European Journal of Ophthalmology / Vol. 9 no. 4, 1999 / pp. 309-311

SHORT COMMUNICATION

Case report

Orbital emphysema and diplopia following thoracotomy

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ABSTRACT: Purpose. *To describe the clinical and radiological findings in a patient with diplopia and orbital emphysema following thoracotomy.*
Methods. *Reported is a 71-year-old woman who presented with diplopia several days following thoracotomy.*
Results. *Physical examination revealed diffuse subcutaneous emphysema and a right hypertropia. Head computed tomography revealed facial and palpebral subcutaneous emphysema extending into the infratemporal fossa and orbits bilaterally. A chest tube was replaced and her diplopia resolved.*
Conclusions. *Subcutaneous emphysema can lead to diplopia and orbital emphysema in the absence of orbital trauma. Contrary to previously suggested mechanisms of orbital emphysema associated with subcutaneous emphysema, computed tomography imaging suggested that air entry into the orbit in this case was through the inferior orbital fissure. (Eur J Ophthalmol 1999; 9: 309-11)*

KEY WORDS: Orbital emphysema, Diplopia, Thoracotomy, Inferior orbital fissure

Accepted: June 29, 1999

INTRODUCTION

Orbital emphysema is an uncommon complication of different medical illnesses.Trauma and fracture of orbital bones is the most common cause of orbital emphysema, but subcutaneous emphysema can rarely lead to orbital emphysema (1). We treated a patient with vertical diplopia caused by orbital emphysema following thoracotomy in which orbital emphysema was secondary to subcutaneous emphysema. Computed tomography provided insight into the mechanism of air entry into the orbits.

Case report

A 71-year-old woman with no history of orbital trauma or fracture was examined for complaints of diplopia. She had undergone thoracotomy and right upper lobectomy for broncheoalveolar adenocarcinoma. On the second post-operative day, the first of two chest tubes was removed, and right-sided chest and neck subcutaneous emphysema was noted. Within several hours of the second chest tube removal on the third post-operative day, she began to complain of vertical diplopia. Physical examination revealed diffuse tactile crepitance involving the chest, arms, neck, face, and bilateral palpebra. Chest x - ray demonstrated a small pneumothorax and confirmed extensive subcutaneous emphysema (Fig. 1). Maddox rod testing revealed a right hypertropia in all cardinal positions of gaze, worse with upgaze. The corrected visual acuity was 20/25 in both eyes, and pupils and funduscopic examination were normal.

Head computed tomography showed diffuse facial subcutaneous emphysema and orbital emphysema (Fig. 2). Subcutaneous emphysema involved multiple facial planes and extended into the infratemporal fossa bilaterally. A chest tube was replaced on the same day and her diplopia resolved by the fourth post-

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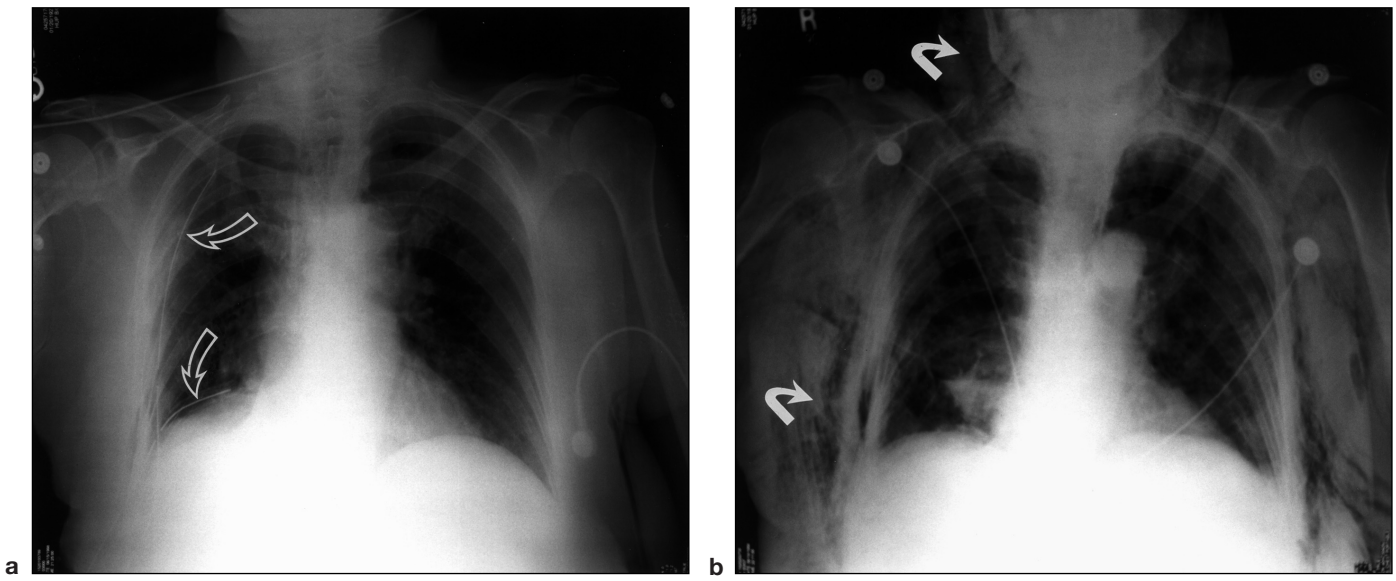

