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Clinical Outcome of Tenon's Patch Graft and Bandage Contact Lens in Cases of Corneal Perforation

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Abstract

Background: Corneal perforation is a leading cause of ocular morbidity around the world. It may occur due to trauma to the eye, keratitis, and many other conditions. Any corneal perforation should be treated immediately and promptly to avoid complications and subsequently corneal blindness. **Objective:** To describe effectiveness of using autologous Tenon's tissue along with bandage contact lens to manage corneal perforations less than 3mm in size. **Methods:** Tenon's patch graft was done in five cases of corneal perforation. Informed consent was obtained from the subjects after explanation of the nature and possible consequences of the study and this study was approved by ethical committee. **Results:** Of the five patients the first patient she showed good integration of the Tenon's Patch Graft (TPG). She had a vision of Perception of Light+ and accurate projection of rays after a period of 5 months post procedure. The wound healed with a leucomatous scar. Case two had a vision of counting fingers close to face after five months. Case three showed good integration of the TPG. He had a vision of 6/60 accurate after a period of three months post procedure. In case four anterior chamber was shallow, post patch integrity was not maintained. Patient was later considered for penetrating keratoplasty. Case five showed integration of TPG after one week postop with vision counting fingers at 6 meters. **Conclusion:** We conclude that Tenon's Patch Graft with bandage contact lens is an effective technique in the treatment of corneal perforations. Using this, the integrity of the eyeball can be maintained without any danger of graft rejection since the tissue is autologous. This technique can be used effectively in places where resources are scant

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Introduction

Corneal blindness is the second most common cause of preventable blindness in developing countries like India [1,2]. Globally, the commonest causes for corneal blindness in adults include corneal ulcerations and corneal trauma [2].

Corneal perforations may occur because of trauma, suppurative corneal ulcers, or secondary to immunological disorders and dry eyes. A corneal perforation is an ocular emergency requiring prompt closure of the corneal defect. If the perforation is large, or not satisfactorily managed,

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extrusion of the intraocular contents through the perforation may occur. This can lead to loss of integrity of the eyeball, resulting in permanent blindness.
Prompt closure of the corneal defect with adequate treatment of the underlying pathology will result in healing. The goal of treatment of corneal perforations is to restore eyeball integrity and enable appropriate healing to occur.

Materials and Methods

The present study was carried for a period of 19 months from 1st march 2021 to 1st November 2022 on patients attending the ophthalmology out-patient department at Basaweshwar Teaching and General Hospital, Gulbarga with corneal perforation. Perforation of mean size 2.00 ±0.9 mm were selected.
Before operating, the patients were explained in detail regarding the procedure, and then an informed and written consent was taken. The surgery was performed under peribulbar block.
The eye was scrubbed and draped. The wound edges were freshened and stromal pocket created around the wound margin. Then, conjunctival peritomy was done and exposed in the upper part of the eye. Thereafter, the conjunctiva was separated from the tenon's tissue by blunt dissection using conjunctival scissors.
The tenon's tissue, of applicable size, was attained by blunt dissection of underlying episcleral tissue. The gathered tenon's tissue was placed over the wound and gently tucked into the stromal pocket of cornea. It was then sutured using 10-0 Ethilon monofilament using overlay sutures. Anterior chamber was well formed with air and a bandage contact lens was placed over cornea.
Postoperative follow-up was performed at Day 1, Day 7, Day 15, Day 30, and 5 months by slit lamp examination. Anterior chamber formation, post-patch integration, inflammation and corneal stromal thickness stability were the main assessment factors.

Results

The baseline characteristics of patients are represented in **[Table 1].**
Of the five patients, one of them had to undergo penetrating keratoplasty because of poor patch integrity. In rest of the four cases, intraoperative anterior chamber was formed which was maintained throughout the follow-up period. The graft was accepted well.

Table 1: Baseline characteristics of the patients

Variables	Case 1	Case 2	Case 3	Case 4	Case 5
Age (Years)	50	70	60	51	55
Gender	Female	Male	Male	Male	Male
Etiology	Fungal Cornea Ulcer	Fungal Cornea Ulcer	Microbial keratitis	Trauma by stone	Fungal Cornea Ulcer
Site of Preformation	2-3mm	2mm	2mm	3mm	2-3mm
Comorbidities	Nil	Hypertensive	Nil	Diabetic	Nil
Visual acuity at last visit	Perception of light+ accurate Projection	Couniting fingers close to face	6/60	Perception of light+ Accurate Projection	Counting fingers at 6 meters.

Case 1 was a patient with left eye central corneal perforation due to fungal corneal ulcer measuring 2-3mm with iris prolapse **[Figure 1a]**. She showed good integration of the TPG.

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She had a vision of Perception of light+ and accurate projection of rays after a period of 5 months post procedure. The wound healed with a leucomatous scar **[Figure 1b]**.

