

Emergency use of combined remnants of 2 corneo-scleral rims to cover a large corneal perforation: a case report

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Abstract

• **AIM:** To describe the use of a combination of 2 preserved homologous corneoscleral patches for the emergency repair of a perforated cornea with extruded lens and exposed vitreous in a lady who had undergone tectonic penetrating keratoplasty.

• **METHODS:** A 49-year-old lady had presented with an extensive fungal corneal ulcer which was complicated by a descemetocele and microperforation. She had undergone a therapeutic cum tectonic penetrating keratoplasty. However, she developed a spontaneous large corneal perforation with expulsion of her crystalline lens with exposed vitreous. In view of the urgent need to cover the defect, a double graft combining 2 preserved full-thickness corneoscleral patches were used as donor cornea was not immediately available.

• **RESULTS:** The surgery was successful in not only restoring the integrity of the globe but also saved her of evisceration. Over the next few weeks, the graft began to heal and there was good re-epithelisation except over the scleral part of the patch. There were no signs of infection and she was able to maintain a vision of hand movement. She was put on a bandage contact lens in view of the epithelial defect. She has also been advised about an elective repeat penetrating keratoplasty.

• **CONCLUSION:** In the absence of a corneal button for grafting, one or more preserved homologous corneoscleral patch(es) may be used temporarily for covering large corneal defects.

• **KEYWORDS:** large corneal perforation; emergency tectonic keratoplasty; homologous corneoscleral patch; double graft

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CASE REPORT

A 49-year-old Malay lady with no known medical illness, had presented to a nearby general hospital with a central corneal ulcer in her left eye following a foreign body entry (mosaic particle) into the eye. Her corneal scraping grew *Fusarium* spp. On day 3 of admission she requested to go home against medical advice and also defaulted follow-up. Unfortunately, by the time she went back for treatment 2 weeks later the ulcer had progressed and the whole cornea was ulcerated with a central descemetocele with impending perforation. The anterior chamber was flat indicating a possibility of sealed perforation or microperforations. Her visual acuity was only hand movement. She was treated with guttae fluconazole 0.2%, guttae amphotericin B 0.15% and guttae ciprofloxacin 0.3% hourly, and tablet fluconazole 200mg daily while awaiting donor cornea. She had successfully undergone a therapeutic cum tectonic penetrating keratoplasty in June 2010. The size of the donor graft was extremely large (10.5mm) and involved almost the whole cornea. Unfortunately she had a wound leak on post-operative day 4. Resuturing was done but she developed raised intraocular pressure (50mmHg) the following day. This was controlled with oral acetazolamide 250mg qid and later with guttae timolol 0.5% bd and guttae dorzolamide 2.0% bd, and she was discharged well. One month later she was noted to have a swollen lens which was pushing the iris anteriorly causing iris prolapse at 6-9 o'clock meridian as well as corneal scarring. Her intraocular pressure measured using the tonopen was 35mmHg. She was re-started on oral Acetazolamide and her topical IOP lowering-agents were continued. Unfortunately she defaulted her subsequent follow-up appointment. She presented to the Emergency Department 2 weeks later with 5 days history of left eye pain, followed by a sudden gush of tears and sticky discharge. Later she felt a soft oval object coming out of her eye. There was no associated pain. She decided to seek treatment due to the persistent sticky clear discharge and watery eye. On examination, her vision was hand movement. A large portion of the central part of the donor button and the lens were absent and the vitreous had prolapsed through the defect. A diagnosis of avulsion of corneal button with extrusion of the lens and prolapsed vitreous were entertained. She was immediately planned for an

emergency patching of the defect in the cornea to prevent secondary infectious endophthalmitis. We performed a novel technique to reform the integrity of the eye because no donor cornea was readily available in this emergency situation. First we removed the damaged donor button. Then we sutured a preserved "doughnut" shaped remnant of the corneo-scleral rim from her previous donor to the limbus, which was cut out to fit the size of the original recipient size(10.5mm)(Figure 1). We then performed a smaller tectonic graft overlapping the 1st graft (piggyback graft) (Figure 2). We had used a corneo-scleral patch, which was the remnant of the donor cornea used for another patient previously. The suturing techniques employed were interrupted nylon 10/0 to the recipient and the corneoscleral patch as shown in Figures 2 and 3. The anterior chamber was reformed by balanced salt solution (BSS) and the eye was padded. The surgery was successful in not only restoring the integrity of the globe but also saved her of having to undergo evisceration. Over the next few weeks, the graft began to heal and there was good re-epithelisation except over the scleral part of the patch. There were no signs of re-infection and she was able to maintain a vision of hand movement. She was put on a bandage contact lens in view of the epithelial defect. She has also been counseled about an elective repeat penetrating keratoplasty but at the moment it is still undecided.

