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Massive subcutaneous emphysema developing before surgery for mandibular fracture: a case report

CASE REPORT

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Abstract – Preoperative massive subcutaneous emphysema before intubation is extremely rare. However, this complication may be potentially lethal, depend on the condition of air spreading. Subcutaneous emphysema which occurs intra- or postoperative period is sometimes iatrogenic because the air is introduced into the tissue space through the hole injured by the operation. But the emphysema in this case occurred preoperatively by the pressure of the bag valve mask, because the patient had an intra-oral wound, which reaches the submental space. In this report, we describe an extremely rare case of preoperative massive emphysema of the patient with the mandibular fracture.

Emphysema of the head and neck regions is usually subcutaneous and is characterized by rapid swelling with crepitus on palpation. This phenomenon is occasionally caused by dental treatment, including endodontic treatment (1) tooth extraction, especially in the case of an impacted third molar (2) and dental implant treatment (3). This is because in these procedures, a high-speed air turbine drill is used to cut the tooth or remove the alveolar bone, and air is thus introduced beneath the soft tissue. In rare cases, the use of an air syringe during endodontic treatment may also cause emphysema. Surgical handpieces that direct the air away from the surgical field should be used during such procedures. In most cases, emphysema occurs during or after treatment (4, 5). Here, we report an extremely rare case of massive emphysema that occurred before surgery for mandibular fracture, owing to the pressure of a bag mask.

Case report

A 51-year-old male (weight, 54 kg; height, 162 cm) was referred to our hospital because he had a fall and was subsequently experiencing difficulty with occlusion. He had a gash in the mental region, but it did not extend to the mandibular bone. Computed tomography (CT) revealed a fracture in the mental region, and an operation was scheduled for 1 day after the accident. He had no other complications. Prior to the surgery, the patient was administered flomoxef sodium (2 g/day) to prevent infection. The surgical procedure involved open reduction and fixation of the mandible under general anesthesia with nasal intubation.

General anesthesia was induced using the standard procedure. Within a few minutes after the induction of anesthesia, both the patient's cheeks and the submandibular and neck areas suddenly began to swell and exhibited crepitus on palpation. We recognized the condition as emphysema because of the pressure of the mask. However, the closure of hole reaches the space and open reduction was deemed necessary. Therefore, nasal intubation was performed according to the standard procedure (Fig. 1a). As there was no intraoral swelling, intubation was not obstructed in any way. During the operation, we initiated treatment with 1 g of cefozopran hydrochloride – a broad-spectrum antibiotic – to prevent infection of the dead space. Open reduction and fixation with a titan plate and intra-maxillary-mandibular fixation were performed. During the operation, we found a hole extending to the submental space (Fig. 1b). At the end of the surgery, neuromuscular blockage was reversed, the patient awakened and the trachea was extubated. On the day of the operation, the patient was transferred to the high care unit because of the complications encountered during the procedure. However, there was no tracheal obstruction or increase in the

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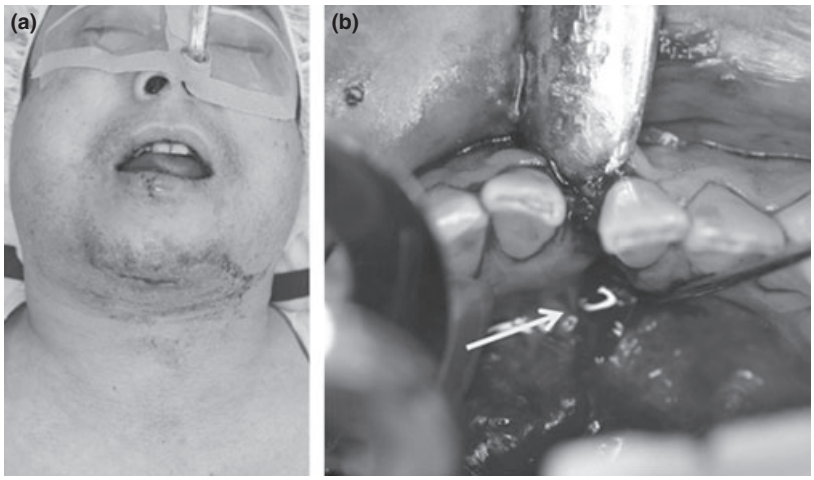
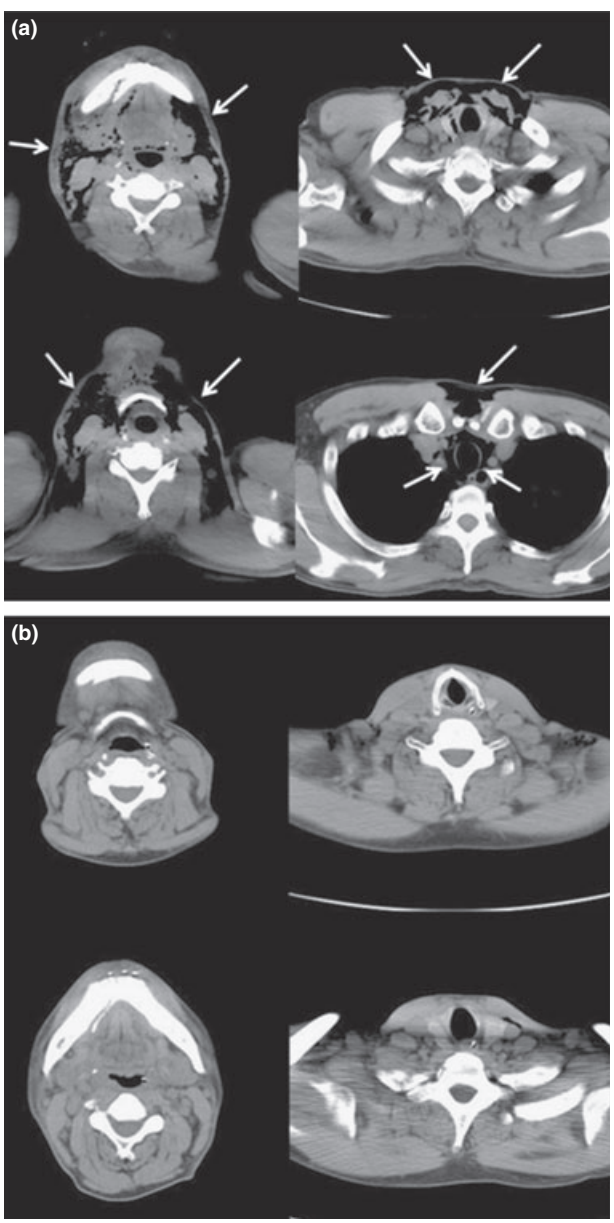


