

# Short term results of pterygium surgery with adjunctive amniotic membrane graft

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## Abstract

**Objective:** The objective of this study is to present the 3 months results of pterygium excision with adjunctive amniotic membrane graft.

**Materials and Methods:** In a non-comparative case series study, the medical records of all patients who had pterygium excision with adjunctive amniotic membrane transplant on bare sclera from December 2009 to August 2010 were reviewed. All the patients were followed up for 3 months. The data collected were sex, age, occupation, type of pterygium (primary or recurrent), extent of pterygium, post-operative complications and recurrent pterygium growth.

**Results:** Thirty eyes of 30 consecutive patients were operated on. There were 14 males and 16 females (M:F =1:1); age range 25 to 70 years (mean: 48.3 SD + 12.01). Twenty-six eyes had primary and 4 recurrent pterygia. Stage 3 pterygium accounted for most of the cases (53.3%) followed by stage 2 (36.7%) and stage 4 (10%). Nineteen patients (63.3%) had occupations with considerable exposure to actinic damage. Of these, manual laborers accounted for the highest number contributing 13 (43.3%) out of the 19 cases. Of the 30 patients 2 had a reoccurrence giving a recurrence rate of 6%. One patient developed dellen 1 week post-operatively with complete resolution following conservative large soft contact lens application.

**Conclusion:** Short term results suggests that adjunctive amniotic membrane transplant with pterygium excision is effective and safe. A larger randomized clinical trial with a longer follow-up period is however recommended.

**Key words:** Amniotic membrane graft, pterygium, recurrence

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## Introduction

A pterygium is a benign condition characterized by a wedge-like fibrovascular growth of actinically damaged conjunctiva encroaching across the limbus and invading the cornea.<sup>[1]</sup>

It is a common surgical external eye problem presenting to the eye clinic. It affects all populations but principally prevalent in tropical Africa<sup>[2]</sup> as a result of its warm and dry climates. Several studies have reported prevalence of 8.8% in Ethiopia<sup>[2]</sup> and 9.5% in India.<sup>[3]</sup> In Nigeria, pterygium accounts for 9% of all new cases and 20% of all planned surgery in the eye clinic.<sup>[4]</sup>

The encroachment of the lesion onto the visual axis, its alteration of corneal contour inducing irregular astigmatism and breakup of precorneal tear film may result in diminution of vision requiring surgery. In a Nigerian study,<sup>[5]</sup> pterygium was responsible for 19% of visual impairment and 4% of blindness. However, treatment is usually complicated with high recurrence rate. This could be as high as 40% for the commonly practiced bare sclera technique.<sup>[4,6]</sup>

To prevent this post-operative recurrence, two major adjunctive therapies are use of conjunctival or limbal

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autograft or application of antimetabolites after the pterygium excision. The efficacy and safety of other proposed therapeutic modalities are yet to be extensively studied.

Lewallen,<sup>[6]</sup> and Bekibele<sup>[7]</sup> *et al.*, reported a pterygium recurrence rate of 7% and 12.1% respectively with conjunctival autograft. Panda *et al.*,<sup>[8]</sup> Waziri-Erameh *et al.*,<sup>[9]</sup> and Ma *et al.*,<sup>[10]</sup> in their series have reported recurrent rates of 12%, 14% and 3.7% respectively with topical mitomycin-C. In spite of the efficacy of this strategy the serious complications associated with the use of adjunctive antimetabolites with pterygium excision are well documented.<sup>[11,12]</sup> Waziri-Erameh *et al.*,<sup>[9]</sup> reported conjunctival granuloma (12.8%), delayed healing (8.8%) and sclera melting (2.9%) as post-operative complications. A local Indian study<sup>[13]</sup> reported a case each of scleromalacia and scleral calcification following use of adjunctive mitomycin C in pterygium surgery. Ajayi *et al.*,<sup>[14]</sup> studied the efficacy of post-operative beta irradiation following pterygium surgery. Recurrence rate was found to be 6.9%. However, reported post-operative complications included conjunctival inflammation (8.6%), corneal opacities (3.2%) and cataract (0.8%).

In recent times, preserved human amniotic membrane has been used for the treatment of many ocular surface disorders including chemical or thermal burns, Steven-Johnson syndrome, ocular cicatricial pemphigoid, coverage of conjunctival defect after pterygium excision and deep corneal ulcers.<sup>[15,16]</sup>

Reports from several studies on the use of adjunctive amniotic membrane therapy for pterygium excision have shown different recurrence rates varying between 2%,<sup>[17]</sup> 5.4%<sup>[10]</sup> to 40.9%<sup>[18]</sup> and 64%.<sup>[19]</sup>

The purpose of this study is to determine the short term outcome of pterygium excision with adjunctive amniotic membrane therapy in terms of recurrence of the lesion and complications.

