Journal of Cardiovascular Disease Research
ISSN:0975-3583,0976-2833 VOL13,ISSUE04,2022

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Article type: Original Article

Title: Analysis of astigmatism and the Safety of limbal conjunctival autograft procedure for pterygium - intraoperative and post operative complications and their management

Seema AV[1]* , Shivayogi R Kusagur[2] , Prabhudeva H [3]

[1]Associate Professor, Dept of Ophthalmology, Aakash Medical College,Bengaluru, India

[2]Professor, Dept of Ophthalmology, JJM Medical College, Davanagere, India

[3]Professor & Head, Dept of Ophthalmology, Basaveshwara Medical College & Hospital,

Chitradurga, India

***Corresponding Author and reprint request to:** Dr Seema A V, flat77/1, Govindappa Road

Basavangudi, Bangalore India 560004 Email id: drseemapatil@gmail.com

ABSTRACT

Background: Objective: Evaluation of change in astigmatism following surgery and to study the safety of the limbal conjunctival autograft for pterygium -intraoperative and post operative complications and their management and **METHODS:** The study was conducted in the outpatient and inpatient Department of Ophthalmology, Chigateri general Hospital and Bapuji Hospital attached to J.J.M medical college, Davanagere during the period of September 2001 - March 2004. **RESULTS:** Eight eyes showed donor site hemorrhage, 7 eyes showed episcleral bleeding while suturing the graft,5 eyes showed subconjunctival hemorrhage, all of which resolved spontaneously. 3 eyes showed graft retraction,3 eyes showed buttonholing 2 of which went in for recurrence.3 eyes showed graft vascularisation,1 of which progressed to recurrence. In total ,3 eyes showed recurrence.1 eye developed foreign body granuloma due to irritation to suture material.

Most grafts demonstrated moderate oedema in the first two weeks, with accumulation of a serous yellow tinged fluid, which resolved spontaneously. No sight threatening complications were encountered.

There was decrease in with the rule astigmatism and increase in against the rule astigmatism following pterygium excision due to release of tension on the horizontal meridian of the cornea,thereby steepening the horizontal meridian.

CONCLUSION: Pterygium excision with conjunctival autograft is advantageous because of excellent cosmetic results and very few minor non sight threathening complications. The mean preoperative astigmatism was 1.64 D and the mean postopeartive astigmatism was 1.43 D with reduction of astigmatism by 0.21 D,thereby improving vision following surgery.

KEYWORDS: Safety, Complication, Conjunctival autograft,

INTRODUCTION: Pterygium is extremely common being worldwide in distribution .Incidence is more common in tropical,sub tropical and coastal area. India being a tropical country where heat and dust are an environmental synonym, is an ideal home for pterygia .India forms a part of 'pterygium belt ',as described as Cameron.1

Pterygium could either be progressive when treatment becomes imperative or it could be stationary when it can be left alone except for its cosmetic appearance.the indications for surgery are marked cosmetic deformity,documented progressive growth toward the visual axis ,recurrent discomfort and irritation,loss of visual acuity either because of induced astigmatism or encroachment onto the visual axis,limitations of ocular motility secondary to restriction and neoplastic transformation.

Pterygium excision presents a very challenging task to the ophthalmic surgeon because of its high rate of recurrence following excision .

The more recent of treatment modalities suggested is the conjunctival autografting following pterygium excision. Pterygium excision is generally regarded as a routine procedure mainly performed by residents in training who treat the condition in cavalier fashion, with in some cases poorer results.2

Sivakumar reported a case of desmetocoele following simple avulsion procedure for pterygium .This case illustrates that pterygium surgery may noy not be routine and free from complications .He proposes caution during surgery when severe pterygium is associated with significant stromal disease.3

This study concerns itself with the study of change in astigmatism following surgery and the safety of the technique-intraoperative and post operative complications and their management

MATERIALS AND METHODS: The source of data in this study is from the outpatient and inpatient department of ophthalmology, Chigateri general hospital and Bapuji hospital attached to J.J.M medical college, Davanagere during the period of September 2001 - March 2004. Ethical clearance was obtained from the institutional ethical committee for the present study.

METHOD OF COLLECTION OF DATA: Data was collected on age, sex, domicile in India, past ocular, medical,surgical history(any h/o DM,HTN), indication for surgery, vision,

intraocular presuure, lacrimal sac syringing, Slit lamp examination - location of pterygium - nasal or temporal, progressive/non progressive, extent of encroachment of pterygium onto the cornea. Keratometry, fundus examination, characteristics of pterygia including location, size and extent across cornea by measurement with calipers, type of pterygium and any previous treatment.

