Emergency decompression of tension retrobulbar emphysema secondary to orbital floor fracture

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Received 11 February 2013; accepted 14 February 2013

Orbital floor fractures are generally the result of blowout orbital trauma or severe facial injury. Orbital emphysema is the abnormal presence of air in the orbit and periorbital tissues, and tends to develop in fractures affecting the paranasal sinuses and orbital walls. Predisposing factors include sneezing, coughing, nose blowing and air travel. The air passes through mucosal sinus lacerations into the orbital space and can induce elevation in the intraorbital pressure with consequent proptosis.

Most cases are benign and resolve spontaneously. However, patients must be followed closely for potential complications. Patients developing acute orbital compartment syndrome with central retinal artery occlusion and loss of vision require rapid decompression.

This article presents a rare case of orbital floor fracture, which required an emergency surgical approach when post-traumatic tension retrobulbar emphysema developed which was exacerbated by nose blowing.

INTRODUCTION

Orbital floor fractures are generally the result of blowout orbital trauma or severe facial injury. Orbital emphysema is the abnormal presence of air in the orbit and periorbital tissues, and tends to develop in fractures affecting the paranasal sinuses and orbital walls. Predisposing factors include sneezing, coughing, nose blowing and air travel. The air passes through mucosal sinus lacerations into the orbital space and can induce elevation in the intraorbital pressure with consequent proptosis.

Most cases are benign and resolve spontaneously. However, patients must be followed closely for potential complications. Patients developing acute orbital compartment syndrome with central retinal artery occlusion and loss of vision require rapid decompression.

This article presents a rare case of orbital floor fracture, which required an emergency surgical approach when post-traumatic tension retrobulbar emphysema developed which was exacerbated by nose blowing.

CASE REPORT

A 49-year-old woman was referred to our department of Oral and Maxillofacial Surgery with a history of blunt trauma in the region of the left eye incurred in a fall 1 day earlier. As there was no functional disturbance, she did not seek medical help initially. The next day, while blowing her nose she developed swelling, pain and progressive loss of vision. Physical examination revealed severe left-sided exophthalmos, accompanied by palpebral and orbital swelling and subconjunctival hematoma. Eye movement in all directions was painful. There was no diplopia at the first ophthalmological evaluation, but a loss of visual acuity of 6/10, accompanied by severe proptosis and increased intraocular pressure (IOP) were indications for rapid surgical treatment.

Spiral computed tomography (CT) was performed using 1 mm slices with a soft tissue and bone algorithm. A non-dislocated orbital floor fracture and a large amount of intraorbital emphysema were found, especially retrobulbar between the ocular muscles and around the optic nerve, causing exophthalmos (the distance from the corneal apex
to the line connecting orbital rims was 18.8 mm; normal 9.0 mm) (Figs 1–2).

Owing to the clinical findings and the severity of the symptoms, surgical decompression was performed under general anesthesia. Lateral blepharoplasty and transconjunctival incisions were made (Fig. 3). The left orbital floor was exposed, revealing a non-dislocated bone defect, without herniation of the periorbital tissue. The surgical management with orbital drainage produced excellent results, with sudden resolution of the proptosis and a postoperative improvement in visual acuity, confirmed by further ophthalmological evaluation (Figs 4–5). The patient was put on amoxicillin and clavulanic acid every 8 h, and advised not to blow her nose vigorously and to use a nasal decongestant.

Two days after surgery, the patient was discharged with restored visual acuity and continuing resolution of the left periorbital swelling and proptosis.

DISCUSSION

Orbital emphysema is the abnormal presence of air within the fascial layers of the orbit. About 63% of cases occur as a result of blunt orbital or facial trauma, involving the paranasal sinuses and orbital walls [1]. Other infrequent sources of intraorbital air include postoperative complications, infection, esophageal rupture, spontaneous pneumothorax and

Figure 1: Axial CT scan showing massive emphysema of the orbit leading to proptosis.

Figure 2: Coronal CT scan showing the retrobulbar emphysema prior to decompression.

Figure 3: Patient after emergency decompression using blepharoplasty incison.

Figure 4: Postoperative axial CT scan showing normal position of the bulbus.
barotrauma [2, 3]. Emphysema usually appears in the periorbital area, rather than within the orbit itself.