Fig. 1. (a) After nasal intubation, massive swelling was detected in both cheeks and in the submandibular and neck areas. (b) Fracture line in the center of the mandible. The probe is inserted into the hole, up to the submental space (arrow).



swelling. Furthermore, he did not complain of any difficulty or discomfort during respiration. No dyspnea or oxygen desaturation was noted on the day of the operation. CT performed 1 day after the operation revealed pneumomediastinum and massive emphysema extending to the submental space and bilaterally to the submandibular, buccal, pterygomandibular, and parapharyngeal spaces (Fig. 2a). Cefozopran hydrochloride (2 g/day) was administered for 4 days after the operation, until the emphysema was no longer detected by CT and on inspection and palpation (Fig. 2b). The postoperative course was uneventful, and the patient was discharged 1 month after the operation.

Discussion

There are some reports on surgical emphysema because of the entry of air through lesions in the pharyngeal or tracheal mucosa when general anesthesia is induced. However, the preoperative development of emphysema is extremely rare. We have encountered many cases of mandibular fracture, but this is the first case associated with emphysema. On detection of emphysema, immediate measures must be taken to prevent infection of the dead space. If the emphysema progresses to pneumomediastinum, the outcome is potentially fatal (6). To avoid this, broad-spectrum antibiotics should be administered and the patient closely monitored until the emphysema is no longer detected.

Emphysema of the head and neck regions most frequently develops after extraction of the lower third molar (7, 8), which is usually performed under local anesthesia. Because this tooth is usually impacted in the bone in an inclined position, the procedure for its extraction usually involves division of the tooth and

Fig. 2. (a) CT scan obtained 1 day after the operation, showing pneumomediastinum and massive emphysema (arrow) extending to the submental space and bilaterally to the submandibular, buccal, pterygomandibular, and parapharyngeal spaces. (b) CT scan obtained 4 days after the operation, showing almost complete absence of the emphysema.

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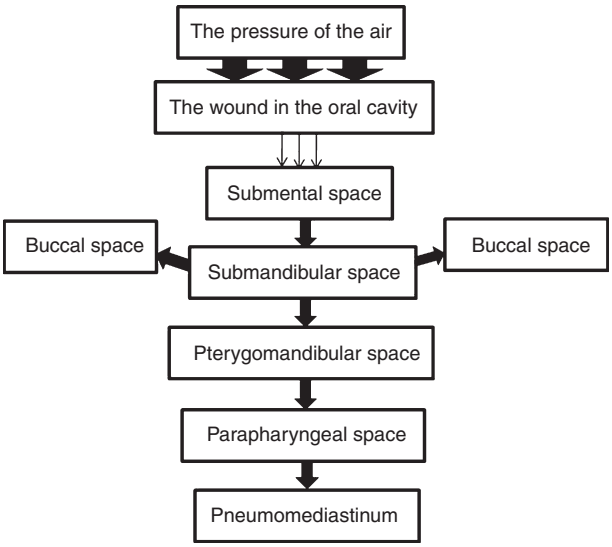

Fig. 3. Predicted air flow in this patient.

removal of the bone with the help of an air turbine. The mucosa surrounding the impacted tooth is incised and exfoliated. If the exfoliation largely involves the lingual side, it results to make the root to the pterygomandibular space. This is considered the primary reason for the development of emphysema on extraction of the third molar. To avoid such accidents associated with dental treatment and intraoral surgical procedures, air turbine drills should be used only when absolutely essential.

In the present case, it was difficult to predict the occurrence of emphysema. However, its occurrence can be explained by the fact that mandibular fractures are occasionally accompanied by mucosal wounds in the oral cavity. When general anesthesia is induced, preoxygenation is mandatory, but the mandible is hold strongly. Thus, small wounds can be closed at this time, and the pressurized air is directed into the trachea by positioning the chin upward. In the present case, although the emphysema was massive, it extended externally. Moreover, the trachea was intact and had no obstruction. Therefore, the operation could be successfully completed. Fig. 3 shows the flow of the air as per our estimation.

In conclusion, wounds in the oral cavity should be treated with caution. The possibility of emphysema developing as a severe and potentially fatal complication, especially if it progresses to pneumomediastinum, should be considered. If this complication is detected, the patient should be closely monitored, and measures should be taken to prevent infection.

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