Patients were started on antibiotic drops 4th hourly in the eye to be operated, one day prior to surgery.

Anterior segment photography preoperative and postoperative (1st post op day and at 1 ,3 and 6 months following surgery) were taken.

Surgical technique and any intra operative and post operative complications, postoperative medications, post operative cosmesis and any recurrence was studied. Since 97% of recurrences occur during first year of surgery and mostly within 6 months, patients were followed for a minimum period of 6-12 months. Preoperative and postoperative keratometry was performed and compared.

INCLUSION CRITERIA

All adult,,otherwise healthy patients ,who came to hospital with primary or recurrent pterygium and are willing to come for regular follow up for a period of 6-12 months were included in this study .

EXCLUSION CRITERIA

- One eyed patients
- Poor patient compliance -not willing to come follow up
- H/O previous ocular surgery which disturbs the integrity of the conjunctiva at the limbal area.
- Patients with open angle glaucoma ,as the superior conjunctiva should not be disturbed which may affect the success of future glaucoma surgery

PROCEDURE OF LIMBAL- CONJUNCTIVAL AUTOGRAFTING

- Peribulbar block/ topical anaesthesia was chosen based on patients level of cooperation
- A wire speculum was used to separate the lids
- Superior rectus bridle was passed to enable to rotate the globe in the desired direction
- A small vertical incision of conjunctival depth was made at the neck of the pterygium

and the conjunctiva over the body of the pterygium was undermined progressively in a triangular fashion towards caruncle,inferior and superior fornix using extension scissors after tenting up the conjunctiva.

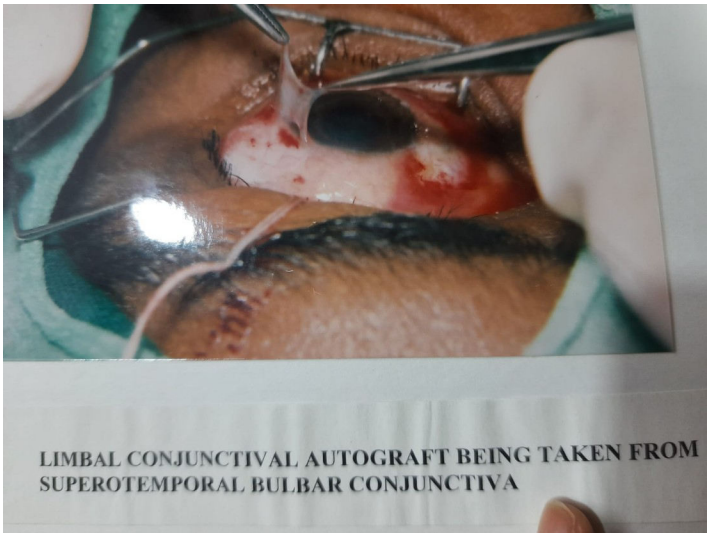
- The extension scissors was passed underneath the neck of the pterygium and cut vertically separating the head from the body of the pterygium .Now the pterygium was held with a toothed forceps and dissected upto the caruncle (taking care not to damage the insertion of tendon of medial rectus muscle) and is cut and removed .

- The cut end of the stump recedes back into the orbit.

- The bare sclera uncovered was cauterised with wet field bipolar cautery for bleeding vessels

- The head of the pterygium was sheared off the cornea in a circular fashion ,using capsulotomy forceps(Avulsion procedure).

- The bare sclera was resurfaced with limbal conjunctival autograft harvested from superotemporal bulbar conjunctiva and sutured with 10-0 vicryl sutures ,maintaining limbus to limbus orientation.Care was taken not to include tenons capsule in the graft and avoiding any buttonholing of the graft.

- 

Post-operatively the patients were started on

- Topical antibiotic -steroid eye drops 4 times a day

- Tear substitutes 4 times a day

- Steroids were stopped after a variable period of 4-6 wks depending on the patient's condition and tear substitutes were continued.

ISSN:0975-3583,0976-2833 VOL13,ISSUE04,2022

Post operatively the patients were evaluated with respect to

- Visual acuity
- Condition of the graft(retraction, chemosis, hemorrhage, congestion)
- Condition of the donor site
- keratometry(post op K1 and k2)
- Presence or absence of recurrence at 1 mth,3 mths,6 mths, 9 mths and 1 yr.

RESULTS: A total number of 40 cases were studied and followed for a minimum period of 6-12 months. Our study showed maximum incidence of pterygium between the age group of 21-40 years (60 %) . . The mean age of presentation was found to be 38.5 years

The youngest patient with pterygium reported in literature were a girl of 14 years and a boy of 15 years , the latter having bilateral lesions.

