

## Bilateral periorbital and cervicofacial emphysema following retinal surgery and fluid gas exchange in a case of inadvertent globe perforation

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Surgical emphysema is defined as gas or air trapped in the subcutaneous tissue plane. Here, we report a rare case of bilateral periorbital and cervicofacial subcutaneous emphysema following a vitreoretinal surgery for inadvertent globe perforation during the administration of peribulbar anesthesia. This condition, although self-resolving when restricted to the subcutaneous plane has the potential to spread into deeper tissue planes such as the retropharyngeal space. The presence of crepitus helps to distinguish it from angioneurotic edema. Ophthalmologists must be sensitive to the fact that surgical emphysema can be a very rare, but possible complication of an intraocular surgery following globe perforation.

**Key words:** Cervicofacial emphysema, fluid-air exchange, globe perforation, peribulbar anesthesia, periorbital emphysema, retinal detachment

Surgical emphysema is defined as gas or air trapped in the subcutaneous tissue plane. Subcutaneous emphysema in the head and neck is known to occur after maxillofacial trauma, tracheostomy and dental procedures.<sup>[1,2]</sup> Although orbital emphysema can be potentially vision-threatening, periorbital subcutaneous emphysema is usually a self-limiting condition and may not require any active intervention.<sup>[3]</sup> In this correspondence, we describe a case of a globe perforation wherein the patient developed bilateral periorbital and cervicofacial subcutaneous emphysema following a vitreoretinal surgery.

### Case Report

A 77-year-old male patient was referred by his primary ophthalmologist, who suspected an inadvertent globe

perforation. The patient was a myope and had been previously diagnosed to have nuclear sclerosis Grade III in both eyes. The patient was scheduled for a left eye cataract surgery for which peribulbar anesthesia was administered, following which the intraocular pressure was found to be hard and on indirect ophthalmoscopy, vitreous hemorrhage was noted. The surgery was canceled and an ultrasound B-scan of the eye confirmed vitreous hemorrhage and a rhegmatogenous retinal detachment; however, the ultrasound showed intact ocular coats and no obvious vitreous incarceration. With a working diagnosis of an occult-globe perforation causing a retinal detachment and vitreous hemorrhage, he was taken up for surgery the following day under local anesthesia. A small incision cataract surgery was performed to extract the cataractous lens; following which an encircling silicone band was placed; vitrectomy, fluid air exchange, endolaser and silicone oil injection were completed uneventfully. Intraoperatively only one retinal break was found, around which laser was applied. The globe was thoroughly examined, and no obvious scleral dehiscence was found. At the end of the surgery, the intraocular pressure was maintained with no obvious signs of leakage or hypotony. However, on taking off the surgical drapes, both the periorbital regions were swollen; with the right side significantly more affected than the left side [Fig. 1a]. Crepitus could be palpated all over the swollen area, which, on closer examination was found to be extending up to the patient's chest [Fig. 1b and c]. There was no pain, and the patient's vitals were found to be stable. There was no proptosis seen in either eye. The patient was closely monitored and at the end of 1-week, the subcutaneous emphysema had resolved completely. The operated eye recovered well, and subsequently underwent silicone oil removal and had an uneventful recovery.

### Discussion

Cervicofacial surgical emphysema develops where air enters into the fascial planes of the head and neck. These planes consist of loose connective tissue, which harbor potential spaces between layers of muscles and other structures. Once air enters the deep soft tissue under pressure, such as passage

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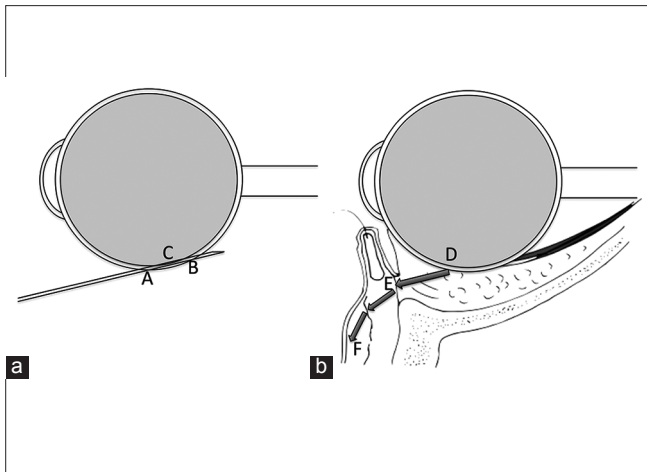


**Figure 1:** External photograph taken immediately after the surgery demonstrating the bilateral subcutaneous emphysema (a), extending up to the level of the chest on both sides (b and c; black arrowheads)

through syringes or high-pressure tubings, it follows the path of least resistance through the connective tissue, along the fascial planes, reaching distant spaces.<sup>[1,4]</sup>

In our case, there was no surgical emphysema present prior to the surgery. However, as the primary ophthalmologist had suspected, the 24G needle used to administer the peribulbar anesthesia had caused an occult globe perforation; perhaps a double perforation [Fig. 2]. Given the beveled tip of the needle and the oblique angle of entry, we postulate that the scleral entry wound could have possibly been a flap-like shelved entry, which acted as a one-way valve during the fluid gas exchange. Fluid air exchange is usually performed while maintaining an intraocular pressure of 30 mm Hg, which would have allowed the air to escape through the sclera and into the subconjunctival space and into the orbit. The needle tract which passed through the skin, the subcutaneous tissue, orbital septum and through the orbital fat would have provided the path of least resistance for the air to escape and enter the subcutaneous plane. The laxity of the subcutaneous tissue, especially in a 77-year-old patient could have further contributed it. On retrospective questioning, the patient denied any episode of sneezing, trauma, coughing or nose blowing in the interim period between the initial injection and the subsequent surgery.

Ophthalmic procedures that have reported to have caused emphysema include balloon dacryoplasty and orbital decompression surgery.<sup>[3,5]</sup> Damasceno *et al.* have reported a case of subcutaneous emphysema involving the



**Figure 2:** (a) Line drawing showing the needle tract, which served as the path of least resistance for the escaping air. Points A and B indicate the possible points of scleral perforation and point C indicates the site of the retinal break. (b) Line drawing showing the possible route taken by the air to escape, through the scleral opening and conjunctiva (D), into the orbital tissue. And through the orbital septum (E) and muscular plane and into the subcutaneous plane (F). The passage of the air being facilitated by the previously created needle tract (a)

orbit, mediastinum, and face after pars plana vitrectomy with the fluid gas exchange. However, the patient had an old orbital fracture and the authors hypothesize that in the presence of an old orbital fracture, the high gas pressure during fluid gas exchange allowed air to travel from the eye into the soft tissue, orbit, and chest.<sup>[6]</sup> Venous-air embolism has also been reported to be one of the rare complications of intra-ocular surgery involving a fluid gas exchange.<sup>[7]</sup> The incidence of globe perforation has been reported in as many as 0.75% of retrobulbar and peribulbar injections.<sup>[8]</sup> Surgical emphysema could be a rare, but possible complication while performing vitreoretinal surgery in cases of inadvertent globe perforation while administering peribulbar anesthesia. Serious complications of cervicofacial emphysema include the involvement of retropharyngeal, mediastinal and peritoneal spaces, which may in turn lead to cardiopulmonary distress. Secondary infection, too remains a potential serious complication.<sup>[9]</sup>

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