

Research Article**Comparison of Preoperative and Postoperative Astigmatism Following Pterygium Excision with Conventional Conjunctival Graft and Amniotic Membrane Graft****Bhavesh Makkar, Ila Agrawal, Ashish Ahuja, H K Shah**

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Abstract: Pterygium is one of the common problems in ophthalmology among the elderly and the middle age group in both sexes. Pterygium or Surfer's Eye most often refers to a benign growth of the conjunctiva. It is a wing shaped conjunctival encroachment onto the cornea which is generally situated on the nasal side. It has been found to be associated with and thought to be caused by ultraviolet light exposure, low humidity and dust. In this study 40 eyes of 40 patients were operated and the changes in astigmatism were noticed. 20 eyes underwent pterygium excision with conventional conjunctival graft and in 20 eyes amniotic membrane graft was used. The patients were kept on follow up for 3 months duration. At the end of follow up, it was found that pterygium excision with amniotic membrane graft was associated with less astigmatism when compared to conventional conjunctival graft. Pterygium may cause flattening of the cornea to the leading apex. An induced astigmatism was explained by several mechanisms: Pooling of the tear film at the leading edge of the pterygium and mechanical traction exerted by the pterygium on the cornea. Pterygium cause mechanical traction on the cornea leading to astigmatism. Surgical removal of the pterygium improves the astigmatism.

Keywords: Pterygium, Astigmatism, Conventional conjunctival graft, Amniotic membrane.

INTRODUCTION

Pterygium is an ocular disease with wing shaped fibrovascular lesion. It can display an aggressive clinical behaviour and can occasionally threaten vision. It usually originates from nasal side but occasionally from temporal side [1].

The nasal predominance of pterygium can be explained by the fact that the sunlight passes unobstructed from the lateral side of the eye and focuses more on the medial limbus. On the medial side, the shadow of the nose decreases the intensity of the sunlight reaching the temporal limbus [2].

Despite the fact that its original description dates back to the time of Hippocrates, the ophthalmic pterygium still manages to keep the secrets of its pathogenesis and more importantly, may still occasionally threaten vision [3].

Earlier pterygium was considered to be a degenerative condition. But recent evidence goes more in favour of proliferative condition. Many molecular genetic alterations have been reported like loss of heterozygosity, point mutations of proto-oncogenes such as k-ras and alterations in the expression of tumour suppressor genes such as p53 or p63. Other findings

include the frequent detection of human papilloma virus deoxyribo nucleic acid, ocular surface changes such as the overexpression of various proteins, including defensins and phospholipase d, as well as up-regulation of growth factors, such as basic fibroblast growth factor or vascular endothelial growth factor [2].

Symptoms associated with pterygium development include chronic ocular surface inflammation, tearing, astigmatism and blurred vision due to optical axis involvement on the corneal surface [4].

Today a variety of options are available for the management of pterygium, from irradiation to conjunctival autografting or amniotic membrane transplantation, along with glue and suture application to which antimetabolite may or may not be added.

Definitive treatment is achieved only by surgical removal.

Conjunctival autograft

In this technique free graft from superior/superotemporal bulbar conjunctiva is placed over the bare sclera after excision of a pterygium. It is

now one of the procedures of choice for pterygium excision [5].

Amniotic membrane transplantation:

It can be used in place of grafts. It is acquired from the innermost layer of human placenta. It facilitates epithelialization and has an anti-inflammatory property. It is an effective and safe method for conjunctival reconstruction after pterygium removal [6].

MATERIALS AND METHODS

Type of study: Prospective comparative case series to compare the preoperative and postoperative astigmatism following pterygium excision with free conventional conjunctival graft and amniotic membrane graft technique.

The study was approved by the Ethics Committee of the Sant Parmanand Hospital. An informed written consent for the surgical excision of pterygium either with free conventional conjunctival autograft or with amniotic membrane graft was taken along with patient's permission to be part of the study group.

Patient selection

40 eyes of 40 patients attending OPD services of Department of Ophthalmology, Sant Parmanand Hospital, Delhi from 1st November 2011 to 1st February 2013 were part of the study. All the eyes included were assigned a case number. They were divided randomly into 2 groups without any prior bias on the basis of first come first serve basis.

Group I

20 eyes underwent pterygium excision with free conventional conjunctival graft.

Group II

20 eyes underwent pterygium excision with amniotic membrane graft technique.

Inclusion criteria

The cases of pterygium presenting with all of the following features were included in the study:

- Patients of either sex greater than 18 years of age.
- Patient with atleast 2 mm of cornea covered with pterygium.

Exclusion criteria

The cases of pterygium with any of the following features were excluded from the study.

- Patients with scarred superior conjunctiva.
- Patients with history of glaucoma.
- Patients with cicatricial ocular surface disease.
- Patients with pseudopterygium or signs of malignancy over pterygium.