Of the 40 cases studied, 14(35%) were male patients and 26 (65%) were female patients. Majority (65%) of the patients with pterygium were outdoor workers.

In this study comprising of 40 cases ,19 patients (47.5%) presented with complaints of recurrent redness,13 patients (32.5%) presented with both recurrent redness and cosmetic problem,7 patients (17.5%) with cosmetic problem alone and 1 patient (2.5%) with foreign body sensation .

Table 1: Complications

Complications	**No. of Cases**
Donor site haemorrhage	8
Episcleral bleeding	7
Subconjunctival haemorrhage	5
Graft retraction	3
Buttonholing	3
Recurrence	3
Graft Vascularisation progressing to recurrence	1
Foreign body grunuloma	1

Most grafts demonstrated moderate oedema in the first two weeks, with accumulation of a serous yellow tinged fluid, which resolved spontaneously. No sight threatening complications were encountered.

ISSN:0975-3583,0976-2833 VOL13,ISSUE04,2022

Eight eyes showed donor site hemorrhage, 7 eyes showed episcleral bleeding while suturing the graft,5 eyes showed subconjunctival hemorrhage, all of which resolved spontaneously.

3 eyes showed graft retraction, no active treatment was instituted and the exposed area epithelized adequately on follow up without compromising surgical or cosmetic results.

3 eyes showed buttonholing 2 of which went in for recurrence.

3 eyes showed graft vascularisation,1 of which progressed to recurrence.

In total ,3 eyes showed recurrence. Of the 3 eyes which showed recurrence, 2 eyes had buttonholing .

1 eye developed foreign body granuloma due to irritation to suture material.

Minor complications like limbal epithelial cyst occurs frequently with conjunctival autograft which may be caused by embedded conjunctival epithelium under the graft or recipient bed.

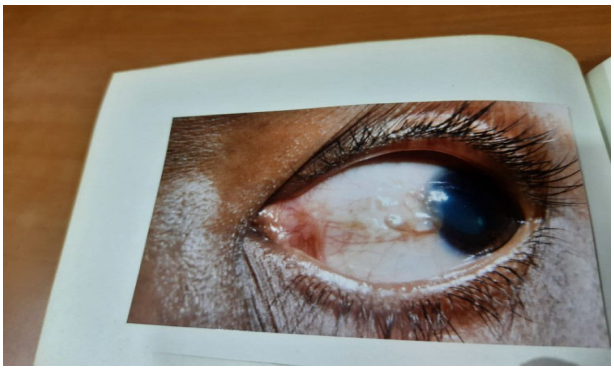


Fig 2: inclusion cyst formation one week post Operative

None of our patients intraoperatively had inadvertent corneal perforation,injury to medial rectus muscle, or loss of orientation/flipping of graft.

All complications mentioned were minor and did not require any intervention except for suture removal in case of foreign body granuloma. Satisfactory postoperative cosmesis was achieved in all eyes.

Table 2: Visual outcome

Vision	**Preoperative**		**Postoperative**	
	No. of Cases	**Percentage**	**No. of Cases**	**Percentage**
6/6 (6/6P, 6/5, 6/5P)	9	22.5	22	55
6/9 – 6/18	24	60	15	37.5

6/24 – 6/36	7	17.5	3	7.5

On comparing visual acuity preoperatively and postoperatively, it is observed that the percentage of cases with 6/6 vision increased from 22.5% preoperatively to 55% postoperatively.

60% of cases had vision in the range of 6/9 - 6/18 preoperatively which decreased to 37.5 % post operatively

17.5 % of cases had vision in the range of 6/24- 6/36 preoperatively which decreased to 7.5 % postoperatively.

In conclusion, there was improvement in vision following surgery.

Table 3: Evaluation of astigmatism

Type of astigmatism	**No. of Patients (%)**	
	Preoperative	**Postoperative**
WTR	33 (82.5%)	33 (82.5%)
ATR	7 (17.5%)	7 (17.5%)

IN this study consisting of 40 patients,33 patients(82.5%) had astigmatism with the rule and 7 patients (17.5 %) had astigmatism against the rule .pterygium causes with the rule astigmatism of about +0.75 to +1.5 D.The astigmatism is caused due to

a. Pooling of tear film at the leading edge of the pterygium.
b. Mechanical traction exerted by pterygium on the cornea,causing flattening of horizontal corneal curvature.

