Air emphysema - an in office emergency: A case report

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ABSTRACT
As with all surgical procedures, there is a risk of operative and post-operative complications associated with endodontics, but these should be unusual provided appropriate precautions are taken. This article reviews the evidence on complications along with a case report of occurrence of air emphysema during endodontic treatment.

INTRODUCTION
Endodontic mishaps or procedural accidents are those unfortunate occurrences that happen during treatment, some owing to inattention to detail, others totally unpredictable. "Retreatodontics" and "disassembly"1 are new terms that have arisen as the profession attempts to correct these new problems or procedural mishaps as they are called. Recognition of a mishap is the first step in its management; it may be by radiographic or clinical observation or as a result of a patient complaint.

Robert J. Frank1 listed those complications as follows:

ACCESS RELATED
- Treating the wrong tooth
- Missed canals
- Damage to existing restoration
- Access cavity perforations
- Crown fractures

INSTRUMENTATION RELATED
- Ledge formation
- Cervical canal perforations
- Midroot perforations
- Apical perforations
- Separated instruments and foreign objects
- Canal blockage

OBSTRUCTION RELATED
- Over- or underextended root canal fillings
- Nerve paresthesia
- Vertical root fractures

MISCELLANEOUS
- Post space perforation
- Irrigant related
- Tissue emphysema
- Instrument aspiration and ingestion

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TISSUE EMPHYSEMA

The appearance of this condition after dental procedures is, fortunately, relatively infrequent. Nevertheless due to the advent of high pressure air instruments such as high-speed hand pieces and air syringes, this phenomenon is increasing\(^2,3\).

Tissue space emphysema has been defined as the passage and collection of gas in tissue spaces or fascial planes\(^4\). It has been reported as an untoward event subsequent to various dental procedures, such as an amalgam restoration\(^5\), periodontal treatment\(^6\), endodontic treatment\(^7\), and exodontia\(^8\). The common etiologic factor is compressed air being forced into the tissue spaces.

Two procedures in endodontics, if carried out improperly, have the potential to cause a problem. First, during canal preparation, a blast of air to dry the canal, and second, during apical surgery, air from a high-speed drill can lead to air emphysema. Any time a stream of air is directed toward exposed soft tissues, the potential for a problem exists.

DIAGNOSIS

In order to guide as to correct diagnosis, a detailed history of the fact is crucial, as well as a meticulous palpation of the involved tissue\(^9\). The usual sequence of events is rapid swelling, erythema, and crepitus. Hayduk et al. regard crepitus as pathognomonic of tissue space emphysema and therefore easily distinguished from angioedema\(^10\). Although pain is not a major complaint, dysphagia\(^11\) and dyspnea\(^12\) have been reported. Unlike irrigant extrusion reactions, tissue space emphysema remains in the subcutaneous connective tissue and usually does not spread to the deep anatomic spaces\(^13\). Migration of air into the neck region could cause respiratory difficulty, and progression into the mediastinum could cause death.

TREATMENT

Although alarming to the patient and clinician, it is usually a benign condition that resolves over 3–10 days\(^3,15,16\) as the gas is resorbed into the blood stream for eventual excretion via the lungs. Rarely, serious complications such as pneumo-mediastinum\(^17\) and airway compromise are seen\(^18\). Our literature review was unable to find any reports of serious infective sequelae such as mediastinitis following tissue emphysema, however, most reports of this condition have placed the patient on a course of antibiotics designed to cover normal oral flora. The rationale for this is that the breach in the mucosa is almost certainly accompanied by ingress of oral flora which has the potential to infect the subcutaneous tissues. There has not been a randomised case controlled study of the use of antibiotics in emphysema. Thus we are unable to make a definitive pronouncement on the use of antibiotics in this condition, although the weight of opinion in the literature would seem to advocate the use of chemoprophylaxis.