Baseline evaluation

- Detailed history and clinical examination.
- Measurement of uncorrected visual acuity and best corrected visual acuity with Snellen's chart.
- Diffuse torch light examination.
- Detailed examination of pterygium with reference to
 - Length of corneal encroachment (Distance from limbus to the head of pterygium)
 - Width of the neck (Distance between superior and inferior margins of pterygium over limbus)
 - Vascularity of pterygium: It will be graded as

Grade I

No congestion in the body of pterygium.

Grade II

Mild hyperaemia.

Grade III

Highly vascular/Aggressive and inflamed look

- Detailed ocular examination with slit lamp to evaluate adnexa, conjunctiva, cornea, anterior chamber, iris and lens.
- Measurement of Intra ocular pressure with Goldmann applanation tonometer.
- Keratometry (Bausch and Lomb) to note the amount of astigmatism and its axis.
- Detailed fundus exam with direct ophthalmoscope and indirect ophthalmoscope.

An informed written consent for the surgical excision of pterygium either with free conventional conjunctival autograft or with amniotic membrane graft was taken along with patient's permission to be part of the study group. The procedure was carried out with meticulous aseptic precautions in the operating room under peribulbar block as follows:-

Group I

It underwent free conventional conjunctival graft.

The pterygium head was taken off the cornea by blunt dissection with a crescent knife. The pterygium was then resected from the underlying sclera. Fibrous adhesions if any, between the underlying muscle and pterygium were carefully dissected before excision of pterygium. Minimal wet field cautery was used to maintain homeostasis. The corneal and limbal surfaces were smoothed by scraping with a Bard Parker blade. After pterygium excision, the eye ball was rotated down and an area of superior bulbar conjunctiva adjacent to limbus, measuring 1 mm greater than the bare sclera was demarcated. Dissection of the conjunctiva without the Tenon's capsule was carried out.

The limbal tissue was not included. The autograft was slid into place over the bare sclera in its correct anatomical orientation and anchored to the

limbus by applying sutures and peripherally to surrounding conjunctiva by 8-0 vicryl sutures.

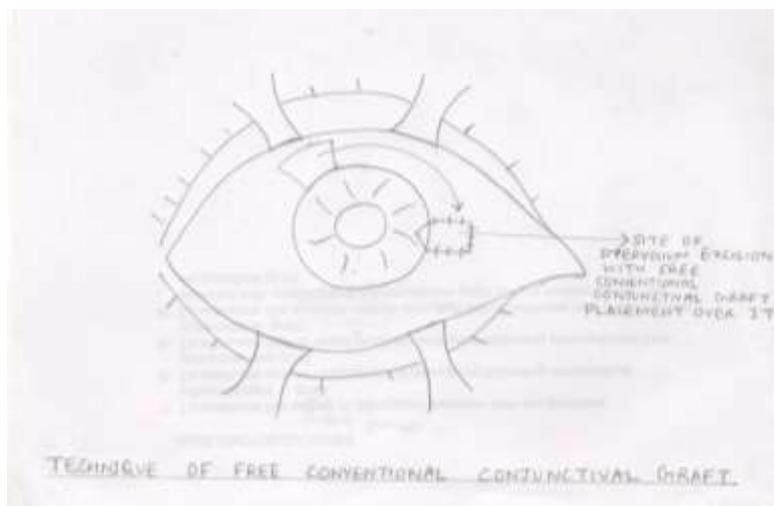


Fig. 1: Technique of free conventional conjunctival graft

Group II

It underwent amniotic membrane graft.

The pterygium head was taken off the cornea by blunt dissection with a crescent knife. The pterygium was then resected from the underlying sclera. Fibrous adhesions if any, between the underlying muscle and pterygium were carefully dissected before excision of pterygium. Minimal wet field cautery was used to

maintain homeostasis. The corneal and limbal surfaces were smoothed by scraping with a Bard Parker blade. Then the amniotic membrane was sutured over the bare sclera. This was followed by further placement of another layer of amniotic membrane over the previous which was sutured to surrounding conjunctiva by 8-0 vicryl sutures and it covered the denuded corneal surface as well.

