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Original Article

# Sutureless and Glueless Amniotic Membrane Graft in Primary Pterygium Surgery

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## Abstract

**Introduction:** Amniotic membrane has a very unique property as it shares the basement membrane properties of conjunctiva. Hence, it is useful replacement for the conjunctiva in pterygium surgery.

**Objective:** The objective of the study is to see the efficacy and safety of amniotic membrane graft (AMG) in primary pterygium surgery.

**Materials and Methods:** A non-comparative interventional case study was conducted on 30 eyes of 30 patients. The main outcomes that evaluated were graft success, recurrence rate in a follow-up period of 6 months and complications.

**Results:** The mean follow-up was 6 ± 2 months. Their mean age was 37 ± 10.28 years and ranged from 18 to 55 years. 19 (63%) patients were males and 11 (37%) were females. The pre-operative size of pterygium ranged from 2 to 5 mm (mean 3 mm) was recorded. In 4 (13.13%) patients, graft loss was seen on the 1st post-operative day. No other graft-related complications were seen during the follow-up period of 6 months. Post-operative complications in follow-up visits were conjunctival hyperemia seen in 9 (30%) patients, 3 (10%) patients had conjunctival granuloma. The recurrence of pterygium was observed in 2 (6.66%) patients after 3rd and 6th post-operative month.

**Conclusion:** The present study thus concluded that AMG was effective and safe with no major complications and did not require creating another raw area over ocular surface with inherent complications.

**Key words:** Amniotic membrane graft, Basement membrane, Conjunctival granuloma, Cornea, Pterygium

## INTRODUCTION

A pterygium is a "wing-like" growth which is triangular in shape, fleshy, and consists of conjunctival epithelium and hypertrophied subconjunctival connective tissue that occurs nasally and or temporally in the palpebral fissure, and encroaching onto the cornea [Figure 1]. Limbal stem cell deficiency, epithelial abnormalities, and fibrovascular component have a role in the pathogenesis of pterygium, corneal invasion, and pterygium recurrence.

Treatment of choice is the surgical removal. The fact that numerous different techniques exist for the surgical treatment of pterygium underscores the point that no single approach is universally successful. The main challenge in pterygium surgery is the prevention of recurrence. The bare sclera excision alone has high recurrence rates of 38%–88%.[1] Conjunctival autografting is today recognized by many corneal and anterior segment surgeons as the procedure of choice for pterygium surgery, in terms of its efficacy and safety and represents the "gold standard" to which other procedures may be compared. Both superior and inferior conjunctival autografts can be used.[2]

Recently, preserved human amniotic membrane has been advocated for the management of many ocular surface disorders,[3] the basement membrane component of amniotic membrane is similar in composition to the conjunctiva.[4] Amniotic membrane has anti-fibroblastic and antimicrobial activity, as it has been shown to suppress transforming growth factor-beta signaling in conjunctival and pterygium fibroblasts.

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Therefore, this study was undertaken to evaluate the amniotic membrane graft (AMG) for the management of pterygium and its complications.

### Aim and Objectives

The present study was undertaken to evaluate and assess the efficacy and safety of AMG as an adjunctive therapy after removal of primary pterygium.

The main outcome measures that were studied include graft success, recurrence rate in a follow-up period of 6 months, complications, and to analyze the data collected and compare it with international literature.

## MATERIALS AND METHODS

A total of 30 patients with primary pterygium were included in the study. In 30 patients (30 eyes), the commercially available dry AMG was attached.

A detailed medical and ophthalmic history was recorded. Uncorrected and best-corrected visual acuity was recorded with Snellen chart. Slit lamp examination with special reference to size and extent of pterygium was recorded. Conjunctival swabs were taken to rule out infection. Hematological examination such as hemoglobin, bleeding time, and clotting time was performed for each patient. All patients were given explanation of the procedure, and informed consent was obtained from all.

### Surgical Procedure

Peribulbar anesthesia was used with 50:50 mixtures of 5 ml of 2% lignocaine and 0.5% of bupivacaine with 150 units/ml of hyaluronidase injection.

Preparing and draping the selected eye in normal sterile fashion in over time. An eye speculum was inserted and eyelids retracted. The eye was irrigated thoroughly with balanced saline solution. A 0.5 ml of 2% xylocaine was injected just underneath the body of pterygium about 2–3 mm away from limbus with a 26 gauge needle.