Fig. 1a - *Chest x-ray immediately following surgery. Two chest tubes are present (open arrows).* ***(b)*** *- Chest x-ray three days later, revealing diffuse subcutaneous emphysema (closed arrows).*

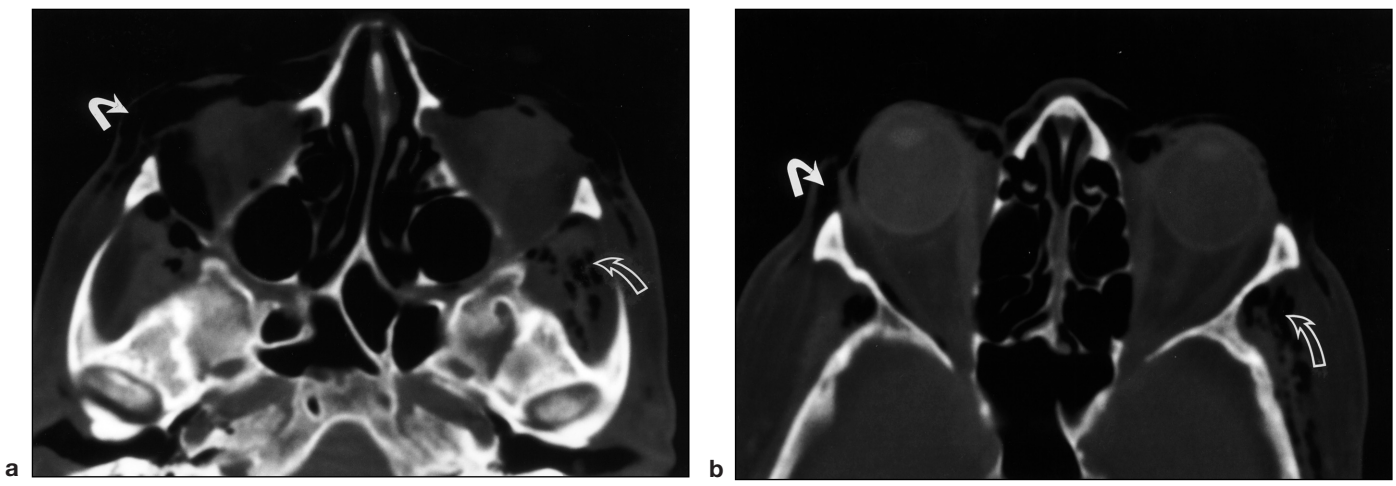

Fig. 2 - *Head computed tomography at the level of the inferior orbit* ***(a)*** *and superior orbital fissure* ***(b)*** *showing extensive orbital emphysema and subcutaneous facial and palpebral emphysema (closed arrows). The predominance of orbital air is in the superior and inferior anterior orbit, adjacent to the infratemporal fossa (open arrows) and orbital septum.*

operative day. The chest tube was removed on the eighth post-operative day, and she was discharged with no visual complaints.

DISCUSSION

Orbital emphysema is a common complication of orbital trauma, but there are only four reports of orbital emphysema arising from subcutaneous emphysema (2-5).

The mechanism of air entry into the orbit in these non-traumatic cases has been unclear (1). Fisher described a case of orbital emphysema in a five-month-old boy with severe bronchopneumonia (2). Using plain-film x-rays, he suggested air from alveolar rupture tracked along vascular sheaths to the skull base, thereby entering the orbit through the inferior orbital fissure. Aydingoz et al. demonstrated orbital emphysema after tracheostomy and suggested that air entered through narrow perivascular spaces around vessels perforat-

ing the inferior orbital walls (3). Schneider and Goodman described retro-orbital and periorbital emphysema in a patient with spontaneous esophageal rupture (4). They suggested that air entered the orbit through small sinus defects. Shulman et al. reported orbital emphysema during mechanical intubation following inhalation of toxic gas (5). They acknowledged not knowing the site of air entry into the orbit.

Our case illustrates that passive tissue dissection by subcutaneous emphysema may lead to orbital emphysema, even in the absence of high airway pressures seen during mechanical ventilation. Furthermore, orbital emphysema from this passive tissue dissection can cause diplopia. Computed tomography suggests that the mechanism of diplopia was likely mechanical restriction of the globe or extraocular muscles.

Specifically, the large amount of air in the inferior portion of the right orbit (Fig. 2) may have mechanically deviated the eye upwards and restricted movement. Resolution of diplopia after chest tube replacement was presumedly due to resorption of the orbital emphysema.

The radiographic findings in this case demonstrate extensive subcutaneous emphysema and orbital emphysema, but also show large amounts of air in the infratemporal fossa bilaterally. The inferior orbital fissure provides a direct conduit between the infratemporal fossa and the orbit, and is a likely mechanism of air entry into the orbit. Alternatively, large amounts of palpebral emphysema seen in close juxtaposition to orbital emphysema suggest a possible trans-septal mechanism of orbital emphysema. This trans-septal mechanism is similar to that suggested in orbital emphysema arising from compressed air injury. Although our case did not involve compressed air injury, the pressure produced from normal respiration must have been significant to cause such extensive subcutaneous emphysema (Fig. 1). Our imaging does not support sinus defects as a mechanism of orbital air entry.

ACKNOWLEDGEMENTS

We thank Dr. Robert W. Hurst for helpful discussions.

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