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SS Shawaf[1], N Elkum[2] and KF Tabbara[1,2,3]

[1]The Eye Center and The Eye Foundation for Research in Ophthalmology, Riyadh, Saudi Arabia

[2]King Faisal Specialist Hospital and Research Center, Riyadh, Saudi Arabia

[3]The Wilmer Ophthalmological Institute of The Johns Hopkins University School of Medicine, Baltimore, MD, USA

Correspondence: KF Tabbara,
The Eye Center and The Eye Foundation for Research in Ophthalmology, 241 Makkah Road (Takhassusi East), PO Box 55307, Riyadh 11534, Saudi Arabia
Tel: +966 1 464 9614;
Fax: +966 1 462 9675.
E-mail: k.tabbara@nesma.net.sa

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Sir,

Failure of imaging to detect optic nerve avulsion: an explanation based on histopathology

A 26-year-old man was struck in his unprotected left eye by a paintball and noted immediate, complete vision loss. The paintball did not burst upon impact.

Visual acuities were 20/20 OD and no light perception OS. The right eye was normal. The left eye demonstrated incomplete ophthalmoplegia, an afferent and efferent pupillary defect, chemosis, corneal oedema, a small hyphaema, and iridodialysis. Fundus examination revealed vitreous haemorrhage, obscuring the optic nerve, and a giant retinal tear. Ultrasonography (Figure 1) and orbital magnetic resonance imaging (MRI, Figure 2) utilising T1, T2, and fat-suppression techniques demonstrated no abnormality of the optic nerve.

The patient underwent enucleation the following week for a blind painful eye. The optic nerve sheath remained attached to the intact globe with no apparent injury to the optic nerve. Histology revealed avulsion of the optic nerve head (posterior dislocation of the lamina cribrosa). Blood filled the cavity left by the avulsed nerve within the intact dural sheath (Figure 3).

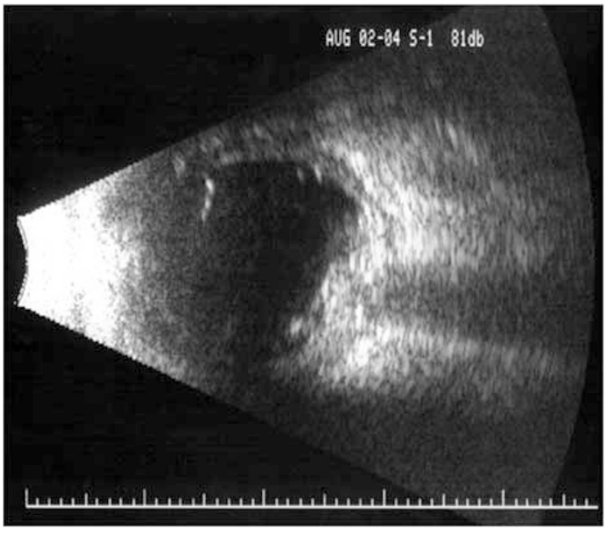

Figure 1 Retrobulbar optic nerve appears normal on ultrasonography (B scan, 10 MHz).

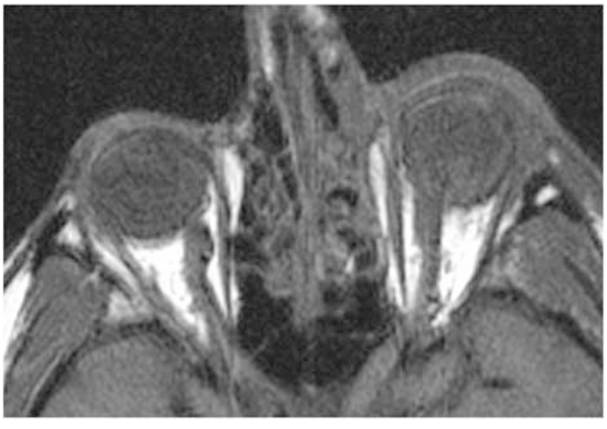

Figure 2 Retrobulbar optic nerve appears normal on MRI (high resolution, axial T2 weighted image).

