

Effect of Pterygium Excision on Pterygium Induced Astigmatism in Patients Visiting A Tertiary Care Hospital in Jamnagar



Medical Science

KEYWORDS : Astigmatism, Pterygium, Visual acuity, bare sclera.

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ABSTRACT

Objective: to study the impact of pterygium surgery on pterygium induced astigmatism in patients visiting G.G.G Hospital Jamnagar.

Methods: Hospital based study conducted in the Department of Ophthalmology of G.G.G.Hospital, Shri M.P. Shah medical college, Jamnagar during may 2015-april 2016. A total of 25 patients of primary pterygium who underwent pterygium excision surgery using bare sclera technique were studied. Detailed pre-operative and post-operative examination was carried out precisely. The effect of surgery on astigmatism was evaluated 1 month after the surgery and the preoperative and the post operative results were compared.

Type of surgery :hospital based cross-sectional study.

Result: Majority of the patient were from 41 to 65 years of age. There was significant reduction of astigmatism after pterygium surgery. There was significant improvement in visual acuity after pterygium surgery. The mean preoperative refractive cylinder was $3.00 \pm 1.0358D$, which improved to $1.43 \pm 0.6752D$ ($P < 0.0001$) postoperatively. The mean visual acuity preoperatively was $0.3812 \pm 0.1159 D$ which improved to $0.6628 \pm 0.1738 D$ ($P < 0.0001$) postoperatively. The willingness of the patients for pterygium surgery is highest in grade II pterygium (52%) with female preponderance (69.23% out of 13 patients having grade II pterygium). Grade II and III show female preponderance to get pterygium operated (36% of grade II pterygium and 32% of grade III pterygium out of 25 patients). The amount of astigmatism was seen to increase with the grade of pterygium.

Conclusion: The present study verifies that successful pterygium excision surgery reduces the pterygium induced refractive astigmatism and improves the visual acuity.

AIMS AND OBJECTIVE

- To study the effect of pterygium excision on pterygium induced astigmatism.
- To compare pre and post operative changes in astigmatism in pterygium induced astigmatism following pterygium surgery with bare sclera technique.

INTRODUCTION

Pterygium is a degenerative and hyperplastic condition of the conjunctiva in which a wing shaped, vascular, fleshy growth of conjunctiva encroach upon the cornea from either side within the interpalpebral fissure.

Etiology

Its etiology is not definitely known but it is more common in people living in hot climate. It is supposed to be a response to prolonged effect of environmental factors like exposure to u.v. radiation, dry heat, high wind and abundance of dust.

Morphology

A pterygium consists of four distinct parts: the cap, the head, the neck and the body/tail.

- The cap** or leading edge is a flat zone on the cornea that consists mainly of fibroblasts that invade and destroy Bowman's membrane.
- The head** is a vascular area that lies behind the cap and is firmly attached to the cornea.
- The neck** is the constricted part present in the limbal area.
- The body/tail** is the mobile area of the bulbar conjunctiva, which can be easily dissected from the underlying tissue.¹
- Stocker's line**, which is iron deposition in the basal layer of corneal epithelium anterior to the cap, indicates that the pterygium is chronic.

The lesion thus appears as a triangular encroachment of the conjunctiva upon the cornea with numerous opacities lying

deeply in the neighbouring part of the cornea in front of its blunt apex. The thick vascularized conjunctiva appears to be drawn onto the cornea from the canthus and is loosely adherent in its whole length to the sclera, the area of adherence being always smaller than its breadth so that there are folds at the upper and lower borders.

Pathogenesis

A leading theory proposes that UV-B radiation causes mutations in the p53 tumor suppressor gene, thus facilitating the abnormal proliferation of limbal epithelium.²

Histologically, the subepithelial tissue shows senile elastosis (basophilic degeneration) of the substantia propria with abnormal collagen fibers. There is dissolution of Bowman's membrane, followed by invasion of the superficial cornea.

Symptoms

Early in the disease process, pterygia are usually asymptomatic; however, there can be signs of dry eye (such as burning, itching or lacrimation) as the lesion causes irregular wetting of the ocular surface.

As the disease progresses, the lesion increases in size and becomes more apparent to the naked eye and may become cosmetically unpleasant for the patient. Further growth may cause visual symptoms due to induced astigmatism or direct encroachment onto the visual axis.

