

# Trans-sinus endoscopic removal of retrobulbar air gun pellet within the orbital apex

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Injuries to the eye have been widely reported in medical literature due to a variety of mechanisms causing significant morbidity and occasional unexpected mortality for the patient [1]. It is often wrongly assumed that air gun pellets lack this potential. A limited number of large case series have been reported [2,3]. The ballistic properties are responsible for the immediate damage and smaller foreign bodies (FB) often, but not always, lack the kinetic energy to penetrate deeper structures. Many suffer permanent visual impairment or complete blindness.

## Case

A 30-year-old male presented with left periorbital bruising and a 5mm entry wound over the supraorbital ridge. Initial visual acuity was 6/9 in the right eye and 6/60 in the left eye with a left relative afferent pupillary defect (RAPD) and restricted gaze. Ocular examination revealed vitreous haemorrhage and subretinal haemorrhage. Computed tomography (CT) showed a metallic FB in the left orbital apex causing optic nerve compression (Figure 1). There was proptosis of the left eye. An immediate left lateral canthotomy was performed. Postoperatively, visual acuity in the left eye improved to 6/18 with full extraocular movement. A review at 20 days postoperatively revealed no pain, no RAPD and left eye acuity of 6/12. Unfortunately, the patient was subsequently lost to follow-up and was uncontactable.

## Discussion

When deciding whether to retrieve an orbital FB, one must balance the risks of retention, long-term infection, and heavy metal toxicity. Metallic intraorbital FB are usually well tolerated, although

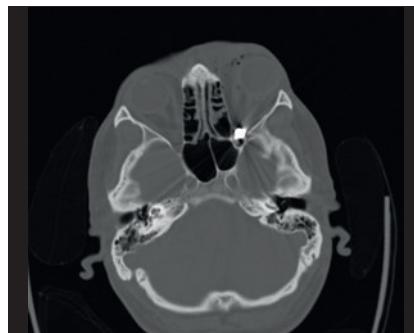


Figure 1: Computed tomography scans of the head showing the presence of a foreign body with metal effect in the right posterior orbital fossa.

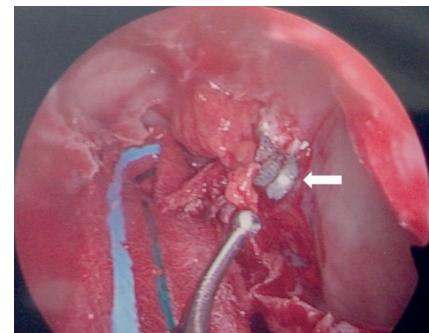


Figure 2: Left transnasal endoscopic view showing the airgun pellet located in the orbital apex.

there is much debate within the literature concerning toxicity. There is no safe level of lead that is known to be without harmful effects. Lead toxicity may go unrecognised with non-specific symptoms. Diagnosis is insidious and blood levels are not an adequate estimate of the total body burden of lead [4]. Retained fragments may serve as a chronic source of exposure and contribute to long-term accumulation.

Magnetic resonance imaging (MRI) has traditionally been contraindicated in patients with suspected metallic FB due to the potential for ferrous alloys, but lead and copper are non-ferrous, though toxic. CT is the imaging mode of choice as it allows the evaluation of FB, anatomy, and displaced structures.

Surgery is especially indicated where orbital symptoms develop such as pain, proptosis, decreased visual acuity or restricted mobility. Optic nerve compression, orbital infection, inflammation, large or sharp-edged objects, as well as inorganic material would make surgery more likely. Retained metallic FB have been associated with malignancy and there is ambiguity in the literature regarding removal [5]. The

decision to remove a bullet depends on its composition, location, facilities available, skill and experience of the surgeon. The approach depends on the location and skill of the surgeon and removal can be extremely challenging. Projectiles entering the orbit have a propensity to funnel toward the orbital apex, a watershed at the borderline of interest of ophthalmologists, maxillofacial, ENT and neurosurgeons.

Traditional approaches to the orbital apex are via a lateral orbitotomy however, FB within the medial intraconal space can be approached endoscopically. Retrobulbar objects pose unique surgical challenges and only a few have reported on removal using endoscopic approaches using a minimally invasive corridor to approach [6,7]. Intraconal FB are especially difficult to visualise within orbital fat and image guided navigation is essential for accurate localisation before mobilisation of orbital fat. Pellets tend to migrate whilst being manipulated during retrieval and success requires an advanced skill set (Figure 2). If ferrous, an endoscopic magnetic-assisted approach has been described [8].

Traumatic optic neuropathy has an incidence of 1.005 per million within the UK, with 13% due to assault-related causes [9]. RAPD is a reliable sign of optic neuropathy. The International Optic Nerve Trauma Study (IONTS) or subsequent studies have demonstrated a convincing functional visual benefit following treatment with steroids [10].

A collaborative, multidisciplinary approach to these challenging

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## "Greater public awareness is required"

presentations can lead to more favourable long-term outcomes. Traditional opinion that metallic FB should be left does not address long-term risk. Early recognition of optic neuropathy and prompt surgical management by a skilled surgeon can mitigate against the harmful effects of metal toxicity.

### Conclusion

Air gun eye injuries can be complex and sight-threatening. Early recognition of optic neuropathy is essential, and prompt management with a multidisciplinary approach improves patient outcomes. This case highlights the key prognostic factors predicting final visual outcome, such as the presenting visual acuity, the level of orbital and ocular trauma, monitoring of optic nerve function and timing of the surgical intervention. Greater public awareness is required to address this important eye care public health issue.

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