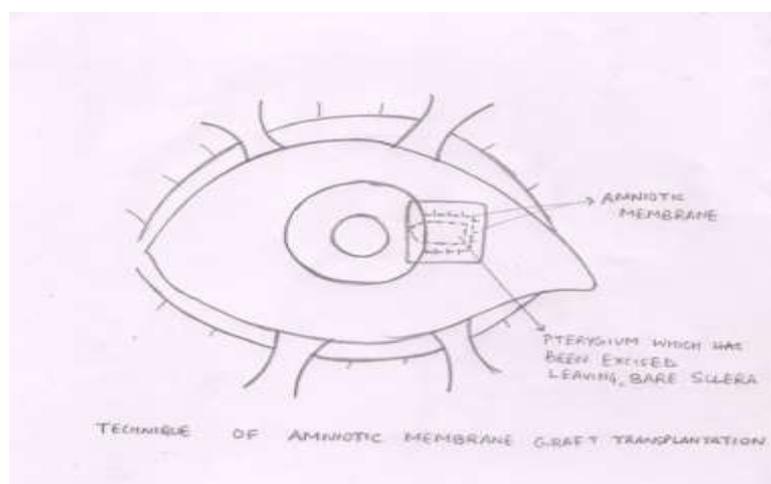


Fig. 2: Technique of amniotic membrane graft transplantation

Pre operative and post operative treatment

Pre operative treatment involved instillation of Moxifloxacin Hydrochloride ophthalmic solution 0.5% w/v eye drops 1 drop 4 times a day for 2 days.

Post operative medications included oral administration of combination of paracetamol and ibuprofen 1 tablet twice daily for 3 days and instillation of Fluorometholone 1 mg/ml eye drops 4 times a day for 2 weeks followed by 3 times a day for

next 2 weeks, Moxifloxacin Hydrochloride ophthalmic solution 0.5% w/v eye drops four times a day for 2 weeks, lubricating 0.5% eye drops 6 times a day for 1 month, lubricating gel (liquid paraffin IP 42.5% and white soft paraffin IP 57.5%) 2 times a day for 1 month.

Follow up

The patient were re-examined on day 2nd, 1 week, 1 month and 3 months post operatively. A

comprehensive ocular examination was done for the patient at each visit keeping particular note of the following parameters:

- Vision
 - Uncorrected visual acuity(UCVA)
 - Best corrected visual acuity(BCVA)
- Keratometry
- Ocular motility
- Conjunctiva
 - Conjunctival hyperaemia
 - Graft edema
 - Graft retraction (if any)
- Cornea
 - Corneal epithelialisation
 - Presence of any haze
 - Corneal vascularisation (if any)
- Sutures
- Post operative infection (if any)

After completion the data was subjected to statistical analysis using Windows SPSS ver. 16.0 software and the results were compared between the three groups. One way ANOVA (Analysis of Variance) test was used for finding whether the results are statistically significant or not.

RESULTS

In this study the mean age of 40 patients was 50.48 years. In males it was 49.48 years and in females it was 44.68 years. By occupation maximum percentage of pterygium was seen among farmer (26.7%) followed by housewife (13.3%). In this study higher percentage of surgery was performed among the age group of 41-50 years.

Out of 40 patients operated, 18 were female and 22 were male. In this study, 20 eyes were operated by conventional graft technique (Group I) and in 20 of the eyes amniotic membrane was used (Group II).

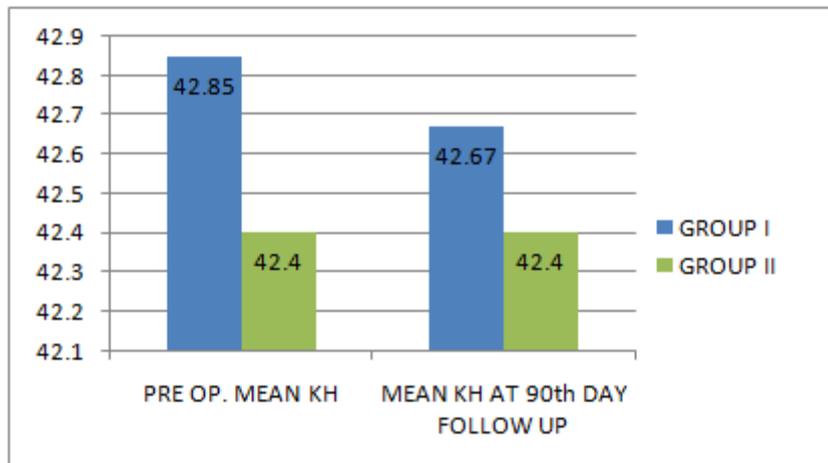


Fig. 1: Comparison of pre operative mean horizontal keratometry with mean horizontal keratometry at 90th day follow up in different groups

