CASE REPORT

Cervicofacial and mediastinal emphysema complicating tooth extraction in an elderly patient: a preventable complication

Gabriel Ayonmibesimi Akra,¹ Khalid Yousif²

¹Emergency, Albury Wodonga Health Albury Campus, Albury, Australia

²Emergency Department, South West Health Campus, Bunbury, Australia

Correspondence to
Gabriel Ayonmibesimi Akra,
akragbesimi@yahoo.com,
gbesimi@gmail.com

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SUMMARY

Subcutaneous emphysema is widely documented in the literature and well known by doctors and dentists. However, subcutaneous emphysema following tooth extraction is not very common.

We report the case of a 72-year-old female who presented to the emergency department of the Bunbury Hospital in Bunbury in the state of Western Australia in Australia, with subcutaneous emphysema of the face and neck with extension into the mediastinum, following a complicated tooth extraction in 2016. It was a dramatic and scary occurrence for both the patient and dentist, but totally preventable. The investigations and treatment could have been very invasive. However, with limited and essential management, the process was kept simple and safe for the patient.

BACKGROUND

Cervicofacial and mediastinal emphysema following tooth extraction is very rare. The first prompting to write this was when it became apparent that among the emergency physicians on the floor with up to 15 years of experience as emergency consultants, none had seen a similar case prior to this. This was corroborated by personal conversation with other emergency consultants and dentists.

In the course of investigating the patient, there was a recommendation by the radiologist, for endoscopy to look for an alternative source of the emphysema. However, following discussions between the emergency physicians and the maxillofacial surgeons, this was avoided, thereby preventing further morbidity to the patient.

CASE PRESENTATION

This is the case of a 72-year-old female who had tooth ache in the right lower molar region. She saw her dentist on the day of presentation for a tooth extraction. She was otherwise well prior to this, without any infective symptoms. During the procedure to remove tooth 46, the root was stuck to the canal and was difficult to remove using the lower molar forceps. The dentist used a triplex syringe for irrigation to create a clear field of surgery for the procedure. Towards the end of the procedure, the patient suddenly developed a right facial swelling that rapidly increased in size. The rate of increase of the swelling was dramatic such that the dentist had to abandon the procedure and referred her to

the local emergency department. The dentist and her colleagues were alarmed because they had not experienced such occurrence in their practice of many years.

The patient reported an associated crackly sensation around the jaw as the swelling developed. Her face felt disfigured, but she denied swelling in the mouth or throat. There was no difficulty with breathing or chest pain.

On arrival in the emergency department, she was triaged as category 4 according to the Australian Triage Scale.

On examination, she had a right facial swelling extending from the forehead, the eyelids, to the upper part of the neck ([figure 1](#)). There was crepitus in the areas of swelling. There was no redness, warmth or tenderness.

Her mouth opening was normal. There was no intraoral swelling and the airway was preserved.

Temperature: 36.5°C. Pulse rate of 70/min. Blood pressure of 125/76 mmHg. Oxygen saturation of 98% in air.

Examination of the chest and cardiovascular system was normal.

A diagnosis of subcutaneous emphysema of the right side of the face and neck following tooth extraction was made.

INVESTIGATIONS

A radiograph of the face was done ([figure 2](#)). This showed air in the soft tissue of the right side of the face, extending into the chest/mediastinum.

Following discussions with the maxillofacial surgical team at a tertiary hospital in Perth, a decision for conservative measures and discharge home on oral antibiotics for 5 days was made.

The emergency medicine team made an arrangement to review her the following day.

During the next day follow-up presentation, there was reduction of the facial swelling. However, on further questioning, she reported some odynophagia the previous night, but no respiratory difficulty.

Examination of the chest and cardiovascular system was normal. At this stage, a CT of the chest ([figures 3–6](#)) was done to determine if the emphysema was extending into the chest or if there was an alternative pathology to explain her presentation.

The radiologist reported the findings of the CT chest to be that of a concentration of deep

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Figure 1 Right facial swelling with eyelid involvement.

mediastinal emphysema abutting on what may be a tract between an air filled oesophagus at the level of the aortopulmonary window and emphysema extending distally around the aorta. This finding is equivocal for what may be a small oesophageal disruption. A distal tracheal disruption likewise warrants consideration.

Given the findings described in relation to the oesophagus and possibly the trachea, and extensive emphysema, further characterisation of the oesophagus, trachea with direct imaging

Figure 2 X-ray facial view demonstrating a right-sided air in the soft tissue.

Figure 3 Coronal view of CT chest demonstrating mediastinal emphysema.

and endoscopy was recommended. However, the patient remained well with no chest pain or chest signs of significance. Therefore, a decision was made to admit the patient in the emergency department short-stay unit through the day and overnight after discussions of the findings on CT with the patient.

The emergency physicians and the maxillofacial surgeons did not think endoscopy was warranted. The patient opted to go home after a whole day of observation was unremarkable with the promise to represent if she thought she was getting worse, as she lived near the hospital and had access to transport.

OUTCOME AND FOLLOW-UP

A follow-up review after 2 days following discharge from the emergency department showed that she continued to improve. By 2 weeks, the swelling and crepitus had completely resolved.

DISCUSSION

Subcutaneous emphysema is a relatively rare complication of lower molar extraction.¹ This was demonstrated by the fact that

Figure 4 Axial view of CT chest demonstrating mediastinal emphysema.

