

Changes in Visual Acuity and Keratometry Readings following Pterygium Excision: A Study in A Public Medical College Hospital

Dr. Jewell Ilias Rab¹, Dr. Barna², Dr. Md. Ashiqur Rahman Akanda³, Dr. Debabrata Paul⁴,

Abstract

Introduction: Pterygium is a degenerative, triangular wing shaped, fibro vascular connective tissue of bulbar conjunctiva towards and onto the cornea, leading to significant astigmatism. It is a common ophthalmic condition of tropical and sub-tropical country like Bangladesh where there is dry sunny hot dusty climate. **Purpose:** To find out the change in visual acuity and keratometry before and after pterygium excision and effect of different grades of pterygium on the final outcome. **Methods:** This prospective study was carried out from March 2021 to December 2021 at Ophthalmology Department, Sher-E-Bangla Medical College & Hospital, Barishal. Total 68 patients with different grades of pterygium were operated for pterygium excision with conjunctival autograft and were studied and analyzed. All the eyes underwent detailed ocular examination like visual acuity measured by Snellen's chart; refractive astigmatism measured by automated keratometry and slit lamp biomicroscopy and fundus examination. **Results:** Pterygium is more common in males (61.76%) than females (38.23%) where 45.59% cases were in age group of 31-40 years followed by 33.82% in 41-50 years and rare (2.94%) in more than 60 years; so, 86.76% cases are in the age group of 31-60 years. Preoperatively mean±SD of K1 (Horizontal meridian) was 42.428±1.853 D and 3 month after the surgery it was 42.061±0.563 D. On the other hand mean±SD of K2 (vertical) readings before surgical excision were 44.185± 0.871 D and postoperatively after 3 months it was 42.691±0.384 D. Pre and post-operative BCVA in Grade I pterygium cases were 6/6-6/9 both pre & post-operatively. In patients of Grade II preoperative VA was 6/18-6/36 which was postoperatively 6/12-6/18; in Grade III pre and postoperative VA was 6/24-6/36 and 6/12-6/18 respectively. While in Grade IV pterygium VA were 6/36-6/60 preoperatively and 6/18-6/24 postoperatively. **Conclusion:** We conclude that, the greater the grade of pterygium the lesser is the outcome of visual acuity after surgery; the greater was the change in keratometry reading. It was inferred that, timely and appropriate surgery at Grade II & Grade III can result in not only a good visual outcome but also less complications.

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Introduction

Pterygium is a degenerative, triangular wing shaped, fibro vascular connective tissue of bulbar conjunctiva towards and onto the

cornea^[1], leading to significant astigmatism^[2,3]. Although pterygium has a worldwide distribution, it is more common in dry climates like Bangladesh^[4]. Recent studies suggests that damage to limbal stem cells and activation of matrix metalloproteinase^[5] due to UV rays triggers pterygium occurrence. The prevalence of pterygium is highest in people over 40 years of age and the incidence is the highest between the ages of 20-40^[6].

Furthermore, it can be categorized in 4 types according to the extent of corneal involvement of the pterygium: Grade I pterygium reaching up to the limbus, Grade II reaching midway between the limbus and the pupil, Grade III reaching up to the papillary margin and Grade IV crossing the pupil.

¹ Assistant Professor, Dept. of Ophthalmology, Sher-E-Bangla Medical College & Hospital (SBMC&H),

² Assistant Professor, Dept. of Ophthalmology, SBMC&H

³ Associate Professor, Dept. of Paediatric Ophthalmology, NIO&H

⁴ Associate Professor & Head, Dept. of Ophthalmology, SBMC&H

Address of correspondence:

Dr. Jewell Ilias Rab
Assistant Professor,
Dept. of Ophthalmology, SBMC&H,
Mobile-01718832439, e-mail-jewelrab73@gmail.com

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Decrease in visual acuity due to pterygium can occur due to following cause:

- i. Encroachment of pterygium at papillary area ^[5]
- ii. Astigmatism
- iii. Restriction of medial rectus muscle

Pterygium leads to a considerable effect on corneal refractive status, measured by refraction, keratometry and corneal topography^[2, 7-9]. Such effects increase with the increase in the grade of pterygia.

Indications for surgical excision are; reduced visual acuity, ocular movement disorder, symblepharon, diplopia, chronic inflammation, and cosmetic defect ^[10].