A small incision was given in the conjunctiva just medial to the head of pterygium after engaging with fixation forceps. The conjunctiva was progressively dissected off from the body of pterygium using Westcott scissors. The pterygium was removed from the cornea by avulsion. Only the thickened portions of conjunctiva and the immediate adjacent and subjacent Tenon's capsule showing tortuous vasculature were excised. Where, possible, hemostasis was allowed to occur spontaneously without the use of cautery.

The size of defect was measured with the calipers.

The commercially available dry amniotic membrane was taken. The size of graft was determined using calipers on the 3 cm × 3 cm amniotic membrane piece. The patient's bare scleral area was then covered with AMG, which was oriented with basement membrane side up. The grafts were left untouched for 5 min so that grafts get adhered to its bed and were patched and bandaged for 24 h.

The patients were followed up postoperatively after 24 h [Figure 2], 2 weeks, and at 3 months, 6 months.

A slit lamp examination was performed at every visit to monitor graft integrity and development of complications such as corneal defects, symblepharon, giant papillary conjunctivitis, and granuloma formation.

## RESULTS

The characteristics of patients are shown in Table 1. Averaged follow-up time was 6 months. 4 patients (13%) had graft loss on the 1st post-operative day. 3 patients (10%) had graft edema that subsided after 1st post-operative week shown in Table 2. 2 cases (7%) developed recurrence of pterygium which occurred at 3rd and 6th post-operative month, respectively, were shown in Table 3.

9 (30%) patients had conjunctival hyperemia which subsided by the end of the 1st post-operative week. There

**Table 1: Pre-operative characteristics of eyes with primary pterygium in the patients**

| Characteristics | Patients |
|---|---|
| Number of eyes | 30 |
| Age in years (Mean±SD) | 37±10.28 |
| Gender | |
| Male | 19 |
| Female | 11 |
| Eye involved | |
| Right | 18 |
| Left | 12 |
| Site of pterygium | |
| Nasal | 30 |
| Temporal | 0 |
| Pre-operative size of pterygium | |
| Mean±SD | 3±1.2 |

SD: Standard deviation

**Table 2: 1st post-operative day**

| Complications | Number of patients AMG (%) |
|---|---|
| Graft loss | 4/30 (13) |
| Graft retraction | 0/30 (0) |
| Graft edema | 3/30 (10) |
| Sub-graft hematoma | 0/30 (0) |
| Others | 0/30 (0) |

AMG: Amniotic membrane graft

were three cases of conjunctival granuloma which were treated surgically. No other complications were seen in patients.

## DISCUSSION

The high rate of recurrence after excision of pterygium has been the main obstacle in its successful treatment. However, in its endeavor to minimize recurrence, different techniques with different adjuncts were tried by various authors from time to time [Table 4]. Although many surgical modalities have been proposed to treat pterygium, none of them is yet an ideal one to accomplish the desired result. Adjunctive treatments in the form of beta-irradiation, argon-laser photocoagulation, and thiotepa were introduced to reduce the rate of recurrence, but none of them were without complications such as sclera thinning, radiation induce cataract, and ulceration.[5] The use of Mitomycin C (MMC) eye drops has also been used to prevent the recurrence of pterygium after its excision, but the use of MMC is also associated with complications such as corneoscleral melting, cataract, uveitis, symblepharon, and secondary glaucoma.

The bare sclera technique used for excision of pterygium was also associated with high recurrence rate.

Kenyon *et al*.[6] popularized the conjunctival autograft transplantation technique. It reestablishes the barrier functions of limbus, and hence, significantly lowers the recurrence rate.

Amniotic membrane promotes conjunctival epithelial wound healing and suppresses activation and extracellular matrix production by pterygium fibroblasts and inhibits pterygium recurrence. When compared with conjunctival limbal autograft transplantation recurrences rate is higher for AMG. The chemotherapeutic agents like 5-fluorouracil and other medications like bevacizumab are also currently being investigated.[7]

The use of topical mitomycin C in combination with amniotic membrane transplantation (AMT) has also been shown to lower the rate of recurrence in pterygium. However, another study did not show the same results.[19]

**Table 3: Post-operative complications in follow-up visits in both the groups**

| Complications | Patients (%) |
|---|---|
| Conjunctival hyperemia | 9/30 (30) |
| Corneal defects | 0/30 (0) |
| Pyogenic granuloma | 0/30 (0) |
| Symblepharon | 0/30 (0) |
| Conjunctival granuloma | 3/30 (10) |
| Recurrence | 2/30 (7) |
| Increased IOP | 0/30 (0) |
| Others | 0/30 (0) |

