

SUBCUTANEOUS EMPHYSEMA AND PNEUMOMEDIASTINUM SECONDARY TO DENTAL EXTRACTION: A CASE REPORT AND LITERATURE REVIEW

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Here, we present the case of a woman who suffered from acute dyspnea and right cheek and neck swelling during molar extraction. 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. We report this case because physicians in the emergency department may misdiagnose the symptoms as an allergic reaction. Dentists should be more aware of air leak during dental extraction.

Key Words: dental extraction, pneumomediastinum, subcutaneous emphysema
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Subcutaneous emphysema and pneumomediastinum are complications associated with head and neck surgery, trauma or infectious processes involving these areas [1,2]. However, the occurrence of this complication after dental extraction is rare. The most common cause is the use of an air-turbine handpiece that may cause air to be injected into the loose surrounding connective tissue [1-5]. We report the rare complications of subcutaneous emphysema and pneumomediastinum that occurred during dental extraction. The mechanisms, clinical presentations, and complications are reviewed.

CASE PRESENTATION

A 38-year-old woman visited our emergency department with the complaints of right cheek and neck swelling as well as acute dyspnea that occurred after dental extraction. She did not have any pre-existing cardiopulmonary disease and was in good health; she had undergone an operation for endometriosis 10 years previously. She had visited her dentist for removal of the right lower third molar. The procedure had begun with local Xylocaine[®] (with epinephrine) injection for anesthesia. An air-turbine dental drill was then used for the resection of her tooth before extraction.

In the emergency room, her vital signs on presentation were blood pressure 160/80 mmHg, pulse rate 93 beats/minute, respiratory rate 22 breaths/minute, and body temperature 36.4°C. Physical examination showed mild cheek and neck swelling without local tenderness or erythematous change.

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The physician in the emergency room tentatively suspected drug allergy initially. However, crepitus over the cheek, neck, and upper chest wall was found after palpation. The trachea was in midline. Laboratory findings showed a white cell count of $5,120/\mu\text{L}$ (neutrophils 42%), hemoglobin of 12.2 g/dL, platelet count of $220,000/\mu\text{L}$, and C-reactive protein $< 5 \mu\text{g/dL}$. Other biochemical parameters were within normal ranges. Neck roentgenography showed diffuse subcutaneous emphysema and air dissection in the neck (Figure 1). Neck and chest computed tomography showed massive air accumulation involving the neck and supraclavicular fossa and pneumomediastinum (Figure 2). The patient was admitted for observation and received prophylactic antibiotics. The

admission course was smooth and she was discharged on the 6th day.

DISCUSSION

The etiology of subcutaneous emphysema and pneumomediastinum can be classified into iatrogenic, traumatic, infectious, or spontaneous. The most common etiology of this complication is iatrogenic, and is usually secondary to head and neck surgery, intubation, mechanical ventilation, and dental surgery. Trauma-induced subcutaneous emphysema and pneumomediastinum are usually due to facial bone fracture, intraoral trauma, or trauma with disruption of the

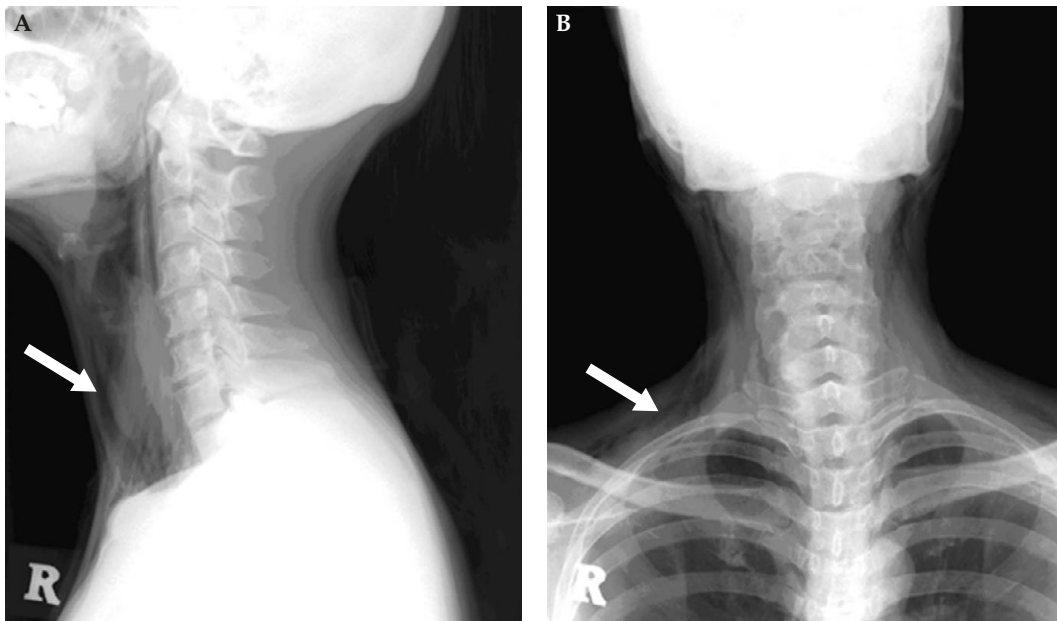


Figure 1. Neck roentgenography shows extensive subcutaneous emphysema: (A) lateral view; (B) anteroposterior view.