## Materials and Methods

In this retrospective case series, a review of medical records of all patients who had pterygium excision done between December 2009 and August 2010 was done at the Goutani Eye Institute, Rajahmundry, Andhra Pradesh, India. Data on age, sex, occupation, type of pterygium (primary or recurrent), extent of pterygium, pterygium recurrence after 3 months and post-operative complications were analyzed. Ethical approval was received from Goutani Eye Institute, Rajahmundry, Andhra Pradesh, India according to Helsinki declaration.

### Preoperative evaluation

Visual acuity, slit lamp examination of the anterior segment and ocular adnexa, schirmer's test, and tear film breakup

time was performed on all the patients prior to surgery to rule out other ocular surface disorders.

### The surgical procedure

All surgeries were done by one specific surgeon assisted by another specific surgeon using amniotic membrane tissue prepared by an eye bank and supplied in a preservative-free liquid medium (glycerol) stored in a refrigerator. The surgery was done under local anesthesia in all the cases using 4cc of peribulbar 2% xylocaine and 0.5% bupivacaine (3:1) injection.

First the head of the pterygium was separated from the limbus and dissected towards the center of the cornea using spring conjunctival scissors. The head and part of the body were then excised. Then the Tenon's capsule and subconjunctival fibrovascular tissues were separated from the overlying conjunctiva and excised upward and downward towards the medial caruncle being careful not to damage the medial rectus tendinous attachment. Bleeding vessels were gently cauterized. The conjunctiva was trimmed to create a bare sclera area of about  $5 \times 7$  to  $6 \times 8$  mm.

Residual fibrovascular tissue on the cornea was scraped with size 15 surgical blade.

Amniotic membrane transplantation: The bare sclera area was covered with amniotic membrane tissue with basement membrane side up. The amniotic membrane was sutured through the episcleral tissue to the adjacent healthy conjunctiva using 8 to 10 size 8.0 Vicryl sutures. All had 0.5 ml of 40 mg/ml non-preserved subconjunctival injection of triamcinolone applied and the eye padded for 24 h. Post-operatively all patients were placed on eyedrops dexamethasone and ofloxacin 10 times per day for the first day, 8 times per day for the second day, 6 times per day for the third day, 4 times per day for the fourth day and 2 times per day for one month.

Follow-up: Post-operatively all patients were seen first day, 1 week, 1 month, 2 months and then 3 months.

### Study definition

For the purpose of this study, pterygium reoccurrence is the finding on slit lamp examination of formation of a wing of fibrovascular tissue occurring at the position of a previously excised pterygium with the apex crossing the limbus and extending onto the cornea, as distinct from 'simple vascularization of the corneal stroma'.

### Data analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS-16 IBM, Armonk, New York, USA). Univariate analysis and the parametric method were used to calculate frequency, percentage, and 95% confidence intervals (CI.), Chi-square were done to ascertain the statistical significance of the results.

**Definitions for purposes of this study**

Stage 1 pterygium: Apex of the pterygium is on the limbus

Stage 2 pterygium: The apex is between the limbus and pupillary margin

Stage 3 pterygium: The apex of the pterygium is on the pupillary margin

Stage 4: The apex of the pterygium is on the visual axis

**Results**

A total of 30 eyes of 30 patients were studied. There were 14 males and 16 females (M:F = 1:1) aged between 25 and 70 years (mean: 48.3 SD + 12.01)

Twenty six (86.7%) had primary and 4 recurrent pterygia (13.3%),  $P = 0.001$ , C.I (1.00-1.26). The difference is statistically significant.

The sex and age distribution of the patients that had pterygium surgeries are presented in Table 1.

Stage 3 pterygium accounted for most of the cases (53.3%) followed by stage 2 (36.7%) and Stage 4 (10%)  $P = 0.014$ , C.I (2.49-2.97).

Onset of growth ranged from 2 months to 10 years (mean 2.62 SD + 2.56).

Nineteen patients (63.3%) had occupations with considerable exposure to actinic damage. Of these, manual laborers accounted for the highest number contributing to 13 (43.3%) of 19 cases [Table 2].

Pterygium reoccurred in 2 eyes (6%) over the maximum follow-up period of 3 months. The 2 recurrent cases were one each of primary and recurrent pterygia and one each of male and female.

