

Effect of pterygium surgery by using conjunctival auto graft and amniotic membrane graft on astigmatism and visual acuity

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Abstract

Introduction: Pterygium is known to cause astigmatism which can have significant effect impact on vision astigmatism increases with increasing grades of pterygium and astigmatism decreases postoperatively after pterygium excision. Astigmatism seen in patients with pterygium represents both naturally occurring astigmatism and induced astigmatism. **Aims and Objective:** To study effect of pterygium surgery by using Conjunctival auto graft and Amniotic membrane graft on astigmatism and visual acuity. **Material and Method:** fifty cases of primary pterygium were enrolled in the study and were divided in two groups of 25 patients each. After receiving institutional ethical committee approval and informed consent from patients the study was conducted. Group A patients underwent pterygium excision with conjunctival auto-grafting whereas Group B patients underwent pterygium excision with amniotic membrane grafting. All the patients were followed up postoperatively on 2nd, 7th, 15th, 30th and 6 months. In all the patients, pre operative astigmatism and uncorrected and best corrected visual acuity was measured and compared. Automated keratometry in vertical and horizontal directions was used as method to estimate astigmatism. Calibration scale used was 0.25, as a routine protocol of hospital. **Results:** Mean age of patients in group A was 43.16±12.60 years whereas in group B mean age was 42.48±12.20 years. Mean pre-operative astigmatism of group A and group B patients was 3.21±2.84D and 2.77±1.96D respectively. Astigmatism was reduced to 1.22±1.26D in group A and 1.06±0.73D in group B on day-30. The reduction in astigmatism after surgical procedure on post operative day 30 was statistically significant in both the groups. The mean preoperative UCVA in group A and group B was 0.387±0.208 and 0.444±0.204 respectively. The mean post-operative UCVA on day 30 in group A and group B was 0.561±0.213 and 0.631±0.254 respectively. The post-operative improvement in UCVA on post operative day 30 was statistically significant in both the groups. The mean pre-operative best corrected visual acuity in group A and group B was 0.707±0.261 and 0.820±0.240 respectively. The mean UCVA improved to 0.681±0.179 postoperatively from 0.518±0.158 preoperatively and the mean BCVA improved to 0.950±0.120 postoperatively from 0.874±0.203 preoperatively. The changes in astigmatism, UCVA and BCVA were statistically significant. **Conclusion:** Early intervention in the form of pterygium excision with conjunctival autografting / amniotic membrane grafting, not only gives cosmetic results but effectively prevents progression of pterygium induced Astigmatism and avoids development of visual impairment also. Choice of graft; amniotic membrane graft or conjunctival autograft does not affect results in terms of Astigmatism and visual outcome. **Keywords:** primary pterygium, astigmatism, UCVA and BCVA.

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INTRODUCTION

Pterygium is Greek word known as “Pterygion” meaning wing.¹ However, The term pterygium was introduced to the English language in 1875 by Walton.² It is a degenerative condition of sub-conjunctival tissue which proliferates as vascularised granulation tissue to invade cornea, destroying the superficial layers of stroma and Bowman’s membrane; the whole being covered by conjunctival epithelium.³ The bulbar conjunctiva of the

medial canthus is the preferred site for the pterygium (91%). In case of pterygium physical dimensions are most commonly used as indicator of its status. Clinical appearance of pterygium depends on its stage of growth. A mature pterygium is a raised triangular shaped lesion. Base of pterygium is on paralimbal conjunctiva and the apex points towards centre of cornea.^{1,4} Pterygium is known to cause astigmatism which can have significant effect impact on vision astigmatism increases with increasing grades of pterygium and astigmatism decreases postoperatively after pterygium excision.⁴ Astigmatism seen in patients with pterygium represents both naturally occurring astigmatism and induced astigmatism. It may be incorrect to label the entire astigmatism as induced. We would like to believe that majority of astigmatism seen in our study population was caused by pterygium itself since all patients in our study showed ‘with the rule astigmatism’ preoperatively; while naturally occurring astigmatism can be ‘with the rule’ or ‘against the rule’. Astigmatism, when present post-operatively, was also ‘with the rule astigmatism’. In the present study we tried to study the outcome of two commonly performed surgical procedure viz. Conjunctival auto graft and Amniotic membrane graft after primary pterygium excision.

AIMS AND OBJECTIVE

To study effect of pterygium surgery by using Conjunctival auto graft and Amniotic membrane graft on astigmatism and visual acuity.

MATERIAL AND METHOD

This was a prospective study was conducted in ophthalmology department of Govt. Medical College and Hospital, Aurangabad from November 2001 to November 2013. After receiving the approval from Institutional Ethical Committee the study was conducted. For the purpose of study, patients of varying degree of pterygium reporting to our OPD, fitting in the following inclusion and exclusion criteria were selected.