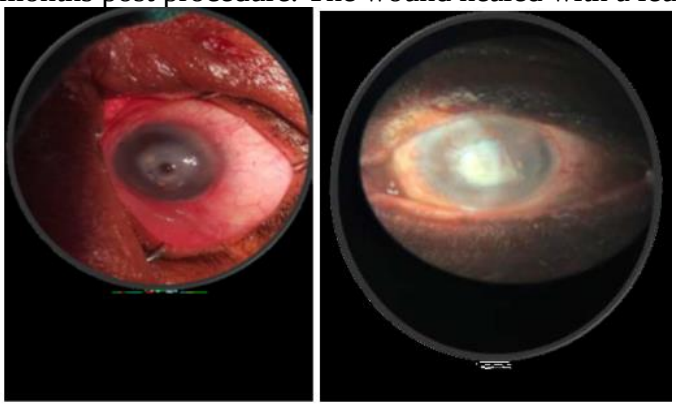

Figure 1(a): Preoperative image showing Central corneal perforation. Fig 1(b): Leucomatous scar after 5 months post operation.

Case 2 was a patient with left eye necrotizing stromal keratitis with paracentral corneal perforation **[Figure 2a]**. He showed good integration of the TPG **[Figure 2b]**.. He had a vision of counting fingers close to face after 5 months.

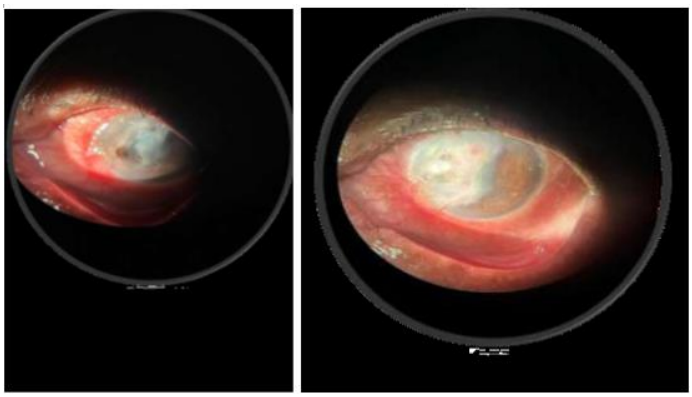

Figure 2(a): Preoperative image showing Left eye necrotizing stromal keratitis With paracentral corneal perforation. Fig 2(b): Post operative image after 5 months showing good Integration of TPG.

Case 3 was a patient with right eye perforated microbial keratitis below pupillary area measuring around 3mm **[Figure 3a]**. He showed good integration of the TPG **[Figure 3b]**.. He had a vision of 6/60 after period of 3 months post procedure.

Figure 3(a): Preoperative image showing Perforated microbial keratitis. Fig 3(b): Post operative image after 5 months.

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Case 4 was a patient with right eye central corneal perforation due to trauma by stone particle **[Figure 4a]**. Went to traditional healer and later patient presented with corneal perforation. Tenon's patch graft was done. However, on post operative day-5 anterior chamber was shallow, post patch integrity was not maintained **[Figure 4b]**. Patient was later considered for penetrating keratoplasty.

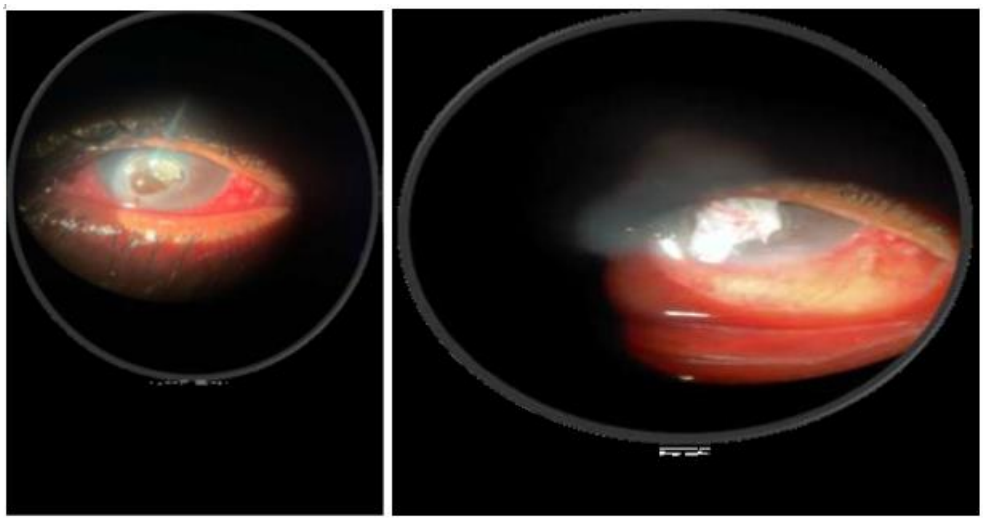

Figure 4(a): Central corneal perforation. Fig 4(b): Post-op day 5 image showing poor Post patch integrity.

Case 5 was a patient with left eye perforated fungal corneal ulcer **[Figure 5a]**, with vision-counting fingers at ½ m, with endothelial plaque protruding out of perforated site. He showed integration of TPG after 1 week post-op **[Figure 5b]** with vision of counting fingers at 6meters.