Studies indicate that in the majority of pterygium patients, localized flattening of the corneal curvature usually occurs at horizontal meridian, which results in 'with- the rule astigmatism' ^[11]. However, other studies suggested that in some cases 'against-the rule astigmatism' or 'oblique astigmatism' can also be induced by the pterygium.

Pterygium excision followed by sutureless and gluefree conjunctival autograft can be considered as a better technique to reduce astigmatism, improvement in visual acuity with additional benefit of low recurrence rate, in comparison to other techniques ^[13-15].

We conducted this study to assess the effect of pterygium excision on visual acuity & keratometry changes postoperatively on day 1, week 1, 1 month & 3 month serially.

Methods

This prospective study was carried out from March 2021 to December 2021 at Ophthalmology Department, Sher-E-Bangla Medical College & Hospital, Barishal. A total of 68 patients with different grades of pterygium were operated for pterygium excision with conjunctival autograft and were studied and analyzed.

Any patient undergoing pterygium excision surgery at Sher-E-Bangla Medical College,

Barishal were included in this study. Patients with pre-existing cornea pathology like traumatic or surgical corneal scar or ecstasic corneal disorder, pseudopterygium, recurrent pterygium, patients having some retinal disease affecting vision, pterygium crossing the pupillary margin were excluded. Moreover, patients with recurrent pterygium, history of ocular trauma, blepharitis, keratitis, dry eye, entropion, ectropion, other ocular surface pathologic features and major systemic illness like DM, collagen vascular disease were also excluded from the study.

All the eyes underwent detailed ocular examination like visual acuity measured by Snellen's chart; refractive astigmatism measured by automated keratometry and slit lamp biomicroscopy and fundus examination.

Depending on the extent of pterygium over the cornea pterygium was divided into, Grade I: crossing the limbus, Grade II: halfway between limbus and pupil, Grade III: approaching the pupil edge and Grade IV: central papillary portion.

All surgeries were carried out by a single experienced surgeon. All patients were operated for pterygium excision along with conjunctival autografting and were examined postoperatively for unaided and corrected visual acuity, auto-refractometry and keratometry on postoperative day 1, week 1, month 1 and month 3.

The study adhered with the tenets of the Declaration of Helsinki. The local ethics committee approved the study protocol. Informed consent was obtained from each participant before the enrollment.

Statistical analysis was done using SPSS-26 Software. Frequency and percentage for qualitative data and mean with standard deviation (SD) for quantitative data were used to describe the characteristics of the total sample.

Results

Table 1: Gender distribution of cases (n=68)

Gender	No of patients
Male	42 (61.76%)
Female	26 (38.23%)

Table -1 shows that pterygium is more common in males (61.76%) than females (38.23%).

Table 2: Age distribution of cases (n=68)

Age group (in years)	No of patients
21-30	07 (10.30%)
31-40	31 (45.59%)
41-50	23 (33.82%)
51-60	05 (07.35%)
61-70	02 (02.94%)

Table -2 shows that 45.59% cases were in age group of 31-40 years followed by 33.82% in 41-50 years and rare (2.94%) in more than 60 years.

Table 3: Grading of pterygium according to Yongson^[16]

Grading of Pterygium	No of patients
I. Pterygium invading < 1.5 mm of cornea	05 (7.35%)
II. Pterygium invading < 1 half the radius of cornea	35 (51.47%)
III. Pterygium invading > 1 half the radius of cornea	21 (30.88%)
IV. Pterygium almost reaching the centre of cornea	07 (10.30%)

Table – 3 displays that 5 patients (7.35%) had Grade –I, 35 patients (51.47%) had Grade – II pterygium. 21 patients (30.88%) had Grade –III pterygium while 07 patients (10.30%) had Grade – IV pterygium.