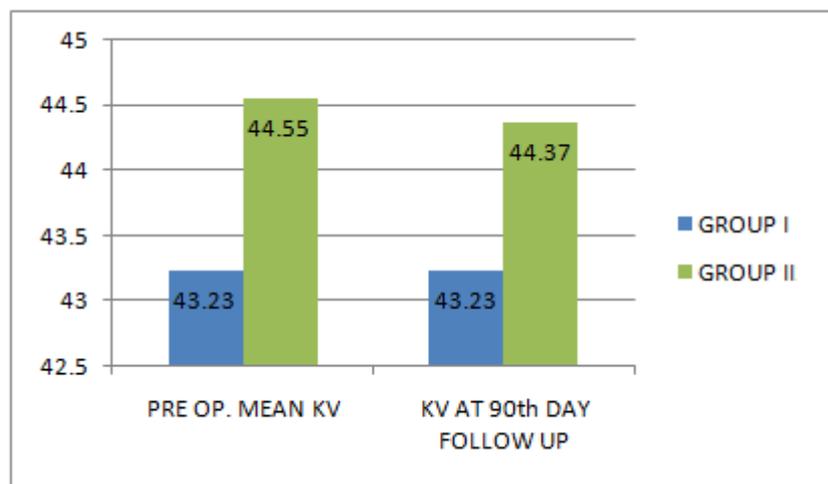


Fig. 2: Comparison of pre operative mean vertical keratometry with mean vertical keratometry at 90th day follow up in different groups

Mean Pre operative astigmatism in

- Group I: K Vertical-K Horizontal= 43.23-42.85=0.38 (with the rule astigmatism).
- Group II: K Vertical-K Horizontal= 44.55-42.4=2.15 (with the rule astigmatism).

Mean Post operative astigmatism at 90th day in

- Group I: K Vertical-K Horizontal= 43.23-42.67=0.56 (with the rule astigmatism).
- Group II: K Vertical-K Horizontal= 44.37-42.4=1.97 (with the rule astigmatism).

The above findings shows that astigmatism has decreased in amniotic membrane group (Group II) which showed improvement of 0.18 D. Astigmatism has increased in conventional group (group I). However statistically it was not significant. In group I $p=0.43$. In Group II $p=0.74$.

DISCUSSION

Pterygium can be described as a fibrovascular membrane advancing on the corneal surface, often triangular in shape, sometimes bilateral and usually originating from the nasal bulbar conjunctiva, but also occasionally from the temporal conjunctiva [3,8]. It is associated with and thought to be caused by ultraviolet light exposure (e.g., sunlight), low humidity and dust. Males are more exposed to outdoor activity so that pterygia are nearly twice as often in men than in women. Geographically, the condition is common in the so-called "pterygium zone" which is confined within a geographical latitude of 40° North and South of the equator [7]. In countries within this area prevalence of upto 22% in the general population has been reported [8]. In countries outside this area reported prevalence rates usually do not exceed 2% of the general population and the lesion affects mostly patients with an increased exposure to solar light, such as people working outdoors [9,10].

Although there is no consensus regarding the pathogenesis of pterygia, epidemiological evidence [11-14], its association with sun-related disorders such as pinguecula and cataracts [15], climatic droplet keratopathy [16] and squamous cell and basal cell carcinomas [17,18], together with in vitro study [19-22], support the concept that UV radiation plays a major role in development of pterygium [23]. Furthermore, the limbal predilection may be explained by the phenomenon of peripheral light focussing, in which incidental light passes through the anterior chamber and is focussed at the distal (nasal) limbus where limbal stem cells (LSCs) reside [24].

The pterygium is composed of several segments

- Fuchs patches (minute grey blemishes that disperse near the pterygium head)
- Stocker's line (a brownish line composed of iron deposits)

- Hood (fibrous non vascular portion of pterygium)
- Head (apex of pterygium, typically raised and highly vascular)
- Body (fleshy elevated portion congested with tortuous vessels)
- Superior edge (upper edge of triangular or wing shaped portion of the pterygium)
- Inferior edge (lower edge of triangular or wing shaped portion of pterygium).

In this study 40 eyes were operated with equal number of eyes in each of the two group.

In this study we found that the improvement in astigmatism was seen in Group II (amniotic). In Group I there was increase in astigmatism after the pterygium excision.

Pterygium may cause flattening of the cornea to the leading apex. An induced astigmatism was explained by several mechanisms: Pooling of the tear film at the leading edge of the pterygium and mechanical traction exerted by the pterygium on the cornea [25].

Mohammad-Salih and co-workers studied the pterygium extension, width and total area and investigated their relationship with corneal astigmatism. Among the 3, an extension had the strongest and the most significant correlation with the astigmatism ($p<.001$, Pearson correlation analysis) [26].

Kampitak concluded that the amount of induced corneal astigmatism and timing for pterygium excision are related to the pterygium size, and reported that 2.25 mm pterygium resulted in astigmatism of 2D, and should be considered in the limits of surgery [27].

Accordingly, Seitz *et al.* concluded that with the size of pterygium from 2.5 mm, the preoperative astigmatism increases, therefore, the authors believed that the surgery should be performed before it reaches beyond this point [28].

In a study by Altan-Yaycioglu *et al.* the astigmatic changes following pterygium excision was compared by 5 different methods. It was found that pterygium results in high corneal astigmatism which decreases to an acceptable level following excision [29].

CONCLUSION

Pterygium cause mechanical traction on the cornea leading to astigmatism. Surgical removal of the pterygium improves the astigmatism.

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