Figure 5 Coronal view of CT face and neck demonstrating right-sided subcutaneous emphysema without compromise to the airway or oesophagus.

the dentist and her colleagues were alarmed when it occurred. She (the dentist) came to the emergency department herself, as she was keen to see how the patient was progressing. Emergency

Figure 6 Sagittal view of CT face and neck demonstrating intact airway and oesophagus.

physicians see subcutaneous emphysema following trauma to the chest or airway in their practice as a common occurrence. However, one following tooth extraction is very uncommon.

Emphysema has been well described in trauma. In dentistry, it may also occur following restorative dentistry, periodontal surgery, endodontic treatment, repair of facial fractures, temporomandibular joint surgery, extraction of teeth and other procedures.^{1,2}

In a literature review published by Heyman *et al*³ in 1995, they noted that 74 cases of emphysematous complication following dental procedures in ambulatory dental patients had been reported in the English literature over 33 years. This equates to approximately 22 cases in a decade. In reality, the incidence may be higher as some would not have been reported. The patient population appeared to be in their third and fifth decades of life, unlike our patient who is in her eighth decade of life. Most of the patients reported had mandibular tooth extraction on the right side just like in our patient.

The use of an air syringe, high-speed hand pieces or their combination was reported in 71% of cases.³ This appears to be a major risk factor for developing this complication. In our case report, a triplex syringe which uses a combination of air and water to create a clear surgical field was used. This device may have created microtrauma to the buccal mucosa driving air into tissue planes. It would be useful to minimise the pressure used while operating this device to obviate this complication. Better still this condition could be prevented, but this comes with awareness.

Yang *et al*⁴ in their review paper noted the following: 'The use of a high-speed dental drill may introduce air into the soft tissue and lead to subcutaneous emphysema and pneumomediastinum. After a review of the literature, we found that subcutaneous emphysema and pneumomediastinum are rare complications secondary to dental extraction. Physicians in the emergency department may misdiagnose the symptoms as an allergic reaction. Dentists should be more aware of air leak during dental extraction'.

From my personal conversation with the dentist who performed the tooth extraction, the triplex syringe was used as a pressurised device which makes the procedure faster. Alternatively, gauze could have been used to create a relatively dry field for the procedure, but it takes longer. We would therefore advise awareness and the need to prevent this complication even if the use of gauze which takes a longer time will help to achieve this.

This complication could extend to the mediastinum or pleural space with the potential for fatality. Our patient had pneumomediastinum, but no pneumothorax and she was asymptomatic from the chest involvement of the spread of air. This and how to prevent associated complications were echoed in 2009 in the paper by Arai *et al*⁵ where they noted that subcutaneous emphysema and pneumomediastinum in their patient developed asymptotically, probably due to extraction of a mandibular third molar, and were found incidentally on the day after the dental procedure. To avoid subcutaneous emphysema and pneumomediastinum associated with dental treatment and surgical intraoral procedures such as tooth extraction, air turbine drills should be used only when it is essential.

Previous reports and the literature noted these complications from 2 hours to a day after the procedure. However, it can be dramatic like in our patient where it occurred while the procedure was going on such that they had to abandon the surgery, but this was already at the end of the procedure.

Our patient was managed symptomatically with analgesics and oral antibiotics for 5 days. This was done to reduce the added

risk of infection from oral flora which may have been driven into the tissue planes along with the air. She was discharged home for an outpatient follow-up.

Admission to the emergency short-stay unit is a good option of disposition for patients like this who do not have any potentially life-threatening symptoms or sign and not requiring invasive treatment like a chest drain for pneumothorax. This will expand the indications for admission to the short-stay unit under the care of the emergency physician.

We also recommend that investigations should be kept to a minimum, except there are concerning symptoms and signs.

It is worth considering the cost implication of this complication in an ever-increasing cost of modern healthcare delivery.

An attempt to estimate the cost of managing this patient in our hospital revealed the following: The facial X-ray was approximated to cost \$A125.00, the CT chest was estimated to cost \$A480.00 and the cost of admission to the short-stay unit for part of the day was estimated at \$A750.00. The estimated cost from the above, excluding other components of patient care for this patient, is \$A1355.00. This cost could have been minimised or avoided, besides the added burden of disrupting the patient's daily routine and the need for multiple trips to the hospital.

Contributors GAA and KY both managed the patient. GAA wrote the manuscript. KY reviewed and made corrections and additions to the manuscript. Patient consent for the use of pictures and publication was obtained by GAA.

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Learning points

- ▶ In conclusion, subcutaneous emphysema following tooth extraction is a rare condition. When it occurs, it can be extensive and far down to the mediastinum.
- ▶ Diagnosis is by clinical history and physical signs with minimal radiological investigations.
- ▶ Antibiotics are recommended because of the potential for infection from oral flora which may have been driven into tissue planes with the air.
- ▶ Outpatient follow-up should be considered if the patient is asymptomatic with normal observations and has easy access to transport. Otherwise, the patient should be admitted into an emergency department short-stay unit if there is any doubt or it is late at night and there is no requirement for an invasive procedure. More importantly, these complications can be prevented by avoiding the use of pressurised devices and using gauze for haemostasis. Doing these may help reduce the emotional, social and financial cost of patient care.

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