and also emphysema spread to the orbital and periorbital regions, leading to blindness due to nerve compression. Very few reports are there of air embolism developed from subcutaneous emphysema causing seizures and ischemic brain lesions, leading to short-term memory impairment. Thus, early recognition and proper management must be implemented to prevent such progressions.

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