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METHODS

Dried scleral patch graft: A temporary measure of corneal perforation prior keratoplasty – two case reports

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Aim: The aim of this study was to describe the temporary management of corneal perforation by using a dried sclera patch graft prior to keratoplasty when donor tissue is not available.
Case report: Two cases of corneal perforation (> 2 mm) of various causes presented with severely decreased vision, a shallow anterior chamber, and a soft eyeball. Both needed immediate therapeutic keratoplasty to save the globe and restore the vision. Due to the unavailability of donor cornea, both patients were surgically managed with a dried scleral patch graft temporarily to save the globe. Both patients underwent therapeutic keratoplasty for 1 month and one and a half months, respectively. Both patients gained better vision (6/18 and 6/24, respectively), quiet anterior chamber, and no secondary glaucoma after 6 months of keratoplasty.
Conclusion: A dried sclera patch graft is a good option for the temporary management of corneal perforation of various causes until a donor cornea is available. These patch grafts prevent ocular hypotony, posterior synechiae, and secondary glaucoma.

Keywords: corneal perforation, patch graft, dried sclera, keratoplasty

Introduction

Perforation cornea from any cause is an ocular emergency. Cyanoacrylate glue is frequently used to manage small perforations of less than 2 mm, but large corneal perforations should be managed by keratoplasty. The perforation of the cornea along with tissue loss resulting from corneal ulcer and trauma should be given special attention. Therapeutic keratoplasty is the best option. In the absence of donor corneal tissue, we can use dried, preserved scleral tissue for temporary management of the corneal perforation. We should replace the dried scleral tissue as soon as possible with a fresh donor tissue. In our country, donor corneal tissues are not easily available, so a dried sclera tissue can be used on an emergency basis to seal the perforation and prevent perforation-related complications.

Case report and surgical method

Surgical methods

All necrotic tissues surrounding the corneal perforation were removed. Dried preserved scleral tissues were punched 2 mm larger than the actual perforation, and patch grafts were sutured with a 10/0 nylon monofilament. Bandage contact lenses were then applied. Therapeutic penetrating keratoplasties were performed subsequently when donor corneas were available.

Case one

A 25-year-old female patient presented at the Cornea Clinic of Chittagong Eye Infirmary and Training Complex (CEITC) with complaints of pain, redness, watering, and dimness of vision in her left eye for 4 days. The patient had a history of full-thickness corneal injury and was sutured elsewhere. She was non-diabetic and normotensive. A slit lamp examination revealed suturing causes distortion of the cornea (**Figure 1**). As an emergency, the patient was advised to have a dried scleral patch graft due to the unavailability of donor cornea. On the same day, the patient underwent surgical intervention – removal of sutures and s dried scleral patch graft sutured with 10-0 nylon (**Figures 2**, **3**) under local anesthesia. Bandage contact lens and eye patch were applied for 24 h. Postoperatively, she was treated with oral ciprofloxacin of 500 mg twice daily for 7 days, atropine 1% eye drop 8 hourly, moxifloxacin 0.5% eye drop 4 hourly, betamethasone 0.1% eye drop 4 hourly in her left eye, and advised for review after 7 days. After 1 week, the anterior chamber was well formed with normal intraocular pressure (IOP). After 1 month, the therapeutic keratoplasty was performed (**Figure 4**). The patient was again treated with atropine 1% eye drop 8 hourly for a week more, moxifloxacin 0.5% eye drops continued for a further 2 weeks, and betamethasone 0.1% eye drop 4 hourly in her left eye. After 1 month, corticosteroid drops tapered over the next 2 months and continued as once-daily dose. Digitally, the IOP was measured at each visit. A 6 month follow-up showed a clear graft with good (6/18) vision (**Figure 5**).