Inclusion Criteria

- Primary pterygium

Exclusion Criteria

- History of trauma to same eye.

RESULTS

- Other Corneal diseases such as Cornea Dystrophies, Cornea Degeneration or Cornea Opacities.
- Previous Pterygium Excision surgery in same eye.
- Any other ocular surgery in same eye.
- Posterior Segment Anomalies.

Thus with references to above mentioned inclusion and exclusion criteria total fifty patients who were willing to give informed consent for surgery were enrolled into the study. After properly selecting the patients they were randomly distributed in two groups, with 25 patients in each group.

Group A: underwent pterygium excision with conjunctival auto-grafting

Group B: underwent pterygium excision with amniotic membrane grafting

A detailed demographic, ocular, medical and surgical history was taken and recorded on a prestructured proforma. An elaborate ocular examination was performed. All patients were operated on OPD basis. Informed and written consent was obtained from patient. All the surgeries were performed by a single experienced surgeon. Procedure was done under peribulbar anaesthesia. Pterygium excision was done and as per group allotted, either conjunctival autografting or amniotic membrane grafting was done for closure of bare area. Systemic antibiotics and analgesics were given for 3 days post operatively. Next day eye pad removed and slit lamp examination was carried out. Post operatively, dark goggle was advised and topical preparations were given, i.e. steroid antibiotic eye drops in tapering doses for 4 weeks or till inflammation subsides and artificial tear drops. Patient was explained post operative care to avoid dust exposure, rubbing of eyes and was explained regular follow up. Review postoperative examination will be carried out on day- 2nd, 7th, 15th, 30th and 6 months after surgery. In all the patients, pre operative astigmatism and uncorrected and best corrected visual acuity was measured and compared. Automated keratometry in vertical and horizontal directions was used as method to estimate astigmatism. Calibration scale used was 0.25, as a routine protocol of hospital.

Table 1: Age and sex wise distribution of patients

Variable		Group A (n=25)	Group B (n=25)
Age in years	Mean ± SD	43.16 ± 12.60	41.80 ± 12.00
	Sex		
	Male	5 (20%)	11 (44%)
	Female	20 (80%)	14 (46%)

The age of patients in the present study was ranged from 24 to 65 years. Mean age of patients in group A

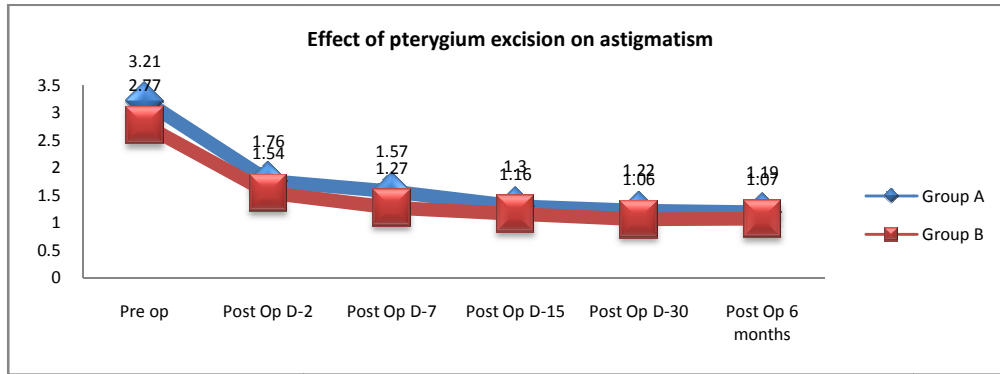
(underwent pterygium excision with conjunctival auto grafting) was 43.16±12.60 years whereas in group B

(underwent pterygium excision with amniotic membrane grafting) mean age was 42.48 ± 12.20 years. There was no statistically significant difference in age of patients among group A and group B. There were 5 males (20%)

and 20 females (80%) in Group A and 11 males (44%) and 14 females (46%) in group B. There was no statistically significant difference in sex distribution among group A and group B.