DISCUSSION

Corneal ulcers and deep corneal defects which have perforated or are impending perforation not only threaten the vision of the patient but also compromise the integrity of the globe. Secondary infectious endophthalmitis, secondary intractable glaucoma, and in-growth of corneal and conjunctival epithelium are but a few of the complications of untreated perforated corneal defects^[1]. More often than not, reconstructive or tectonic keratoplasty is the only available surgical option for treatment of such cases, and it is successful in the vast majority of patients in preserving the globe and improving vision. Nevertheless, several factors seem to affect graft healing after penetrating keratoplasty. These include poor wound apposition, suture failure, and incomplete wound healing, which may be affected by corneal edema, postoperative steroid usage, or elevated intraocular pressure. Wound dehiscence generally occurs at the graft-host junction^[2]. However, in our case this happened at the central portion of the donor graft. We postulate that this was caused by an increased intraocular pressure as there was no evidence of re-infection.

Authors described several surgical techniques to seal corneal perforations, which includes corneal tectonic grafts, conjunctival pedicle graft, amniotic membrane graft, cyanoacrylate glue and fibrin glue. However, in this case the perforation was too large to be corrected in a conventional way. As there was no readily available corneal tissue suitable for a re-graft, we had to quickly modify the tissue that we had to perform an emergency

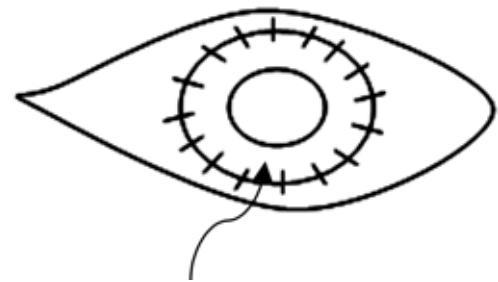


Figure 1 Corneo-scleral rim sutured to the limbus.

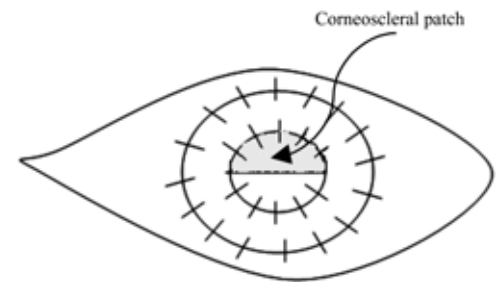


Figure 2 Piggyback graft.



Figure 3 One week post-operation.

tectonic graft. Although the use of partial thickness scleral patch graft, or scleral autoplasty had been described as early as in the late 1940's, it has been pretty much overlooked until recently. In 2006, Turner *et al*^[3] reported 9 patients who had undergone partial thickness scleroplasty. In 2 of them the graft had cleared. Although 3 of them ultimately needed a penetrating keratoplasty or a repeat graft due to graft melting, it certainly bought time for a definitive treatment later on. The remaining 4 had a successful patch graft. The electron microscopy studies by Maurice *et al*^[4] confirmed previous hypothesis, that the clearing of the scleral graft occurs as a result of two processes: 1) scleral tissue is replaced by collagenous fibres from the recipient cornea and 2) scleral fibres assume the properties of those in the cornea. However, there is little evidence in the literature to support the use of donor sclera for sealing a full-thickness corneal defect. Shmuel *et al*^[5] reported the use of a full-thickness scleral patch to seal a corneal perforation in an emergency situation, in which eventually scar tissue formed underneath the scleral graft. When the graft was removed, there was mild opacification at the site of corneal perforation.

In our case, as the corneal perforation was too extensive we had to remove the whole donor button and re-graft it. However, since there was no readily available corneal tissue for re-grafting, we had to use the preserved remnants from 2 previous donors to create a double graft. Soong *et al*^[6] quoted smaller tectonic grafts overlapping the previous penetrating keratoplasty as "piggyback", "snowman", or "double" grafts. However, our method was a very unique tectonic method using not only double grafts but also combining corneal graft with a corneoscleral patch. The fact was that there were no immediate leak or infection and the grafts showed progressive healing proves that it was a useful technique for emergency closure of large corneal perforation in the absence of readily available fresh donor cornea. In conclusion, we present this case to illustrate that one or more preserved homologous corneoscleral patch(es) may be used temporarily to cover large corneal defects in an emergency situation when a donor cornea is not immediately available for transplantation.

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急诊使用角巩膜缘联合残留物覆盖大型角膜穿孔1例

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摘要

目的:探讨联合两个经保存的同源角巩膜修补片紧急修复伴有晶状体受挤压和玻璃体暴露的角膜穿孔,在成形性穿透性角膜移植术后的应用。

方法:一位49岁的患者患广泛性真菌性角膜溃疡并发后弹力层膨出和微小穿孔。患者在接受了暨成形性穿透性角膜移植术后暴发了自发性大规模角膜穿孔伴晶状体驱逐和玻璃体暴露。鉴于覆盖破损处的迫切需要,供体角膜又无法立即获得,采用联合两个经保存的角巩膜修补片的双移植片。

结果:手术成功不仅恢复了眼球的完整性,也免于眼内容物剜除。在接下来的几周内,移植片开始愈合,除了补片的巩膜部分,其它部位有良好的再上皮化,没有感染的迹象,并且能够保持手动视力。鉴于上皮缺损,患者配戴了绷带式角膜接触镜,同时被建议重复穿透性角膜移植术。

结论:在缺乏角膜移植片的情况下,可采用一个或多个经保存的同源角巩膜修补片覆盖大范围的角膜缺损。

关键词:角膜大穿孔;急诊成形性角膜移植术;同源角巩膜修补片;双移植片