Pterygium induces astigmatism by various mechanisms:

- pooling of the tear film at the leading edge of pterygium
- mechanical traction induced by pterygium on the cornea.

Treatment

A pterygium is best left alone unless it is progressing towards the pupillary area, causes excessive astigmatism, a restriction of ocular motility or is disfiguring. It can-

not be removed without leaving a scar unless a lamellar corneal graft replaces it. Early in the disease process, physicians often take a conservative approach, limiting therapy to lubricating medications. Since UV radiation is believed to be an important risk factor, the clinician should recommend that patients with early-stage pterygia use proper protective eyewear. A pterygium larger than 3 mm may induce some astigmatism, and intervention may be warranted in such a case. Lesions larger than 3.5 mm (more than halfway to the center of the pupil in a typical cornea) are likely to be associated with more than 1 D of astigmatism and often cause blurring of uncorrected vision.

Surgical techniques. The main challenge to successful surgical treatment of pterygium is recurrence, evidenced by fibrovascular growth across the limbus onto the cornea. Regardless of the technique used, excision of the pterygium is the first step for repair.

The bare sclera technique involves excising the head and body of the pterygium while allowing the bare scleral bed to re-epithelialize. High recurrence rates, between 24 percent and 89 percent, have been documented in various reports.

A conjunctival autograft technique has recurrence rates reported to be as low as 2 percent and as high as 40 percent in several prospective studies. The procedure involves obtaining an autograft, usually from the superotemporal bulbar conjunctiva, and suturing the graft over the exposed scleral bed after excision of the pterygium. Complications are infrequent.

Amniotic membrane grafting has also been used to prevent pterygium recurrence. Researchers have suggested that it is the basement membrane that contains factors important for inhibiting inflammation and fibrosis and promoting epithelialization. A distinct advantage of this technique over the conjunctival autograft, however, is the preservation of bulbar conjunctiva. Amniotic membrane is typically placed over the bare sclera, with the basement membrane facing up and the stroma facing down.

Adjunctive therapies. The high recurrence rates associated with surgery continue to be a problem, and thus adjunctive medical therapies have been incorporated into the management of pterygia.

Mitomycin -c has been used as an adjunctive treatment because of its ability to inhibit fibroblasts. Its effects are similar to beta irradiation. However, the minimal safe and effective dosage levels have yet to be determined.

Beta irradiation has also been used to prevent recurrence, since it inhibits mitosis in the rapidly dividing cells of a pterygium. However, the adverse effects of irradiation include scleral necrosis and melting, endophthalmitis and sectorial cataract formation, and this has prompted physicians to recommend against its use.

MATERIALS AND METHODS:-

In this study we collected data of 25 patients before and after surgery, coming to ophthalmology department of G.G.G.Hospital, diagnosed as having clinically significant pterygium.

Case selection:

Inclusion criteria :-

25 patients of pterygium are to be studied with >1.50 di-

opters WITH THE RULE astigmatism having clear cornea with primary pterygium

Exclusion criteria:

patients with grade I pterygium, recurrent pterygium, pseudopterygium, chemical injury, history of ocular diseases predisposing to ulceration or poor wound healing such as dry eye, rheumatoid arthritis, herpetic keratitis are not included in this study.

Method:

- A thorough examination of this patient, his/her visual acuity, best correctable visual acuity, autorefractometry testing, keratometry were evaluated.
- Postoperative visual acuity, best correctable visual acuity, autorefractometry reading and keratometry readings will be noted.
- We will then compare the preoperative and post operative findings.
- Data was collected over 3-6 months.

Preoperative Snellen’s visual acuity, best corrected visual acuity, pinhole, dilated autorefractometry retinoscopy, keratometry, anterior segment examination, posterior segment examination were carried out. Post operative results were compared one month after the surgery.

All surgeries were performed under local anaesthesia (peribulbar block). “ Bare Sclera” technique is used in the surgery. Removal is effected by seizing the neck near the margin with fixation forceps, raising it and shaving it with 15 no. bard parker knife starting from the apex of pterygia. The pterygium is freed from the sclera and subconjunctival dissection carried out for about half the distance towards the canthus. Two parallel incision is then made with scissors to excise as much of the pterygia as possible. The head of the pterygia is then excised and a bare area of sclera remains at the edge of the cornea.

Depending on the extent of corneal involvement, pterygium is graded as:

- Grade I - crossing limbus
- Grade II - midway between limbus and pupil
- Grade III - reaching up to pupillary margin
- Grade IV - crossing pupillary margin.