**Table 1: Age-sex distribution of patients that had pterygium surgery**

Age group	Frequency (sex)		Total (%)
	Male	Female	
21-40	5	4	9 (30)
41-60	7	9	16 (53.3)
>60	2	3	5 (16.7)
Total	14	16	30 (100)

**Table 2: Distribution of occupations of patients that had pterygium surgery**

Occupation	Number (%)
Housewife	11 (37)
Farmer	4 (13)
Manual laborer	13 (43)
Driver	2 (7)
Total	30 (100)

One patient developed dellen 1 week post-operatively with complete resolution following conservative management with large soft contact lens application. Otherwise, there was no significant change in the visual acuity and intraocular pressure of the patients post-operatively.

**Discussion**

Different surgical treatments for pterygium have been advocated. However, recurrence remains a common complication.<sup>[20]</sup> The mechanism of pterygium recurrence has been attributed to surgical trauma, post-operative inflammation, proliferation of fibroblasts and deposition of extracellular matrix protein.<sup>[21,22]</sup>

Recurrence rates as high as 40%<sup>[4,6]</sup> and 16.7%<sup>[23]</sup> have been observed in the bare sclera and primary closure techniques, respectively. To reduce this recurrence rate, adjunctive conjunctival autograft or topical mitomycin C could be used. Following pterygium excision with conjunctival autograft recurrence rates of 7%, 7.5% and 7.1% have been reported.<sup>[6,23,24]</sup> Topical mitomycin C has been as a method of reducing recurrence.<sup>[25,26]</sup> However, it has a recurrence rate of 38%<sup>[22]</sup> which is comparatively high. Moreover, some vision-threatening side-effects such as scleral ulceration, cataract formation and glaucoma have been reported.<sup>[11,12,27,28]</sup>

Being a natural basement membrane, the amniotic membrane contains various matrix proteins which promote the adherence, migration and differentiation of epithelial cells and prevent their apoptosis. It is thought that the major mechanisms by which amniotic membrane reduces recurrence of pterygium are promotion of conjunctival epithelial wound healing, suppression of fibroblasts and reduced extracellular matrix production.<sup>[10]</sup> This biomaterial may be considered as an alternative to conjunctival grafting in the treatment of pterygia.<sup>[17]</sup>

In this study, the mean age of the patients was 48.3 SD±12.01. This is similar to those of other studies.<sup>[16,28]</sup> This may be a reflection of the active years when most people are involved in outdoor activities that exposes them to actinic degenerative changes on the conjunctiva.

Sixty-two percent of the cohort were involved in occupation and lifestyle associated with considerable exposure to actinic damage to the conjunctiva. Of these, 43% were manual laborers. Housewives accounted for 37% of patients with pterygium. It is possible that majority of these women are both housewives and also farmers largely involved in outdoor activities but due to socio-cultural reasons prefer to indicate housewife as their primary occupation. In another study<sup>[23]</sup> 42% of the study population was involved in lifestyles associated

with environmental exposure with a risk of development of pterygium. This underscores the etiopathogenic importance of outdoor activities in the occurrence of pterygium.

In this study, a recurrence rate of 6% was recorded. This is lower than the findings in other studies which reported recurrence rates of 7.9%, 25% and 28.1%<sup>[23,29,30]</sup> respectively. Even though similar in that these cohorts comprised both primary and recurrent pterygia these studies differed in study design, sample size and follow-up period. While this study evaluated 30 eyes with primary and recurrent pterygia who had pterygium excision with adjunctive amniotic membrane transplant, Kucukerdonmez *et al.*,<sup>[24]</sup> Katircioglu *et al.*,<sup>[29]</sup> and Luanratanakorn *et al.*,<sup>[30]</sup> studied 38, 16 and 287 eyes respectively. Kucukerdonmez *et al.*,<sup>[24]</sup> and Luanratanakorn *et al.*,<sup>[30]</sup> followed up their patients for 13.4 months (mean period) and 6 months respectively while follow-up period of this study was just for 3 months. Again, while their studies were prospective this study was retrospective. In contrast, Nakamura *et al.*,<sup>[31]</sup> recorded no recurrence in their series. Their study however differed from this study in being prospective and had a longer mean follow-up period of 13.9±6 months.

In the present study, only the minor post-operative complication of dellen was reported. No significant sight-threatening complications were recorded. These findings are similar those in other studies<sup>[16,31,32]</sup>

The low recurrence rate and no major post-operative complication following amniotic membrane graft with pterygium excision in the present study agree with other reports that this procedure is effective and safe. However, due to the study's major limitations which are it being retrospective, its small sample size and a short period of follow-up, the findings should be interpreted with caution. A larger randomized controlled study will be required to confirm our findings.

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