Figure 5(a): Perforated fungal corneal ulcer. Fig 5(b): 1 week post-op image showing good integrity of TPG.

None of the patients were lost to follow-up and showed no signs of wound leak at the end of POD 30.

Discussion

Tenons Patch Graft is a very simple and a very feasible option in management of small to moderate corneal perforations. Hence a proper understanding of the anatomy, advantages and disadvantages of tenons patch grafting is of utmost importance.

ANATOMY

- Located between conjunctival stroma & episclera.
- Posteriorly, merges with dural sheath of optic nerve.

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- Separates orbital fat from contact with the sclera.
- The Tenons capsule begins about 2 mm posterior to the limbus and is composed of two parts.
- The anterior part is a thick fibrous tissue with smooth muscle fibres and fibroblasts, the posterior part is thin fibrous capsule of the orbital fat. **(Figure 6)**
- The Tenons tissue is postulated to produce autologous fibroblasts and connective tissue, which allows it to be incorporated in the healed corneal tissue.

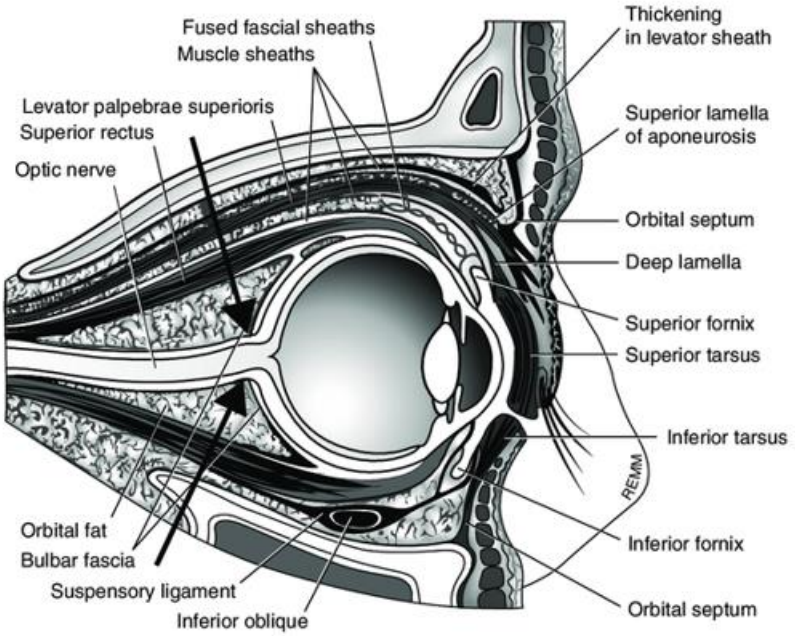

Figure 6: Anatomy of the Tenon's Capsule.

Indications of TPG: Peripheral Ulcerative Keratitis [3], Traumatic corneal perforations [3], Neurotrophic keratitis [3], Leaking trabeculectomy blebs [4], Scleromalacia after pterygium excision [5], Traumatic scleral perforation [6] , Corneal fistulas [7].
Advantages of TPG are that it is available easily and in abundance, and there is
No need of donor cornea hence eliminates risk of disease transmission as it is autologous.
There are multiple techniques of TPG:

1. Tenons patch graft alone –sutured or tucked –in
2. Tenons patch graft sutured with AMG overlay
3. Tenons patch graft with AMG overlay sutured
4. Tenons patch graft with fibrin glue

There have been various materials, allogenous, and autologous, which are being used to aid and provide tectonic support in corneal fistulas, sclero-corneal wounds, and pterygium surgeries [8-10].
The alternatives to TPG include tissue adhesives like cyanoacrylate glue, AMG, penetrating keratoplasty, lamellar grafts, temporalis fascia-lata, and periosteum, each one having their own set of advantages and disadvantages [11]. While some of these alternatives need a second surgery to harvest the tissue, the others need donor tissue. The main issue with using an allogenic material is that they carry an increased risk of tissue rejection and infection. The goal of treatment of corneal perforations is **to restore globe integrity**, and allow healing of the defect.

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Although the use of autologous and lab-cultured tenon's tissue for case of post trabeculectomy bleb site leak and pterygium surgeries has been reported before, the mention of the use of TPG to treat corneal perforations is **very rare** [12-14].

The drawbacks of the technique are that the TPG can be used for sterile corneal perforations of **size 3-5mm only**. Perforations of size **larger than 5 mm** need a patch graft as the support provided by TPG is inadequate.

In our technique, we harvested tenon's tissue from the **superior quadrant**, as the tissue from the inferior quadrant carries a risk of getting infected due to inadequate closure by the lids. Harvesting the tissue from the medial or lateral side is avoided as it can cause mild restriction of extraocular movement, due to the tug on medial and lateral ligaments respectively.

Conclusion

We conclude that Tenon's Patch Graft with bandage contact lens is an effective technique in the treatment of corneal perforations. Using this, the integrity of the eyeball can be maintained without any danger of graft rejection since the tissue is autologous. This technique can be used effectively in places where resources are scant.

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