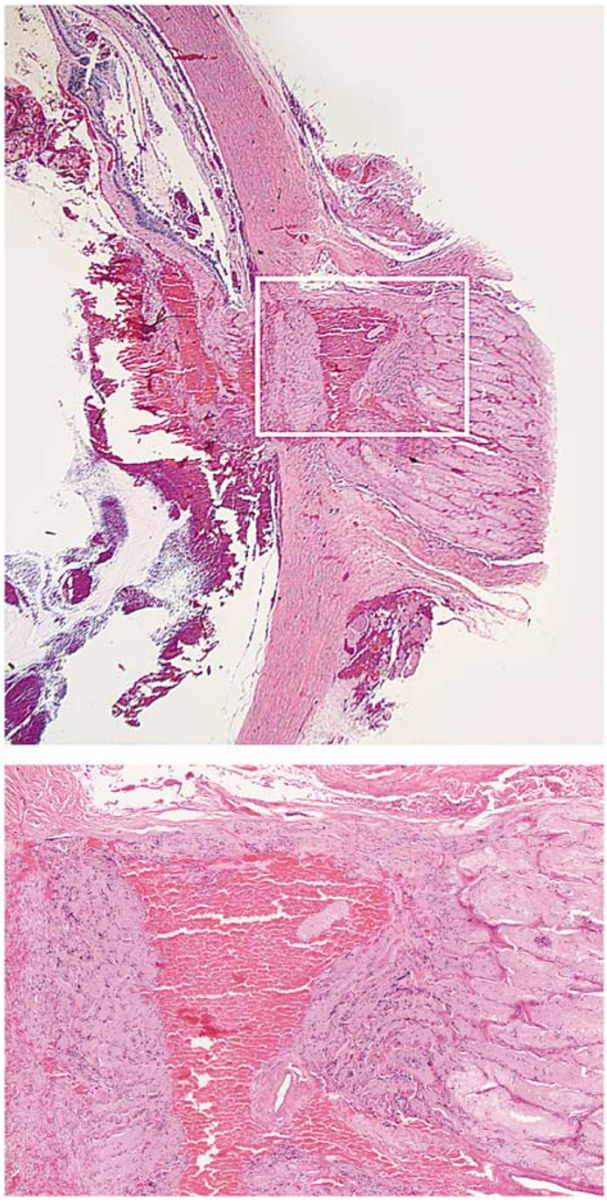

Figure 3 Optic nerve avulsion injury with posterior dislocation of lamina cribrosa within an intact dural sheath. The posterior third of the lamina cribrosa is disconnected from the proximal two-thirds (H&E stain, magnification ×20 and ×100).

Comment

Ocular paintball injuries are well described.[1,2] Types of injuries include corneal rupture, hyphaema, lenticular damage, vitreous haemorrhage, retinal tear/detachment, and optic neuropathy.[1] Optic nerve head avulsion occurs in the setting of blunt trauma to the eye.

A sudden rise in intraocular pressure or sudden rotation of the globe may lead to retrodisplacement of the nerve head within the robust sheath.[3,4] Avulsion may be difficult to diagnose when the nerve head cannot be visualised on fundus examination. Additionally, imaging often does not reveal the diagnosis since the dural sheath remains attached to the globe.[5–7]

Histopathology of the injury may explain the oftentimes-normal imaging studies.[3] In our patient, the size of the recession was small with blood filling the space created by the avulsion. This combination and intact dural sheath seem to obscure imaging of this injury.

Paintball injury may result in optic nerve head avulsion. The diagnosis should be suspected in a patient with no light perception vision after blunt ocular injury to an intact globe. MRI and ultrasonography usually do not support the clinical diagnosis. Our case represents a rare case of histopathologic confirmation of traumatic optic nerve head avulsion and offers insight into possible reasons for the difficulty of accurate diagnosis with available imaging techniques.