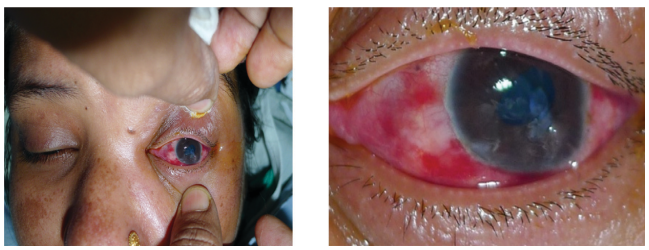

FIGURE 1 | At presentation.

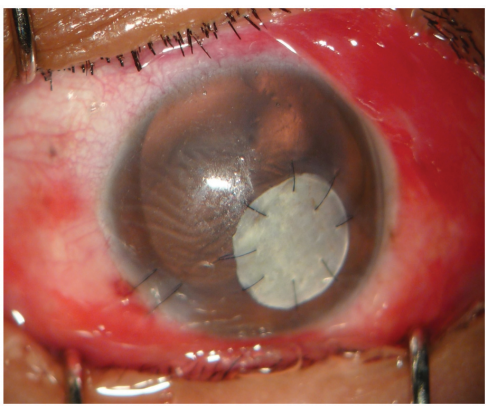

FIGURE 2 | Intraoperative view (dried scleral patch graft with bandage contact lens).

Case two

Another female patient of 14 years old presented with complaints of pain, redness, watering, and a marked dimness of vision in her right eye for 10 days. The patient had a history of keratitis and was treated elsewhere. On slit lamp examination, there was a corneal perforation with iris prolapsed, a shallow anterior chamber with leaking, and soft eyeball (**Figure 6**). She also underwent a dried scleral patch graft under general anesthesia followed by a

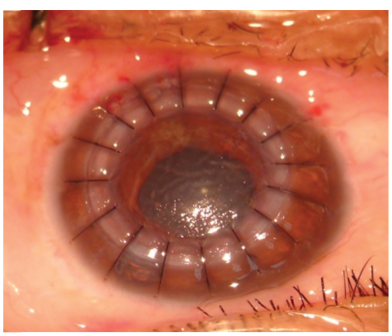

FIGURE 4 | Intraoperative view of keratoplasty.

FIGURE 3 | One month postoperative.

FIGURE 5 | Six month postoperative view of keratoplasty.

FIGURE 6 | At presentation.

bandage contact lens application. The patient was treated postoperatively with oral ciprofloxacin 250 mg twice daily for 7 days, atropine 1% eye drop 8 hourly, moxifloxacin 0.5% eye drop 4 hourly, and betamethasone 0.1% eye drop 4 hourly in her right eye. After 1 week, the anterior chamber was well formed with normal IOP (**Figure 7**). After one and a half months, the therapeutic keratoplasty was performed. The patient was again treated with atropine 1% eye drop and 8 hourly for 2 weeks, moxifloxacin 0.5% eye drops continued for a further month, and betamethasone 0.1% eye drop 4 hourly in her left eye. After 1 month, corticosteroid drops tapered over next the 2 months and continued as once-daily dose. Digitally, IOP was measured at each visit. A 6 month follow-up showed a clear graft with 6/24 vision (**Figure 8**).

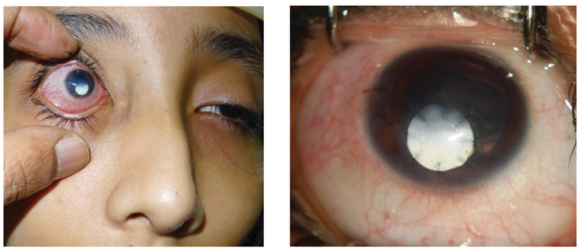

FIGURE 7 | One week postoperative view.