PREVENTION

Preventive measures that should be taken to avoid the risk of this occurrence during endodontic procedures include using paper points to dry root canals. If the air syringe is to be used, Jerome suggested horizontal positioning over the access opening, using the “Venturi effect” to aid in drying the canal\(^20\). In surgical procedures, once a flap is reflected, apical access can be made with the slow-speed or high-speed handpieces that do not direct jets of air into surgery sites\(^1\).
CASE REPORT

A 46 year old male patient was referred to the Department of Conservative Dentistry, Chhatrapati Shahuji Maharaj Medical University, Lucknow by a general dental practitioner following the acute onset of left periorbital and facial swelling during the endodontic treatment.

Patient visited to a private clinic with the chief complaint of hot and cold sensitivity in relation to upper left anterior region. Clinical examination showed generalised attrition and maxillary left lateral incisor and canine were severely involved. On periapical radiograph pulpal exposure of tooth #22 and #23 was evident and a diagnosis of acute periodontitis in the same teeth were made. Treatment plan included pulp space therapy of maxillary left lateral incisor and canine, followed by post endodontic restoration after patient’s consent in the private clinic. Proper access opening was accomplished and biomechanical preparation was done. When the root canals were attempted to be dried by air syringe by the concerned dentist, it resulted in swelling in periorbital region and the patient was referred to the Department of Conservative dentistry, Chhatrapati Shahuji Maharaj Medical University, Lucknow.

In our department, on examination, a well looking man with obvious left facial swelling was seen (Fig. 1). His vital signs were all within normal limits (temperature 37.1°C, respiratory rate 16 breaths per minute, heart rate 80 beats per minute, blood pressure 120/70 mmHg) and he was warm and well perfused. Examination of his respiratory and cardiovascular system revealed vesicular breath sounds with good air entry bibasally and a midline trachea. He was able to swallow and was not in any respiratory distress.

Extraoral examination showed a swelling in left maxillary region which was more pronounced in left periorbital region (Fig. 2). Intraoral examination revealed swelling in buccal vestibule extending from #22 to #24 region (Fig. 3).

We advised the patient that he must avoid increase in the intraoral pressure, such as blowing the nose vigorously or playing musical instruments, which could introduce more air.

Figure 1 - Patient showing swelling developed during pulp space therapy
Figure 2 - Swelling was prominent in periorbital region and conjunctiva
Figure 3 - Intraoral examination revealed swelling in buccal vestibule extending from #22 to #24 region
DISCUSSION

Endodontics is currently in the midst of its own “Industrial Revolution.” The technological advances made routinely since the early part of this decade have far exceeded the progress made since the discipline was first recognized as a specialty. The advent of nickel titanium files, rotary instrumentation, “endosonics,” radiovisiography, the endoscope, and the clinical microscope are but a few innovations that have changed the way in which endodontics is practiced. This progress has increased both productivity and quality of care. On the other hand, the complexity of the cases being treated by both general dentists and endodontists is increasing, with the result that new problems are being created. Correction of a mishap may be accomplished in one of several ways depending on the type and extent of procedural accident. Unfortunately, in some instances, the mishap causes such extensive damage to the tooth that it may have to be extracted.

Endodontic mishaps sometimes have dentolegal consequences. These can be minimized or avoided by providing patients with adequate information prior to the endodontic procedure.

The word emphysema arose in the ancient Greek language and means “to blow in”. Subcutaneous emphysema event is the consequence of air introduction or other gases into softs tissues. In dentistry, it may appear with the use of high pressure air during a procedure or in difficult or long extractions, that is to say, iatrogenic. Also, it may be due to traumatics causes namely fractures that affect the facial skeleton or can be of spontaneous occurrence and set off sometimes by the patients themselves. Blowing the nose vigorously or playing a wind instrument after an extraction may be the origin problem.

The subcutaneous emphysema is an uncommon pathology in dental practices, so that a secondary appearance in a dental procedure can be alarming both for the patient and for the dentist. Many cases go unrecognized or are misdiagnosed. It is important to make differential diagnosis of this complication with others that also produce volume increase like hematoma, allergic reaction or angioedema.

Our purpose is not to add one more case of emphysema to literature, but to show dentists that in simple endodontic procedures using air pressure instruments, they could be exposed to this complication.

References:
1. Robert J. Frank (Ingle)


