The Use of Preserved Bovine Pericardium for Emergency Temporizing Graft in Corneal Perforation

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SUMMARY

Corneal perforation is an ocular emergency that requires early intervention to avoid permanent visual loss from endophthalmitis or irreversible structural changes. Although tectonic keratoplasty is the best choice for patching a large perforation, a donor cornea is not always immediately available. Consequently, an alternative material is required while awaiting a donor cornea. We report the use of preserved bovine pericardium as a temporizing graft to maintain the ocular integrity in two patients with corneal perforation.

KEY WORDS:
Corneal perforation, Bovine pericardium, Cornea graft

INTRODUCTION

Corneal perforation is an ocular emergency that requires early closure to prevent visual loss. In Malaysia, due to the lack of corneal donors, immediate tectonic keratoplasty is rarely possible. Consequently, it is necessary to use an alternative tissue or material to seal or patch the perforation until a donor cornea becomes available. With small perforations (<2.0mm diameter), tissue glue is often effective; with bigger perforations (>2.0mm diameter), a patching material is usually required. We report the use of preserved bovine pericardium, which is readily available from a tissue bank in Malaysia, as a temporary tissue for closing big corneal perforations.

CASE 1

A 35-year-old man sustained a traumatic right corneal injury after falling on a twig. He presented one week later with hand movement vision. On examination, a perforated corneal ulcer with iris prolapse and a shallow anterior chamber were noted. The perforation measured 3.2mm in diameter. He was started immediately on topical and systemic antibiotics. The perforation was closed using a piece of bovine pericardium (7mm in diameter). The pericardium was cut with a corneal trephine and sutured onto the cornea with interrupted nylon 10/0 sutures. On the second operative day, the anterior chamber deepened (Figure 1). He later underwent a successful tectonic corneal graft 12 days later in another centre.

CASE 2

A 54-year-old man presented with a two-week history of right ocular pain. On examination, he was found to have a right nasal sclerokeratitis. He gave a history of a pterygium operation 20 years ago with adjunctive perioperative mitomycin C application to the bare sclera in the affected eye. Culture of the lesion revealed Fusarium species. Despite antifungal treatments including oral ketoconazole and topical natamycin, he developed a corneoscleral perforation measuring 3.6mm. A corneal graft was ordered from Sri Lanka but was not available until a week later. As a temporizing measure, the perforation was covered with bovine percardium measuring 8 X 7mm. The percardium was cut using a pair of Westcoat's scissors and sutured over the perforation with interrupted nylon 10/0 sutures. The anterior chamber depth was restored (Figure 2). A tectonic corneal graft was performed nine days later.

DISCUSSION

Corneal perforation, unless treated urgently, can lead to permanent visual loss through endophthalmitis and loss of ocular structural integrity[1]. The most common causes of corneal perforation are trauma and infection. Small perforations (<2.0mm) may be sealed with cyanoacrylate glue but big perforations (>2.0mm) requires closure with a tectonic keratoplasty or patching with exogenous material[2]. The use of tectonic keratoplasty is preferable as the transparency of the cornea which is the main refractive medium of the eye is maintained. The use of exogenous material is only a temporizing measure until a donor cornea becomes available.

In Malaysia, tectonic keratoplasty is the second most common reason for corneal transplantation[3]. However, due to a shortage of local donors, the majority of donor corneas come from the USA[3]. In Sarawak, most of the donor corneas used in the government hospitals are obtained from Sri Lanka. These donor corneas are ordered through the Lion's Club which pays for part or all the expenses depending on the patient's socioeconomic circumstances. The donor cornea usually takes about one week or more to arrive depending on availability. Consequently, it is essential to find an alternative tissue or material to close the corneal perforation until a donor cornea can be obtained.

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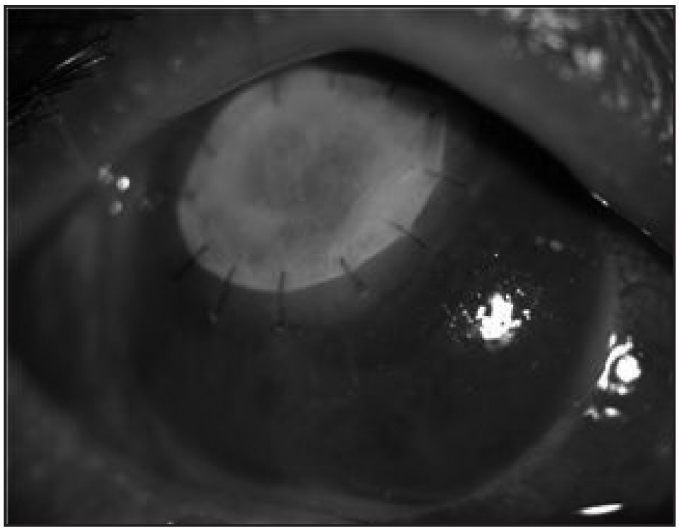

Fig. 1: Trephined bovine pericardium patch sutured over corneal perforation

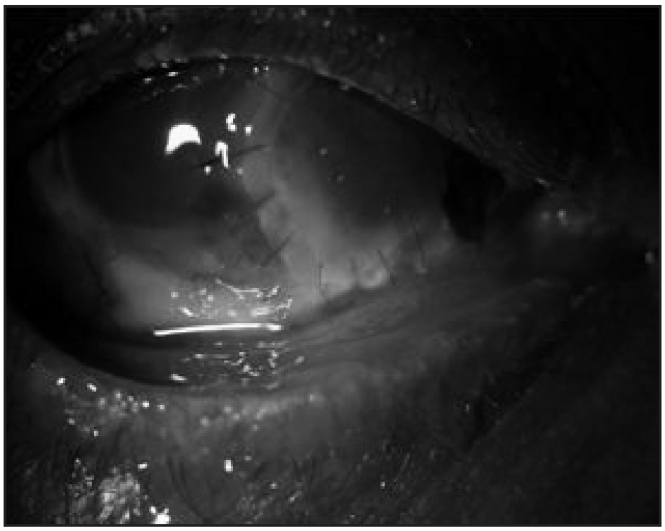

Fig. 2: Bovine pericardium as a temporizing patch for corneoscleral perforation

Preserved human pericardium, dura mater, autologous cartilage and fascia are some of the usual materials that have been used as exogenous materials to patch corneal perforations[1]. Bovine pericardium have been used in ocular surgery as wrap for orbital implants, patch for leaking blebs, cover for exposed glaucoma drainage devices and only recently, as graft to preserve globe integrity in corneal perforations. Bovine pericardium has the advantage of being durable yet well tolerated as it is immunogenically inert. Although there is a possible risk of prion transmission from tissue infected with Bovine Spongiform Encephalopathy (BSE), there has been no reported cases involving the use bovine pericardium in human beings.

In our patients, locally prepared bovine pericardium was successfully used to seal the perforations and restore the integrity of the globes for up to 12 days before definitive tectonic keratoplasty was performed with donor corneas. The locally prepared lyophilized bovine pericardium, Lyolemb, is readily available from the National Tissue Bank in Universiti Sains Malaysia at a cost of RM20.00 per piece (2 X 4cm). It is obtained from the local abattoir and prepared in sodium hypochlorite 0.05% and freeze-dried for storage. No cases of BSE have been reported in the local cattle population and the usage of sodium hypochlorite further reduces the risk of prion transmission.

Our report shows that bovine pericardium can be used as an effective and inexpensive temporarizing measure to close large corneal perforations until a donor cornea becomes available. Patients with religious concerns should be counseled prior to using bovine pericardium.

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