Table 2: Effect of pterygium excision on astigmatism

Observed on	Group A (n=25) Mean±SD (D)	Group B (n=25) Mean ±SD (D)
Pre op	3.21 ± 2.84	2.77 ± 1.96
Post Op D-2	1.76 ± 1.62	1.54 ± 0.85
Post Op D-7	1.57 ± 1.49	1.27 ± 0.94
Post Op D-15	1.30 ± 1.20	1.16 ± 0.79
Post Op D-30	1.22 ± 1.26	1.06 ± 0.73
Post Op 6 months	1.19 ± 1.25	1.07 ± 0.76



Preoperatively, none of the patients was free of astigmatism in either group. In both groups, no patient had increase in astigmatism postoperatively. Further analysis was done to see for change in astigmatism over a period. For this purpose mean astigmatism in groups was calculated. Mean pre-operative astigmatism of group A and group B patients was $3.21 \pm 2.84D$ and $2.77 \pm 1.96D$ respectively. Both groups were comparable pre-operatively ($p=0.5266$). It was observed that astigmatism

was reduced to $1.76 \pm 1.62D$ in group A and $1.54 \pm 0.85D$ in group B on second post-operative date; which changed over to $1.22 \pm 1.26D$ in group A and $1.06 \pm 0.73D$ in group B on day-30. Astigmatism remained stable over follow ups, with mean astigmatism of $1.19 \pm 1.25D$ and $1.07 \pm 0.76D$ in group A and group B respectively at the end of 6 months post-operatively. Change in astigmatism, as calculated on day 30 post-operatively, was statistically significant in both the groups ($P < 0.0001$).

Table 3: Effect of pterygium excision on mean uncorrected visual acuity (UCVA)

	Group A (Mean±SD)	Group B (Mean±SD)	p-value (unpaired t test)
Pre-op	0.387±0.208	0.444±0.204	0.3281
Post-op D30	0.561±0.213	0.631±0.254	0.2992
p-value (paired t test)	< 0.0001	< 0.0001	

It was observed that the mean pre-operative and post operative uncorrected visual acuity in group A was 0.387 ± 0.208 and 0.561 ± 0.213 respectively and the difference was statistically significant. Similarly in group B, the mean pre-operative and post operative uncorrected

visual acuity was 0.444 ± 0.204 and 0.631 ± 0.254 respectively and the difference was also statically significant. But when comparison was done in group A and B, the observed difference was not statistically significant.

Table 4: Effect of pterygium excision on mean best corrected visual acuity (BCVA)

	Group A (Mean+/-SD)	Group B (Mean+/-SD)	p-value (unpaired t test)
Pre-op	0.707±0.261	0.820±0.240	0.1158
Post-op D30	0.841±0.206	0.881±0.182	0.4710
p-value (paired t test)	< 0.0001	0.0164	

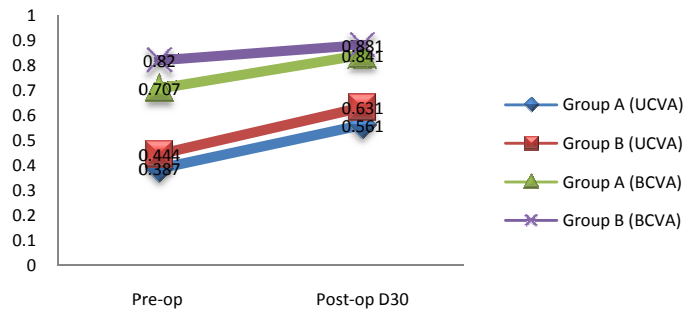
It was observed that the mean pre-operative and post operative best corrected visual acuity in group A was

0.707 ± 0.2618 and 0.841 ± 0.206 respectively and the difference was statistically significant. Similarly in group

B, the mean pre-operative and post operative uncorrected visual acuity was 0.820 ± 0.240 and 0.881 ± 0.182 respectively and the difference was also statically significant. But when comparison was done in group A

and B, the observed difference was not statistically significant. Thus the change in both uncorrected and best corrected visual acuity after pterygium excision was statistically significant in both groups.

Effect of pterygium excision on mean oncorrected and best corrected visual acuity



DISCUSSION

The present study was conducted at Govt. Medical College and Hospital, Aurangabad on 50 eyes of 50 patients with primary pterygium without any other ocular pathology, to determine the surgical outcomes of two commonly used procedures of pterygium treatment, viz; conjunctival autografting and amniotic membrane grafting in terms astigmatism and visual acuity. Mean age of the patients in the study was 43.16 ± 12.60 years in group A, 41.80 ± 12.00 years in group B and over all mean age 42.48 ± 12.20 years. Both the groups were comparable as there was no statistically significant difference in age of patients among group A and group B. (By unpaired students t test, $P=0.6979$). Similar findings were also reported by Dr. Rao S. K. *et al*⁶ (42.7 ± 14.5 years) and Shrestha A. *et al*⁷ (43 ± 7.97 years) in their study. According to Cameron⁸ pterygium affects people living in pre-equatorial regions. The disease affects preferentially adults over the middle age being relatively rare in children; the highest incidence is in fourth decades. So, age profile of our study population was matching with similar other studies. In our study, Group A had 5 males (20%) and 20 females (80%) while group B had 11 males (44%) and 14 females (46%). Statistically both groups were comparable in sex distribution (By Fishers exact test, $P=0.1284$). Thus the female predominance was observed in the present study. Similar findings were also reported by David Hui-Kang Ma, *et al*⁸. In contrary to our findings male predominance was reported by Dr. Rao S. K. *et al*⁶, Lu P. *et al*⁹ and Shrestha A. *et al*⁷. The possible difference may be due to the fact that quite majority of our patients came for treatment cosmetic disfigurement caused by pterygium. Also, as most of the women in our study came from lower socioeconomic class and rural areas; were exposed more to ‘chullah’ smoke and outdoor