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A Galor[1], JD Perry[1], N Ratliff[2], PK Kaiser[1], SJ Bakri[1] and MS Lee[1,3]

[1]Department of Ophthalmology, Cole Eye Institute, Cleveland Clinic Foundation, Cleveland, OH, USA

[2]Department of Pathology, Cleveland Clinic Foundation, Cleveland, OH, USA

[3]Department of Neurology, Cleveland Clinic Foundation, Cleveland, OH, USA

Correspondence: MS Lee,
Department of Ophthalmology,
University of Minnesota,
420 Delaware St SE - MMC 493,
Minneapolis, MN 55455, USA
Tel: +1 612 625 3553;
Fax: +1 612 626 3119.
E-mail: leex2679@umn.edu

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Sir,

Intralamellar haemorrhage 44 years following lamellar keratoplasty

Lamellar keratoplasty is a procedure in which partial thickness donor cornea, devoid of endothelium and Descemet's membrane, is transplanted onto a recipient bed that has had its anterior stroma removed. It has been performed for over 100 years and allows the removal of diseased anterior stroma while the host's own endothelium is preserved. We describe a patient who developed corneal neovascularisation following a lamellar graft, and then subsequently haemorrhaged into the graft–host interface, causing significant morbidity.

Case report

The patient we describe underwent a right lamellar keratoplasty in 1960, following herpes simplex keratitis. He was intermittently treated for recurrences of the keratitis at the graft margins, but continued to have a corrected visual acuity in the affected eye of 6/6 up to his last routine review in May 2002. At that time, there was evidence of inactive neovascularisation at the temporal margin of the graft, but no epithelial defects or signs of inflammation. He had a history of ischaemic heart disease and had been taking clopidogrel 75 mg once daily since February 2002.

After 1 year the patient represented with sudden loss of vision in his right eye. There was no history of trauma or preceding irritation. The acuity in the right eye was 6/60 unaided, 6/18 with pinhole. There was haemorrhage within the right corneal stroma, and an inferior fluid level (Figure 1). The anterior and posterior

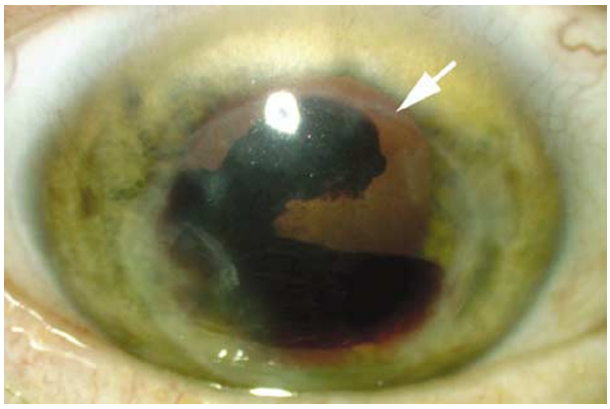

Figure 1 Slit-lamp photograph of the right eye showing clear lamellar graft (arrow indicates edge), and interface haemorrhage with inferior fluid level.

margins of the haemorrhage were very regular and elliptical in cross-section, consistent with haemorrhage in between the host and graft layers of stroma. The intraocular pressure was normal and the epithelium was intact and regular. The vessels noted previously at the temporal margin of the graft were more engorged than on his preceding visit and so topical steroids and aciclovir were prescribed. Over the following month, the haemorrhage became more diffuse but less dense. The patient had functionally acceptable vision from his other eye and elected for conservative management.

Discussion

The first successful lamellar keratoplasties were performed towards the end of the 19th century. The procedure enables the removal of diseased anterior stroma while preserving the recipient's endothelium and so avoids the major problems of endothelial rejection and accelerated endothelial cell loss seen with penetrating keratoplasty.[1–3] It was therefore a particularly favourable technique before the introduction of corticosteroids, new surgical techniques, and modern eye banking allowed improved success rates for penetrating surgery in the late 1970s. Modern penetrating keratoplasty (PKP) can achieve better visual results than lamellar keratoplasty (LKP), and is less technically challenging and time consuming to perform.[4,5] LKP does, however, continue to have a role in tectonic surgery, and can be used as an alternative to PKP in countries where there is an absence of high-quality donor material, and in patients with increased risk of blunt ocular trauma.

The optical success of LKP is most commonly limited by residual host bed scarring, astigmatism, graft surface irregularities, or opacities at the donor–host interface.[6–8] Some of these have been addressed by modern advancements in lamellar surgery, namely deep lamellar