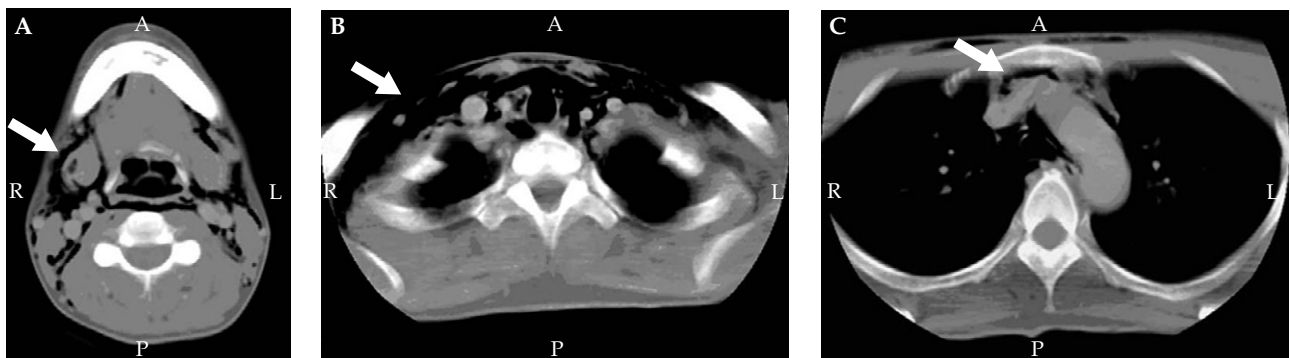


Figure 2. Neck and chest computed tomography show massive air accumulation involving: (A) bilateral neck; (B) supraclavicular fossa; (C) pneumomediastinum.

chest wall or aerodigestive tract. Some infectious processes with gas-forming organisms involving the head and neck may also cause this complication. Spontaneous subcutaneous emphysema and pneumomediastinum usually occur in those with previous pulmonary disease with increased intra-alveolar pressure or weakened alveolar walls [2]. However, it is a rare complication following dental extraction, and usually results from the use of high-speed dental drills and air and water dental syringes [1]. The high-speed dental air-turbine handpiece is designed for cutting teeth and discharging air or air and water to cool the bur-tooth interface [1,3,6]. The air may be driven into the subcutaneous layer through the surgical wound. If a large amount of air is injected, it may dissect into the deeper structure. The first case of subcutaneous emphysema associated with a dental procedure was reported in 1900 [7].

The pressurized air may dissect through the cervical fascial planes into the mediastinum [1,9]. The roots of the first, second, and third molars communicate directly with the sublingual and submandibular spaces. The sublingual space is also in communication with the pterygomandibular, parapharyngeal, and retropharyngeal spaces. The retropharyngeal space is the main route of communication from the mouth to the mediastinum [1,8]. The modern dental handpiece used to remove bone around the teeth to aid extraction seems to be the most likely source of gas [4].

The differential diagnosis of neck swelling after dental procedure includes hematoma, cellulitis, angioedema, allergic reactions, and subcutaneous emphysema

[3,6]. The most important step is correct diagnosis [6]. Crepitus over the cheek and neck is an important clue for the diagnosis of subcutaneous emphysema. Some cases may be initially misdiagnosed as an allergic reaction due to the clinical course if the physician is not aware of this potential complication, and the misdiagnosis may lead to mistreatment and adverse outcome [10].

The patient with isolated subcutaneous emphysema usually only has a painless puffy face or neck [2]. The symptoms and signs of pneumomediastinum include dyspnea, chest and back pain, Hamman's sign (crunching sound with each heart beat) [2,5,11], and positive radiographic finding. Nonspecific ST-T change may be seen on electrocardiography [4,8,12]. Therapy is conservative and directed toward the underlying cause, with close observation for subsequent complications such as cardiac tamponade, pneumothorax, mediastinitis, or airway obstruction [2].

Most cases from the literature were due to lower third molar extraction (Table). Patients were almost always of young age and without underlying pulmonary disease. The most common symptoms were facial and neck swelling, dyspnea, chest pain, and odynophagia. Brassy voice and dysphagia were noted occasionally. The symptoms usually occurred soon after the dental procedures and patients usually sought help within hours. However, in some cases, the patients only sought help 2 days later [1]. Associated pneumopericardium and pneumoperitoneum were reported in one case [15]. One case was suspected to have necrotizing fasciitis and neck incision was

Table. Cases of subcutaneous emphysema and pneumomediastinum after dental extraction