Preoperative and postoperative values were compared using the paired t-test. Preoperative astigmatism was compared against the grade of pterygium using one-way analysis of variance.

OBSERVATION AND ANALYSIS

In this study total of 25 patients of age group between 41 to 65 years of both sexes are included

TABLE-1 AGE GROUP OF PATIENTS OF CEREBRO-VASCULAR STROKE

Table 1- Percentage of Pterygium Surgery in both sexes.

Sex	Number	Percentage
Male	08	32%
Female	17	68%

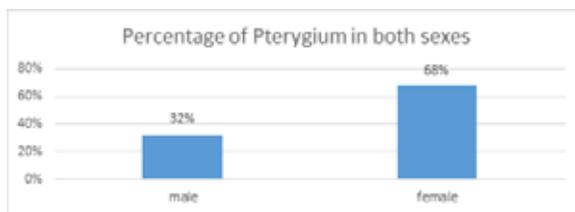
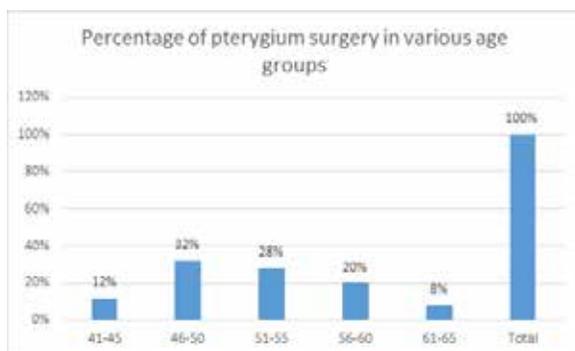


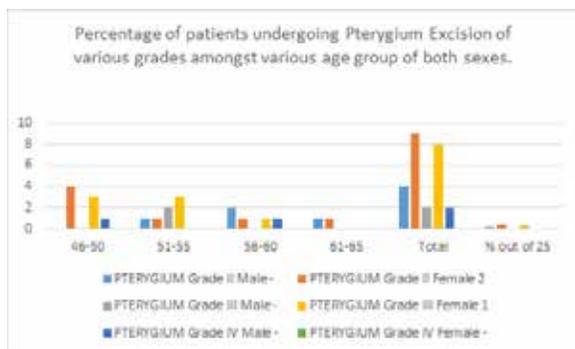
Table 2- Percentage of Pterygium Surgery in various age group of patients

Age (in years)	Number	Percentage
41-45	03	12%
46-50	08	32%
51-55	07	28%
56-60	05	20%
61-65	02	08%
Total	25	100%



Pterygium final table 3- table depicting percentage of patients undergoing pterygium excision of various grades amongst various age group of both sexes.

Age group	PTERYGIUM					
	Grade II		Grade III		Grade IV	
	Male	Female	Male	Female	Male	Female
41-45	-	2	-	1	-	-
46-50	-	4	-	3	1	-
51-55	1	1	2	3	-	-
56-60	2	1	-	1	1	-
61-65	1	1	-	-	-	-
Total	4	9	2	8	2	-
% out of 25	16%	36%	8%	32%	8%	-
Total	52%		40%		8%	



Above table depicts the willingness of the patients of pterygium to get operated in various age groups as well as

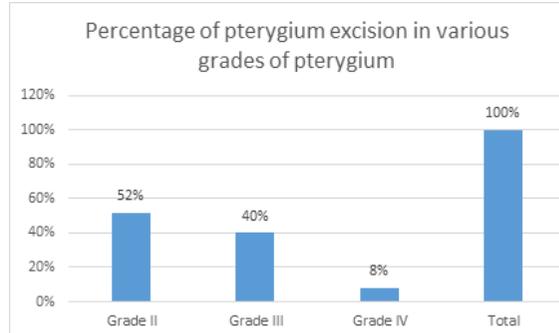
shows the comparison between males and females of different grades of pterygium to get operated. The above table reveals that

the willingness of the patients for pterygium surgery is highest in grade II pterygium (52%) with female preponderance (69.23% out of 13 patients having grade II pterygium).