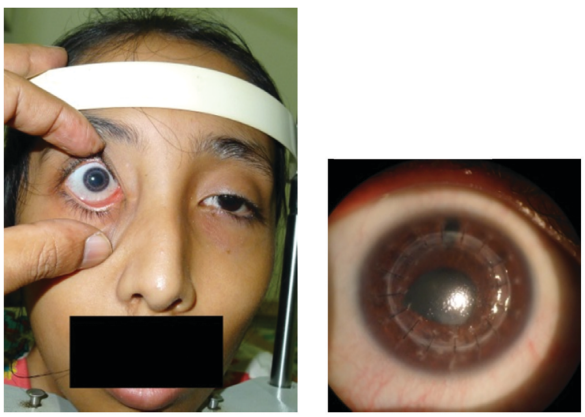

FIGURE 8 | Three month postoperative view after keratoplasty.

Discussion

Corneal perforation resulting from various causes is an ocular emergency and needs urgent management to prevent devastating complications. Most commonly, corneal perforation is caused by bacterial infection, but fungal infection, immunological inflammation, and trauma can also cause perforation. Infectious etiologies contribute to about 24–55% of corneal perforations. (1–7) A sudden decrease in visual acuity associated with pain is the most common symptom. The most common symptoms are soft eyeballs, flat anterior chamber, and leaking from the lesion (positive Seidel test). Even prolapsed uveal tissue sealed a large perforation and reformed an irregular anterior chamber. Descemet's folds radiating from the base of the lesion are seen in impending perforation.(8) Management is instructed to seal the perforation as soon as possible to maintain the integrity of the eyeball, preferably within 48 h to avoid peripheral anterior synechiae and damage to the corneal endothelium. Systemic antibiotics, most preferably oral ciprofloxacin, should be used for prophylaxis, and minimal manipulation of the eyeball should be maintained. Sealing of perforation can be performed with the use of cyanoacrylate tissue adhesive, which is very effective in small perforations less than 2 mm in diameter. Cyanoacrylate glue quickly solidifies in contact with water and seals the perforation (4, 8, 9) A bandage contact lens should be used as solidified cyanoacrylate is hard in consistency and makes a foreign body sensation. After healing of the perforation, cyanoacrylate glue should be removed along with the bandage contact lens. Fibrin glue, which is softer and more comfortable to use, is use in even the smallest perforations and wound leaks. Fibrin glue has a lower tensile strength than cyanoacrylate glue. This glue originates from human and animal sources, and there is a chance of hypersensitive reaction and disease transmission (10, 11).

Multilayer amniotic membrane transplantation can be done in small perforations, but in large perforations it gives low tensile strength. After cleaning the base of perforation, a small piece of membrane was put over the perforation, then another layer of the amniotic membrane with a basement membrane was side up and sutured with 10-0 nylon, and finally, a third layer of the amniotic membrane with a basement membrane side down, placed and multiple interrupted sutured with 10-0 nylon.(12, 13) Partial thickness corneal or sclera tissue can be used in large perforations with the use of suture or tissue adhesive.(14) Autologous Tenon's or oral mucous membrane patch graft can be used as an alternative. In large perforations, therapeutic penetrating keratoplasty (TPK) is the best option if the corneal tissue is available. Here, we used dried sclera tissue for a temporary patch graft on an emergency basis because at that time, donor cornea was not available. We prepared

dried scleral tissue from the remaining sclerocorneal rim of donor tissue after using the central corneal button for keratoplasty. Tissue rim is cleaned, heat dried, packaged, sterilized with ethylene oxide, and preserved at room temperature for a year. In these two cases, we performed TPK after getting the donor cornea about 1 month later. Host corneas were trephined larger than the dried sclera patch graft and TPK was performed. Postoperatively, we used a topical corticosteroid for 1 month, tapered over the next 2 months, and continued as once-daily dose. The IOP was normal at each follow-up visit. After 3–6 months, the grafted eyes were stable, and patients were advised to follow-up every 6 months.

Conclusion

Corneal perforation should be treated as an ocular emergency by sealing the wound as soon as possible to maintain the integrity of the eyeball. A dried scleral patch graft is a good option for temporary management of large corneal perforations, until a donor corneal tissue is available. This patch graft will prevent ocular hypotony, peripheral anterior synechiae, and secondary glaucoma. Visual rehabilitation can be achieved with a corneal graft later on.

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