

Cervico-Facial Emphysema and Pneumomediastinum Complicating a High-Speed Drill Dental Procedure

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Pneumomediastinum and cervico-facial emphysema associated with a dental procedure was first reported by Turnball in 1900 [1]. He described a case of massive cervico-facial subcutaneous emphysema and mediastinal emphysema following a tooth extraction in a bull. Physiologically, PMCFE can occur as a complication of coughing, sneezing, nose-blowing and vomiting, or following a dental extraction [2,3]. PMCFE occurring during dental procedures while using high-speed air or water drills has been documented mainly in the dentistry literature. The use of a high-speed drill can cause entrance of air that dissects through the periodontal ligament or under the raised mucoperiosteal flap. This air enters the sublingual and submandibular spaces; these spaces are in communication with the pterygomandibular, parapharyngeal and retropharyngeal spaces. Entrance of air into the gums can thus penetrate through the cervical facial planes and into the mediastinum [3].

We present a patient suffering from PMCFE with a computed tomography scan of the neck and mediastinum. As seen on the CT scan, the organs in the anterior half

of the neck are surrounded by air that had dissected into the parapharyngeal region and into the mediastinum.

Patient Description

A 79 year old healthy woman underwent a surgical extraction of her right mandibular second molar at a dental clinic. During the treatment, in which a high-speed, air-turbine drill was employed, the patient complained of a swelling in the neck and difficulty breathing, but suffered no chest pain. She was transferred to the emergency room.

Upon arrival her vital signs were normal. A clinical examination revealed a previously sutured right intraoral sublingual laceration. Gross facial swelling with right periorbital tissue fluctuation was noted, accompanied by cervical subcutaneous emphysema. Both lungs were clear to auscultation and no cardiac murmur or rub was detected. The rest of the physical examination was unremarkable. The electrocardiogram was normal. A chest X-ray demonstrated pneumomediastinum and subcutaneous emphysema. No pneumothorax was detected.

A contrast-enhanced axial CT scan of the neck and chest demonstrated a significant amount of free air in the fascial

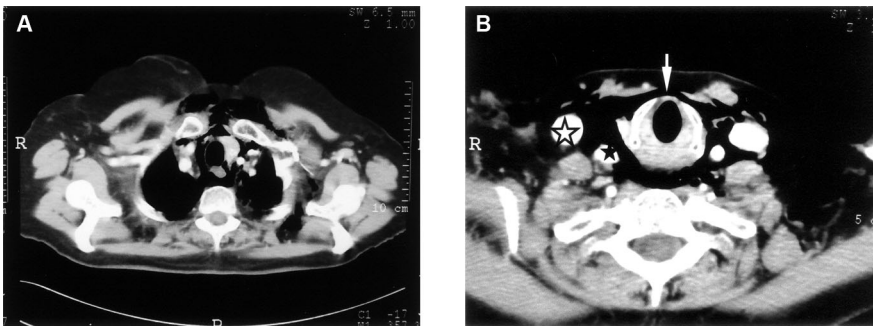
spaces of the neck [Figure A] and in the mediastinum [Figure B]. PMCFE was diagnosed. The patient was admitted to the Department of Otolaryngology/Head and Neck Surgery for airway monitoring and parenteral antibiotic therapy. She was treated with intravenous amoxicillin-clavulanic acid 1 g 3 times a day and analgesics as required. The swelling and the subcutaneous emphysema subsided within 2 days. During this period the patient did not experience any airway obstruction. She was discharged from the hospital 48 hours later and continued the oral antibiotic therapy for 7 more days with no further complications.

Comment

Symptoms of pneumomediastinum and subcutaneous emphysema in the cervico-facial region can vary. In the medical literature we find descriptions of a variety of symptoms such as swelling, a sensation of fullness in the facial/cervical region, erythema, crepitus, dysphagia, dysphonia, dyspnea, periorbital swelling, emphysema around the eye, and pain [2–5].

The differential diagnosis of a rapid facial swelling following a dental procedure should take into consideration angioedema, hematoma, cellulitis, allergic reaction

PMCFE = pneumomediastinum and cervico-facial emphysema



[A] Axial CT scan of the neck with contrast material at the level of the larynx. The organs in the anterior half of the neck are surrounded by air. Arrow = larynx, black asterisk = common carotid artery, hollow asterisk = internal jugular vein. **[B]** Axial CT scan of the chest with contrast material showing pneumomediastinum.

and subcutaneous emphysema [3,4]. Both crepitus and/or a plain film of the neck showing the presence of air trapped in the soft tissues are pathognomonic of subcutaneous emphysema. The existence of a pulsatile mass or a bruit detected by a stethoscope can help to distinguish between a rapidly swelling hematoma and subcutaneous emphysema. A CT scan of the neck with contrast material provides an accurate diagnosis, leading to the right management of the disorder [5].

The diagnosis of pneumomediastinum is based on findings in various imaging modalities. The standard postero-anterior and lateral plain films are usually sufficient for diagnosis. A postero-anterior chest radiograph usually demonstrates a radiolucent line between the left heart border and the mediastinal pleura. Other findings include "highlighting" of the aortic knob and "the contiguous diaphragm" sign [4]. Postero-anterior chest radiographs can overlook 50% of cases of pneumomediastinum. Considering this fact, lateral chest radiographs, which increase sensitivity to almost 100%, should always be performed. In the lateral views air is visualized in the retrosternal space or as lucent streaks outlining the aorta and other mediastinal structures [3,4]. These radiographs can also detect associated pneumothoraces. Lateral decubitus radiographs can sometimes be useful for distinguishing a pneumothorax from a pneumomediastinum. In a pneu-

mothorax the air ascends to the highest possible point, while in a pneumomediastinum the air shows minor positional variations since it is relatively confined [4]. Complementary diagnostic procedures such as a chest CT scan are often performed following conventional radiographic imaging in order to rule out other possible causes of secondary pneumomediastinum [5].

PMCFE is usually harmless, however the potential for complications exists. The possibility of an infection inside the emphysema should be considered as the tissues are inoculated with bacteria carried from the oral cavity by the air. Prophylactic antibiotic therapy is therefore recommended [5]. The probability of upper airway obstruction is small, since the air follows loose low-resistance areas, thus rarely causing respiratory distress. However, patients suffering from PMCFE should be hospitalized for 24–48 hours for observation. Signs of respiratory distress indicate a complication or spreading of air into areas such as the submucosa of the larynx or trachea. Other rare complications that should not be neglected are pneumopericardium, air embolism, pneumoperitoneum, infective mediastinitis, cardiac tamponade, association with a tension pneumothorax, and orbital emphysema with optic nerve damage [5]. Death from emphysema after the use of a high-speed air-turbine drill has not been reported to date.

Treatment of a patient suffering from PMCFE is symptomatic and includes respiratory monitoring, appropriate antibiotic therapy, and control of possible discomfort with analgesics [5]. Special attention should be given to the correct choice of analgesics; analgesics that might decrease lung ventilation should be avoided. The patient should be instructed to abstain from any augmentation of intraoral pressure via a Valsalva maneuver. Any such increase in intraoral pressure can cause the introduction of supplementary air and/or debris into the soft tissues, thus increasing the risk for further complications such as infection. Antihistamines may be recommended for allergic patients. Smoking should be prohibited.

A patient suffering from PMCFE who does not develop any complications can be discharged from the hospital following an observation period of 1–2 days. The emphysema is likely to resolve fully within 1 or 2 weeks, depending on the initial amount of entrapped air [5].

References

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The hardest thing in the world to understand is the income tax

Albert Einstein