Grade II and III show female preponderance to get pterygium operated (36% of grade II pterygium and 32% of grade III pterygium out of 25 patients)

Table-4 Percentage of pterygium excision in various grades of pterygium

PTERYGIUM GRADE	Number	Percentage
Grade II	13	52%
Grade III	10	40%
Grade IV	02	8%
Total	25	100%



The above table represents the incidence of pterygium excision in various grades of pterygium. the above study reveals that the incidence of pterygium is highest in grade II pterygium (52%) followed by grade III pterygium (40%).

Table 5- Grade of pterygia and astigmatism

Grade of pterygium	Number of patients	Preop mean astigmatism	Postop mean astigmatism	P value	Preop mean Visual acuity	Post op mean visual acuity	P value
Grade II	13(52%)	2.28D	1.01D	1.508	0.433	0.713	9.786
Grade III	10(40%)	3.37D	1.60D		0.348	0.646	
Grade IV	02(08%)	5.75D	3.25D		0.205	0.415	

Table 6 -Astigmatism and Visual acuity following pterygium excision

	Preoperative mean ±SD	Postoperative mean ± SD
Astigmatism	3.00± 1.0358	1.43±0.6752
Visual acuity	0.3812±0.1159	0.6628±0.1738

RESULTS

Nasal pterygium was present in all 25 cases. The eyes with grade I pterygium were excluded.

Nasal pterygium was present in all 25 cases (Table 1). The eyes with grade I pterygium were excluded. 13 eyes (52%) had grade II pterygia, 10 eyes (40%) had grade III pterygia, 2 eyes (8%) had grade IV pterygia .

The amount of astigmatism varied with the grade of pterygium. Mean astigmatism in eyes with grade II pterygium was 2.28D which improved to 1.01D after pterygium surgery. In eyes with grade III pterygium the mean astigmatism of 3.37D which improved to 1.60D after pterygium surgery. 5.75D of mean astigmatism was noted in eyes with grade IV pterygium which improved to a mean of 3.25 D after pterygium surgery. The amount of astigmatism was seen to increase with the grade of pterygium .

The mean preoperative refractive cylinder was $3.00 \pm 1.0358D$, which improved to $1.43 \pm 0.6752(P = <0.0001)$ postoperatively. The mean visual acuity preoperatively was $0.3812 \pm 0.1159 D$ which improved to

$0.6628 \pm 0.1738 D (P < 0.0001)$ postoperatively .

On comparing pre and post operative astigmatism using Paired t- test following results were obtained:

Mean difference	-1.5700
Standard deviation	0.5426
95% CI	-1.7940 to -1.3460
Test statistics	-14.468
Degress of freedom	24
Two tailed probability	P<0.0001

On comparing pre and post operative visual acuity using Paired t- test following results were obtained:

Mean difference	0.2816
Standard deviation	0.1588
95% CI	0.2160 to 0.3472
Test statistics	8.864
Degress of freedom	24
Two tailed probability	P<0.0001

The following statistical analysis is derived from Medcalc Statistical Software and Microsoft 2007.

SUMMARY AND CONCLUSION

the growth of pterygium mass induces astigmatism which in most of the cases is "WITH THE RULE ASTIGMATISM". Hence only "with the rule" astigmatism were included in this study.

the willingness of the patients for pterygium surgery is highest in grade II pterygium (52%) with female preponderance(69.23% out of 13 patients having grade II pterygium).

Grade II and III show female preponderance to get pterygium operated (36% of grade II pterygium and 32% of grade III pterygium out of 25 patients)

Pterygium excision leads to a remarkable improvement in pterygium induced astigmatism with best results obtained in grade II pterygium followed by grade III pterygium.

As the pterygium encroaches the cornea, a tear meniscus develops between leading edge of the pterygium and the apex of cornea. This tear meniscus leads to flattening of the curvature of the cornea. Mechanical compression by the pterygium mass is also responsible for flattening of the corneal curvature.

Lin et al had reported that pterygium induces a significant degree of astigmatism once it reaches upto 45% of the limbus to the visual axis or within 3.2mm of the visual axis. A similar observation was noted in the present study wherein as the grade of pterygium increases, the astigmatism induced by the pterygium is also increased.

Mean improvement in the visual acuity was noted from $0.3812 \pm 0.1159D$ preoperatively to $0.6628 \pm 0.1738D (P = < 0.0001)$ postoperatively.

The mean preoperative refractive cylinder was $3.00 \pm 1.0358D$, which improved to $1.43 \pm 0.6752D (P = <0.0001)$ postoperatively. These results correlate well with the observations of Sejal Maheshwari and Mohd Yousuf.

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