Reference	Age/sex	Location (molar)	Onset	Symptoms
Yoshimoto et al [1]	22/F	Lower L 3 rd	Soon	Swelling, dyspnea
Sood & Pullinger [10]	45/M	Lower R	1 hr	Swelling, dyspnea, odynophagia
Chen et al [3]	32/F	Lower R 3 rd	Soon	Swelling
Davies [4]	29/F	Lower R 3 rd	Hours	Swelling, dyspnea, chest pain
Capes et al [5]	14/F	Lower 3 rd	Day 2	Swelling
Goodnight et al [11]	27/M	Lower R 3 rd	Soon	Swelling, dyspnea, chest pain, dysphagia
Ouahes et al [13]	26/F	Lower R 3 rd	3 hr	Dyspnea, chest pain, syncope
Guest & Henderson [14]	28/M	Lower L 3 rd	Soon	Swelling, dyspnea, dysphagia
Rossiter & Hendrix [2]	52/M	Lower L 2 nd	Day 2	Swelling, odynophagia
Hylton & Laskin [6]	19/F	Lower L 1 st & 2 nd	Soon	Swelling, dyspnea, chest pain
Meyerhoff et al [8]	23/M	Lower R 1 st	Hours	Swelling, chest pain
Torres-Melero et al [9]	29/M	Lower R 3 rd	Sudden	Swelling, dyspnea, chest pain
Noble [16]	20/M	Lower 3 rd	Soon	Swelling, dyspnea, brassy voice

L = left; R = right.

performed [11]. Studies to rule out esophagus or airway lesions were performed in some cases but all showed negative findings [3,13]. Most cases had a benign course and symptoms usually subsided 2–7 days after conservative treatment. Prophylactic antibiotics were suggested due to possible mediastinitis contaminated from the oral cavity, although it was uncommon from the reviewed cases.

In this case, the subcutaneous emphysema and pneumomediastinum could have been initially misdiagnosed as an allergic reaction if careful palpation of the neck and upper chest wall had not been performed. Physicians in the emergency room must be aware of this rare complication following molar dental extraction. Dentists should also be alert to this rare complication if a patient has such symptoms following their dental procedure.

REFERENCES

1. Yoshimoto A, Mitamura Y, Nakamura H, et al. Acute dyspnea during dental extraction. *Respiration* 2002;69:369–71.
2. Rossiter JL, Hendrix RA. Iatrogenic subcutaneous cervicofacial and mediastinal emphysema. *J Otolaryngol* 1991;20:5.
3. Chen SC, Lin FY, Chang KJ. Subcutaneous emphysema and pneumomediastinum after dental extraction. *Am J Emerg Med* 1999;17:678–80.
4. Davies DE. Pneumomediastinum after dental surgery. *Anaesth Intensive Care* 2001;29:638–41.
5. Capes JO, Salon JM, Wells DL. Bilateral cervicofacial, axillary, and anterior mediastinal emphysema: a rare complication of third molar extraction. *J Oral Maxillofac Surg* 1999;57:996–9.
6. Hylton RP, Laskin JL. Subcutaneous emphysema with pneumomediastinum following tooth extraction. *Gen Dent* 1985;33:350–1.
7. Turnbull A. A remarkable coincidence in dental surgery. *Br Med J* 1900;1:1131.
8. Meyerhoff WL, Nelson R, Fry WA. Mediastinal emphysema after oral surgery. *J Oral Surg* 1973;31:477–9.
9. Torres-Melero J, Arias-Diaz J, Balibren JL. Pneumomediastinum secondary to use of high speed air turbine drill during a dental extraction. *Thorax* 1996;51:339–40.
10. Sood T, Pullinger R. Pneumomediastinum secondary to dental extraction. *Emerg Med J* 2001;18:517–22.
11. Goodnight JW, Sercarz JA, Wang MB. Cervical and mediastinal emphysema secondary to third molar extraction. *Head Neck* 1994;16:287–90.
12. Aragon SB, Dolwick MF, Buckley S. Pneumomediastinum and subcutaneous emphysema during third molar extraction under general anesthesia. *J Oral Maxillofac Surg* 1986;44:141–4.
13. Ouahes N, Petit A, Poirier F, et al. Subcutaneous emphysema and pneumomediastinum following dental extraction. *Dermatology* 1993;186:264–5.
14. Guest PG, Henderson S. Surgical emphysema of the mediastinum as a consequence of attempted extraction of a third molar tooth using an air turbine drill. *Br Dent J* 1991;171:283.
15. Sandler CM, Libshitz H, Marks G. Pneumoperitoneum, pneumomediastinum and pneumopericardium following dental extraction. *Radiology* 1975;115:539–40.
16. Noble WH. Mediastinal emphysema resulting from extraction of an impacted mandibular third molar. *JADA* 1972;84:368–70.

拔牙併發皮下氣腫及縱膈氣腫一 病例報告及文獻回顧

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一位年輕女性於拔牙時突然發生呼吸困難及臉頰腫脹；拔牙時所使用的高速牙科電鑽可能使得氣體進入軟組織，進而導致皮下氣腫及縱膈氣腫。經由文獻回顧，我們瞭解皮下氣腫及縱膈氣腫是可能經由拔牙所引起相當少見的一種併發症；急診醫師有可能將此誤診為過敏反應，牙醫師於拔牙時亦須小心此一少見的併發症。

關鍵詞：拔牙，縱膈氣腫，皮下氣腫

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