Minimally Invasive Image-Guided Removal of Retrobulbar Intraconal Foreign Body

N. Vairavan, MS¹, I. Tajunisah, FRCS(GLAS)², V. Subrayan, FRCOphth², V. Waran, FRCS(SN)¹

¹Division of Neurosurgery, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia
²Department of Ophthalmology, Faculty of medicine, University of Malaya, Kuala Lumpur, Malaysia

ABSTRACT

Surgical approaches are becoming increasingly minimally invasive, without compromising either safety or ease. Penetrating ocular foreign bodies has traditionally been approached either by intraocular or supraorbital access. We successfully attempted a minimally invasive approach to remove a retrobulbar foreign body under computer-assisted image guidance in a 19-year-old man involved in an industrial mishap.

KEYWORDS: Retrobulbar foreign body; Minimally invasive surgery; Industrial accident

INTRODUCTION

Penetrating ocular trauma carries significant morbidity in the form of loss of vision and ocular architecture. This is primarily due to the original trauma but is also frequently compounded by iatrogenic injuries sustained during attempts to remove the foreign body which is frequently in the form of an open craniotomy approach. The main difficulty in extracting an intraocular foreign body lies in its localization and access to the foreign body. This is made more difficult in case of small, deeply localized objects (Klimek et al., 1992).

Access through intraocular or retrobulbar approach carries a risk of vision loss and/or damage to the ocular architecture. On the other hand, supraorbital access via craniotomy has its own attendant problems like a large scar, intracranial trauma, and cerebrospinal fluid leakage.

Our Neurosurgical unit has been using a computer-assisted image guidance system, Radionic IGS®, to localize intracranial pathology for the past 6 years. In the following report, we describe a minimally invasive approach to remove a retrobulbar foreign body under image guidance in a 19-year-old man involved in an industrial mishap.

CASE REPORT

A 19-year-old man was referred to the Ophthalmology Department following an industrial accident resulting in a foreign body lodged behind his right eye. The incident occurred at work, a stone polishing site, whereby a piece of stone had pierced into his right eye resulting in bleeding and immediate loss of vision. On arrival, he was noted to have no perception of light (NPL) on the right eye and 6/6 vision on the left eye. The shape of the eyeball was still preserved.

A CT scan of the orbit and head was performed and revealed a distinctly hyperdense lesion measuring about 15mm sitting in a retrobulbar position, embedded in the lateral rectus (Figure 1). He was initially planned for evisceration/enucleation followed by orbital implant. However, the patient wanted to preserve his own globe and requested extraction of the foreign body without either evisceration or enucleation.

The patient was then referred to the Neurosurgical Unit for extraction of foreign body via supraorbital craniotomy. On review of the original CT scans, we decided that an image-guided extraction via a key-
hole approach along the zygomatic bone at the lateral orbital wall would give the best result.

Our patient’s CT images were uploaded onto our computer-assisted image guidance system, Radionic IGS through which a real-time 3D model of the skull was reconstructed preoperatively. With the aid of this computer model, we managed to locate the closest surface marking to the position of the foreign body at a point just superior to the attachment of the zygomatic arch to the lateral wall of orbit. A 10 mm burr hole was performed at that point. The intraconal region was explored with an image guided probe which pointed us directly onto the foreign body embedded in the lateral rectus muscle. The foreign body was removed easily and cavity washed out with antibiotic solution.

(Figure 2). The patient had an uneventful recovery though his vision remained at NPL.

**DISCUSSION**

Computer-assisted image guided surgery has been used with reasonable success to localize and extract penetrating cranial foreign bodies for the past 15 years (Klimek et al., 1993; Wenzel et al., 1994). Despite many case reports and series on intraorbital foreign bodies in the early 1990s, this method has not really caught on among the ophthalmological fraternity. This is probably due to a lack of familiarity in intracranial computer and image guidance surgery among ophthalmologists, the first-line doctors who deal with these types of patients.

We believe the success of this case demonstrates the simplicity with which image guidance can be applied to this particular problem, thereby reducing morbidity while enhancing recovery. Though legally blind, our patient was quite satisfied with the intact ocular architecture post-operatively. He was well enough to be discharged the day after surgery.

The difficulty of localizing small and deep objects, severe bleeding or traumatized anatomy can be easily overcome with real-time image guidance. Access can be created by burrholes on the lateral wall or by endoscopic intranasal procedures via the medial wall of the orbit.

**ACKNOWLEDGMENTS**

Declaration of interest: The authors report no conflict of interest. The authors alone are responsible for the content and writing of the paper.

**REFERENCES**