Table 4: Outcomes of pterygium on keratometric values (D) following pterygium excision with autograft

Keratometric values (D)	Preoperative	Postoperative			
		1 day	1 week	1 month	3 months
K1 (horizontal)	42.428±1.853	42.953±0.881	42.372±0.952	42.147±0.790	42.061±0.563
K2 (vertical)	44.185±0.871	43.782±0.634	43.387±1.025	42.818±0.586	42.691±0.384

Table – 4 shows keratometric reading before surgical excision and 1 day, 1 week, 1 month and 3 months post-terygium surgery. Preoperatively mean \pm SD of K1 (Horizontal meridian) was 42.428 \pm 1.853 D and 3 month after the surgery it was 42.061 \pm 0.563 D. On the other hand mean \pm SD of K2 (vertical) readings before surgical excision were 44.185 \pm 0.871 D and postoperatively after 3 months it was 42.691 \pm 0.384 D. Postoperatively mean \pm SD K1 subsequently changed to 42.953 \pm 0.881 D at day 1, 42.372 \pm 0.952 D at 1 week, 42.147 \pm 0.790 D at 1 month, 42.061 \pm 0.563 D at 3 months. Similarly, K2 readings after surgical excision decreased progressively in follow up period; Mean \pm SD at day 1 was 43.782 \pm 0.63 D; 43.387 \pm 1.025 D at 1 week ; 42.818 \pm 0.586 D at 1 months and 42.691 \pm 0.384 D at 3 months.

Table 5: Pre-operative and post-operative (3 months) visual acuity according to grading of pterygium (n=68)

Grading of Pterygium	Number of patients	Preoperative BCVA	Postoperative (3 months) BCVA
I	05	6/6-6/9	6/6-6/9
II	35	6/18-6/36	6/12-6/18
III	21	6/24-6/36	6/12-6/18
IV	07	6/36-6/60	6/18-6/24

Pre and post-operative BCVA in Grade I pterygium cases were 6/6-6/9 both pre & post -operatively. In patients of Grade II preoperative VA was 6/18-6/36 which was postoperatively 6/12-6/18; in Grade III pre and postoperative VA was 6/24-6/36 and 6/12-6/18 respectively. While in Grade IV pterygium VA were 6/36-6/60 preoperatively and 6/18-6/24 postoperatively.

Discussion

Pterygium is a worldwide ocular disease which is particularly more common in tropical and sub-tropical area [17-20]. The development of a pterygium can lead to significant astigmatism. A pterygium usually causes localized flattening central to the apex of the pterygium [21]. Fong et al in 1998 observed that pterygium excision usually induces the reversal of pterygium related corneal flattening [22].

In the present study total 68 eyes of 68 patients including 42 male and 26 females were involved, having the majority of male patients. Similar predominance of male subjects was present in

previous studies[23]. Rural and male preponderance was reported in our study, this is probably because males are exposed more to sun, dust, and wind due to their outdoor works. The results were identical with the earlier study. [18] According to our study, pterygium was most common in 3rd to 5th decade of life. Similar results were reported by Panchpakesam [18] and Gazzard et al [24]. Another study by Youngson also reported that pterygium was more common in middle age group and rare in extreme ages [25].

In the present study, maximum numbers of

patient were of Grade II i.e 35(51.47%), Grade III 21 (30.88%) and Grade II pterygium were 23.07% each while Grade IV were 7(10.30%) & Grade I was 5 (7.35%). Previous studies done by Chourasia et al.^[12] and Shelke et al.^[23] also reported that the majority of patients had Grade II and III pterygium in their study. Younger patients had Grade I pterygium and underwent pterygium surgery for cosmetic purpose.

As pterygium stretches and flattens the cornea in 'horizontal' diameter, so 'horizontal diameter' increases according to the grades of pterygium and the amount of astigmatism increases. Pterygium induced astigmatism is reduced by surgical excision of pterygium. There are various studies with different opinions.^[26]

In our study the preoperative keratometric values in horizontal (K1) and vertical meridian (K2) were 42.428 ± 1.853 D and 44.185 ± 0.871 D, respectively indicating that the vertical meridian is comparatively steeper. Similar findings were observed by Radadia et al.^[11] in their study. Similar to some studies in the literature, in our

study, postoperative VA increased significantly compared to the preoperative level. This increase in VA was observed from postoperative 1st day up to postoperative 1st and 3rd month^[27].

Our study was not without limitations because of its small sample size and lack of fine instrumentations.

Conclusion

We conclude that, the greater the grade of pterygium the lesser is the outcome of better visual acuity after surgery; the greater was the change in keratometry reading. It was inferred that, timely and appropriate surgery at Grade II & Grade III can result in not only a good visual outcome but also less complications.

There was no financial or other conflicts of interest.

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Conflict of Interest: Nothing to declare.

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