Orbital, subcutaneous, and subconjunctival emphysema following blow-out medial wall fracture

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ABSTRACT

A 40-year-old male presented to the emergency department with the complaint of a sudden, painful left eye and swelling after episodes of sneezing. A day earlier, he had sustained a blunt trauma to the left orbit as the result of a fall from motorcycle. The initial examination showed subcutaneous and subconjunctival emphysema. Visual acuity in the left eye was 20/40 (0.50), the pupils were reactive with no relative afferent pupillary defect, and there were limitations in levoduction, dextroduction, infrauction, and supraduction. A slit-lamp examination revealed normal anterior and posterior segments with an intraocular pressure of 24mmHg. An orbital computed tomography scan showed orbital, subconjunctival, and subcutaneous emphysema associated with a small fracture of medial wall of the left eye. Following conservative management with broad-spectrum oral antibiotics, a topical antiglaucoma drug, low dose systemic steroid drug, and lubricating eye drops, the patient improved dramatically within one week.

Keywords:
emphysema, orbital fracture, trauma

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Introduction
Subconjunctival emphysema, which has rarely been reported in the literature because of its uneventful course, is associated mostly with orbital emphysema in cases of medial orbital wall fractures due to a newly created sino-orbital communication. The patient portrayed here developed simultaneous orbital, subcutaneous, and subconjunctival emphysema after sustaining a small fracture of the medial wall due to a sudden elevation in intranasal pressure.

Case report
A 40-year-old male sustained a trauma to the left orbit as the result of a fall from motorcycle. A day later, he developed sudden left periorbital pain, swelling after episodes of sneezing. He presented to the emergency department where an ophthalmologic examination showed left subcutaneous and subconjunctival emphysema (Figure 1 & 2). The uncorrected visual acuity was 20/40 (0.50), and the pupillary responses were normal. There were limitation in left eye levoduction, dextrodaction, infraduction and supraduction with an inability to close the lids, but no paresthesia of the cheek or teeth. A slit-lamp examination showed normal anterior and posterior segments. The intraocular pressure measured by applanation tonometry was 24 mmHg. An orbital computed tomography scan showed a left linear, nondisplaced fracture of the medial wall orbit associated with multiple air foci in left preseptal space, extraconally and retrobulbar emphysema without muscle entrapment or fat herniation (Figures 3). Uncorrected visual acuity in the right eye was 20/20 (1.0) and was normal upon examination and radiologically. The patient was treated with prophylactic broad-spectrum oral antibiotics, a topical antiglaucoma drug (timolol 0.5% twice daily), low dose systemic steroid (prednisolone 20mg once daily), and lubricating eye drops (four times daily), and was educated not to blow his nose and to return for a follow-up examination the next morning. After daily follow-up, there was histrionic improvement in the subcutaneous and subconjunctival emphysema, ocular movements and vision, with total resolution of the subconjunctival emphysema on the sixth day with no sequelae (figure 4). The topical medications were stopped.

Discussion
The incidence of ocular injury after orbital fractures has been reported to be 70%, depending on the nature of the study and the subspecialty of the authors. Orbital emphysema, usually the result of nose-blowing, is commoner with ethmoid fractures and the ophthalmic circulation may be compromised if the entrapped air causes an undue rise in the orbital pressures; this ophthalmic emergency should be treated instantly by aspiration of air or incision and drainage of the orbital spaces, or an irreversible loss of vision may result.
Figure 2: Left lid subcutaneous emphysema (white arrow) and lateral conjunctival emphysema (black arrow).

Figure 3: Left lid subcutaneous emphysema, lateral subconjunctival emphysema and orbital emphysema on orbital CT.
Orbital emphysema in this situation may occur after any circumstance that increases nasopharyngeal pressure such as nose-blowing, sneezing, coughing or vomiting, and scuba diving. The presence of orbital, subconjunctival, and subcutaneous emphysema may be due to air from the nasal cavity entering between the oose tissue planes of the orbit after fractures of the orbital walls. Subconjunctival emphysema can be explained by probable communication between the subcutaneous and subconjunctival planes or the probable spread from orbital emphysema through the orbital septum when the intraorbital pressure is high.

Subconjunctival emphysema has been reported in patients on mechanical ventilation and after direct injury to the conjunctiva through macroscopic or microscopic conjunctival lacerations associated with injury due to compressed air. Subcutaneous emphysema usually occurs during a brief period after trauma when air can be forced into the tissues. After this, the escape routes are sealed by blood clots or herniated tissues in the sinuses at the fracture sites.

The current case was uncanny in that it had all three types of emphysema (Figure 2) with a small fracture of medial wall orbit (Figure 3). Weber et al reported the occurrence of orbital and subconjunctival emphysema after orbital floor fracture in a patient after blowing his nose, but without subcutaneous emphysema.

Information dealing with subconjunctival emphysema without an orbital fracture is to be found in an article on deep diving. To the best of the author’s knowledge, this is the first reported case of simultaneous subcutaneous, subconjunctival, and orbital emphysema associated with medial wall orbit fracture. Initially air was more likely in the orbit, and with the subsequent sneezing and increased intraorbital pressure, direct spread occurred from the orbit into the subconjunctival and later into the subcutaneous planes, although the orbital septum usually forms a barrier between these potential spaces, which might be torn by blunt trauma.

Elevated intraocular pressure is a concern in orbital more than subconjunctival emphysema. A prolonged increase in intraocular pressure can lead to optic nerve damage from ischemia similar to compartment syndromes in 1–2 hours if the intraocular pressure approaches ophthalmic artery perfusion pressure. Previous reports have described increases in intraocular pressure to 28 mmHg. In the current patient, the intraocular pressure increased to 24 mmHg and he was treated with topical timolol 0.5% twice daily, with return of the intraocular pressure to 16 mmHg with treatment and on resolution of the emphysema. Cartwright et al also reported that an elevation in intraocular pressure after orbital trauma with orbital emphysema is usually not severe or long enough to result in visual compromise but requires continuous monitoring.
Most orbital emphysema requires no specific treatment, since the process is self-limiting, with an approximate duration of 2 weeks.\textsuperscript{3,13} Attention must be paid to prevent compressive optic neuropathy and exposure keratopathy. Although a good visual outcome is common, serious vision-threatening sequelae have been reported.\textsuperscript{10} Increases in intraorbital pressure may cause damage to the blood supply of the optic nerve, leading to optic atrophy and poor vision\textsuperscript{14} or central retinal artery occlusion.\textsuperscript{15} The surgical treatment of orbital emphysema includes lateral canthotomy or cantholysis, orbital decompression by needle aspiration, and bone decompression.\textsuperscript{11,16,17} Therefore, the presence of any type of periocular emphysema after blunt trauma should raise suspicion for orbital blowout fracture and mandates orbital computed tomography with careful follow-up of the patient.

References