In this case, the increased intraorbital pressure followed by intrabulbar hypertension may have caused occlusion of the central retinal artery and optic nerve ischemia (particularly, if the intrabulbar pressure exceeded 65–70 mmHg), which may result in a transient or permanent loss of vision [4]. It is usually associated with sneezing, nose blowing and coughing, which increase the pressure inside the nasal cavities and force air through sino-orbital communication into the orbit. After the air enters, orbital tissue can occlude the bony breach and act as a one-way valve across the fracture site permitting air to enter but not to leave the orbit [5].

There have been some reports of spontaneous orbital emphysema after forceful nose blowing, sneezing or coughing, with no antecedent facial trauma, often as a result of rupture of the lamina papyracea (orbital lamina) [6, 7].

The diagnosis of orbital emphysema is usually made from the history alone, with sudden periorbital swelling and closing of the eyelids on the affected side, supported by the results of physical examination (crepitation, tenderness, pain and ecchymosis) and confirmed by orbital CT.

Orbital emphysema without impaired vision usually resolves spontaneously within 2 weeks. During this time, patients should avoid blowing their nose, sneezing and activities that lead to increased pressure in the nasal cavity [8]. Conservative non-surgical approach includes treatment with antibiotics and antiinflammatory drugs, and high-dose cortisone in cases of ophthalmoplegia with increased IOP.

Orbital infection, such as cellulitis, is a rare complication and is associated with concomitant sinusitis or the penetration of infected nasal secretions into the orbital space [9]. Surgical treatment of tension emphysema includes lateral canthotomy or cantholysis, orbital decompression via needle aspiration, transconjunctival or lateral blepharoplasty approach and bone decompression [1, 10]. Needle decompression is a simple, rapid technique, described by Lindberg, although potential complications require careful consideration, such as retrobulbar hemorrhage, scleral perforation and optic nerve damage.

Our case is a rare example of an orbital floor fracture complicated with orbital emphysema requiring an urgent surgical approach. The typical predisposing constellation was present, i.e. orbital wall rupture and Valsalva maneuver. The need for acute management is important as the systemic absorption of the air mass can take 7–10 days.

Urgent decompression was indicated by the presence of proptosis, elevated IOP and progressive loss of vision due to pressure on the central retinal artery and optic nerve [3]. We preferred to perform decompression via lateral blepharoplasty and transconjunctival approaches due to the retrobulbar localization of the air. This is more difficult to achieve with a needle without damaging important orbital structures (Fig. 3).

We administered prophylactic antibiotics and decongestants, but did not prescribe steroids, as the visual improvement was immediate and sustained after surgical intervention.

CONCLUSION
If tension emphysema occurs, the orbit must be decompressed to relieve the compressive effect of the air accumulation and reverse the potentially sight-threatening condition.

REFERENCES
1. Garcia-Medina JJ, Garcia-Medina M, Pinazo-Duran MD. Severe orbitopalpebral emphysema after nose blowing requiring emergency decompression. Eur J Ophthalmo2006;16:339–42.
2. Rzymska-Grala I, Palczewski I, Blaz M. A peculiar blow-out fracture of the inferior orbital wall complicated by extensive subcutaneous emphysema: A case report and review of the literature. Pol J Radiol 2006;71:e1–2.
3. Lee HJ, Jilani M, Frohman L, Baker S. CT of orbital trauma. Emerg Radiol 2004;10:168–72.
4. Harmer SG, Ethunandan M, Zaki GA, Brennan PA. Sudden transient complete loss of vision caused by nose blowing after a fracture of the orbital floor. Br J Oral Maxillofac Surg 2007;45:154–5.
5. Key SI, Ryba F, Holmes S, Manisali M. Orbital emphysema - the need for surgical intervention. J Cranio maxillofac Surg 2008;36:473–6.
6. Garcia de Marcos JA, del Castillo-Pardo de Vera JL, Calderon-Polanco J. Orbital floor fracture and emphysema after nose blowing. Oral Maxillofac Surg 2008;12:163–5.
7. Rahmel BB, Scott CR, Lynham AJ. Comminuted orbital blowout fracture after vigorous nose blowing that required repair. Br J Oral Maxillofac Surg 2010;48:e21–2.
8. Chiu TW, Chung CK, Chan SH, Ng WM. Sneezing and orbital fracture. Plast Reconstr Surg 2006;117:1049–50.
9. Ben Simon GJ, Bush S, Selva D, McNab AA. Orbital cellulitis: a rare complication after orbital blowout fracture. Ophthalmology 2005;112:2030–4.
10. Lee SL, Mills DM, Meyer DR, Silver SM. Orbital emphysema. Ophthalmology 2006;113:2113 e1–2.