IOP: Intraocular pressure

**Table 4: Recurrence rates recorded by various authors**

**The recurrence rates recorded by various authors are as**

| Study | Surgical technique | Recurrence rate (%) |
|---|---|---|
| Prajna *et al*.[8] | Conjunctival autograft | 0 |
| | AMG | 25.8 |
| Noureddin and Yeung[9] | AMG | 3.8 |
| | Conjunctival autograft | 5.4 |
| | Mitomycin C | 3.7 |
| Katircioglu *et al*.[10] | Amniotic membrane-mitomycin C | 8 |
| | Conjunctival autograft-MMC | 13.3 |
| Patil and Melmane[11] | Group A (conjunctival autograft) | 4 |
| | Group B (AMG) | 4 |
| Kurna *et al*.[12] | Limbal sliding flap transplantation | 7.1 |
| | Primary closing | 56 |
| | AMG | 27.3 |
| Okoye *et al*.[13] | AMG | 6 |
| Arain *et al*.[14] | Bare sclera technique | 37.5 |
| | AMT | 12.9 |
| Li *et al*.[15] | C CLAT | 0.03 |
| | AMG | 0.22 |
| Chen *et al*.[16] | Limbal autograft group | 22.5 |
| | AMG group | 22.2 |
| Khan *et al*.[17] | Bare sclera | 36.6 |
| | Conjunctival autograft | 8.8 |
| | AMG | 7.4 |
| Ozer *et al*.[18] | Bare sclera | 39.58 |
| | Conjunctival autograft | 14.29 |
| | AMG | 23.08 |
| Present study | AMG | 7 |

AMT: Amniotic membrane transplantation, AMG: Amniotic membrane graft, MMC: Mitomycin C, CLAT: Conjunctival limbal autograft transplantation

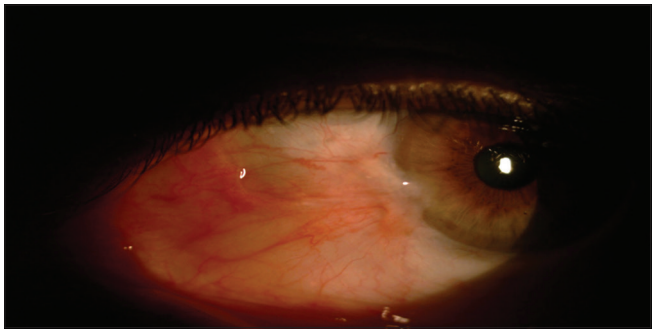

**Figure 1: Nasal pterygium**

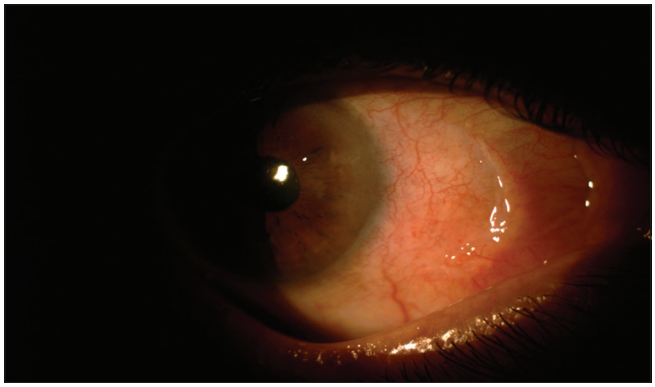

**Figure 2: Amniotic membrane graft on post-operative day 1**

In another study, Kucukerdonmez *et al.*[20] compared the cosmetic outcome of using AMT following pterygium excision with either fibrin glue or vicryl sutures and found that there was no difference in cosmetic outcome. No major complications were seen with AMT. In one study by Ma,[21] no major complications were noted in 80 eyes which were treated with AMT.

## CONCLUSION

The present study thus concluded that amniotic membrane graft was effective and safe with no major complications and did not require creating another raw area over ocular surface with inherent complications. AMG may be the preferred procedure for primary pterygium and is especially suited for large sized pterygium, eyes with diseases of conjunctival involvement, bilateral pterygium, and glaucoma patients who underwent filtration operations.

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