work, it may point towards one of the etiological factors in development of pterygium. In our study, automated keratometry in vertical and horizontal directions was used as method to estimate astigmatism. Calibration scale used was 0.25, as a routine protocol of hospital. Preoperatively, no patient was free of astigmatism in either group. Further analysis was done to see for change in astigmatism over a period. Mean pre-operative astigmatism in group A was 3.21 ± 2.84 D and 2.77 ± 1.96 D in group B. Both groups were comparable pre-operatively ($p=0.5266$). It was reduced to 1.76 ± 1.62 D in group A and 1.54 ± 0.85 D in group B on second post-operative date; which changed over 1 month period to 1.22 ± 1.26 D in group A and 1.06 ± 0.73 D in group B on post operative day- 30. Astigmatism remained stable over follow ups, with mean astigmatism of 1.19 ± 1.25 D and 1.07 ± 0.76 D in group A and group B respectively at 6 months post-operatively. Change in astigmatism, from pre-operative to post-operative day 30, was statistically significant in both the groups. ($P < 0.0001$). In a similar study by Maheshwari S⁵, significant improvement in astigmatism was observed post operatively. Another similar study was done by Saleem M I, *et al*¹¹, who observed preoperative astigmatism decreased from 4.32 ± 1.88 D to 2.11 ± 1.96 D postoperatively. Thus the results of the present study were comparable with the above studies. Effect of pterygium excision on uncorrected visual acuity (UCVA) was studied. The mean pre-operative UCVA in group A and group B was 0.387 ± 0.208 and 0.444 ± 0.204 respectively. Both the groups were statistically comparable for preoperative UCVA. The mean post-operative UCVA on day 30 in group A and group B was 0.561 ± 0.213 and 0.631 ± 0.254 respectively. The post-operative improvement in UCVA as on post operative day 30 was statistically significant in

both the groups. Effect of pterygium excision on best-corrected visual acuity (BCVA) was also studied. The mean preoperative best corrected visual acuity in group A and group B was 0.707 ± 0.261 and 0.820 ± 0.240 respectively. Both the groups were statistically comparable for pre-operative BCVA. The mean postoperative best corrected visual acuity on day 30 in group A and group B was 0.841 ± 0.206 and 0.881 ± 0.182 respectively. The post-operative improvement in BCVA as on post operative day 30, was statistically significant in both the groups. Change in both uncorrected and best corrected visual acuity was statistically significant. In a similar study by Maheshwari S⁵ the mean visual acuity preoperatively was 0.53 ± 0.35 D which improved to 0.68 ± 0.34 D ($P = 0.001$) postoperatively. They concluded that, successful pterygium surgery reduces the pterygium-induced refractive astigmatism and improves the visual acuity. Another similar study was done by Saleem M I, *et al*¹¹, they conclude that, In cases with pterygium, early intervention in the form of pterygium excision effectively brings corneal curvature towards normal, thus reducing the amount of refractive cylinder and so leads to an improvement in visual acuity. Development of pterygium induces 'with the rule astigmatism'. Patients of pterygium if left untreated, may develop impairment in vision because of pterygium induced astigmatism or obscuration of visual axis by pterygium. As grade of pterygium increases, the astigmatism increases with parallel drop in visual acuity. Early surgical management of pterygium effectively reduces pterygium induced astigmatism and prevents further visual impairment. Both amniotic grafting and conjunctival autografting are equally effective procedures in the management of primary pterygium with low astigmatism and good visual outcome. Conjunctival autografting, being "autograft," has no issues of availability and extra cost. But patients may have slight discomfort in immediate post operative period owing to exposed donor site. Amniotic membrane grafting is especially useful in patients with diffuse ocular surface disorders and patients requiring large graft size. The superior conjunctiva is salvaged in this procedure can be useful if patient requires glaucoma surgery in future.

However, availability and cost may limit use of amniotic membrane.

CONCLUSION

Early intervention in the form of pterygium excision with conjunctival autografting / amniotic membrane grafting, effectively prevents progression of pterygium induced astigmatism and thus avoids development of visual impairment. Amniotic membrane grafting can be used as a viable alternative to conjunctival autografting.

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