Table 4: Analysis of preoperative astigmatism

Astigmatism (keratometer) Type	In Dioptres	No. of Cases	Percentage
WTR	0 – 0.5 0.5 – 1 1 – 2 2 - 3	5 2 14 12	12.5 5.0 35.0 30.0
	Total	**33**	**82.5**
ATR	0.5 – 1 1 – 2	3 2	7.5 5.0

	2 – 3	2	5.0
	Total	**7**	**17.5**

In this study of 40 patients, those with astigmatism with the rule were divided into 4 categories: 12.5% had 0- 0.5 D ;5% had 0.5- 1 D ; 35 % had 1- 2 D ; and 30 % had 2 -3 D of with the rule astigmatism.

Those with astigmatism against the rule were divided into 3 categories: 7.5 % had 0.5- 1 D; 5 % had 1 -2 D ; 5 % had 2-3 D of against the rule astigmatism.

Table 5: Analysis of postoperative astigmatism

Astigmatism (keratometer) Type	In Dioptres	No. of Cases	Percentage
WTR	0 – 0.5 0.5 – 1 1 – 2 2 - 3	11 7 12 3	27.5 17.5 30.0 7.5
	Total	**33**	**82.5**
ATR	0 – 0.5 0.5 – 1 1 - 2 2 – 3	1 1 3 2	2.5 2.5 7.5 5.0
	Total	**7**	**17.5**

In this sudy of 40 patients ,our analysis of postoperative astigmatism showed that 27.5 % had 0-0.5 D ;17.5 % had 0.5 - 1 D ;30 % had 1-2 D ;7.5 % had 2-3 D of astigmatism with the rule .

This shows that the number of patients with 0-1 D WTR astigmatism increased from 17.5 % preoperatively to 45 % postoperatively and those with 1 -3 D of astigmatism decreased from 65 % preoperatively to 37.5% postoperatively demonstrating an effective decrease in with the rule astigmatism following surgery.

All 7 patients with against the rule astigmatism continued to have the same postoperatively.

Those with 0-1D against the rule astigmatism decreased from 7.5% preoperatively to 5% postoperatively.
Those with 1-2D against the rule astigmatism increased from 5.0 % preoperatively to 7.5% postoperatively.

The number of patients 2-3D against the rule astigmatism remained the same.
This shows that the amount of astigmatism against the rule increases after surgery in each patient.

Table 6: CHANGE OF ASTIGMATISM FOLLOWING SURGERY

Type of astigmatism	**Astigmatic error (average in D)**		**Difference in astigmatism**
	Preoperative	**Postoperative**	
WTR	1.66	0.94	0.72
• ATR	• 1.54	• 1.92	• 0.38

The average pre operative with the rule astigmatism was 1.66 D and post operative value was 0.94 D with reduction in astigmatism by 0.72 D .this shows that there was reduction in With the rule astigmatism following pterygium excision due to release of tension on the horizontal meridian of the cornea.

- The average preoperative value of astigmatism against the rule was 1.54D and the postopertive value was 1.92 D. There was as increase in astigmatism by 0.38D. This is due to steepening of the horizontal meridian following pterygium excision, which increases astigmatism with the rule.

- The mean preoperative astigmatism was 1.64D and the mean postoperative astigmatism was 1.43D with reduction of astigmatism by 0.21D..

DISCUSSION: As per the results of our study, the mean age of presentation was 38.5 years . Though male preponderance is documented as per literature, our study observed majority of the patients (65%) in the female category, which may be due to the fact that 32% of the patients came with the complaint of cosmetic disfigurement. But Hilgers found no sex bias in his 1959 study of pterygium on the Island of Aruba. 4

Majority of the patients (60%) were outdoor workers. The increased exposure to dust, winds and heat in outdoor workers causes evaporation of tear film leading to drying of epithelium and increased vulnerability to damage by ultraviolet light.

Majority of the patients(47.5%) presented with complaints of recurrent redness while 32.5% of patients complained of both recurrent redness and cosmetic disfigurement .17.5% patients came for cosmetic disfigurement alone while 2.5 % patients complained of foreign body sensation.

Majority of the patients (51 eyes) had nasal pterygium in accordance with the literature documentation of nasal preponderance of pterygium.

No sight threathening complications were observed. Most grafts demonstrated moderate oedema

in the first two weeks, which resolved spontaneously.

8 eyes showed donor site haemorrhage,7 eyes episcleral bleeding,5 eyes subconjunctival haemorrhage,3 eyes graft retraction,3 eyes graft vascularisation,3 eyes recurrence,1 eye graft vascularisation progressing to recurrence,1 eye foreign body granuloma. All complications mentioned were minor and did not require any intervention except for suture removal in case of foreign body granuloma .

All eyes acheived satisfactory post operative cosmesis.

On comparing visual acuity preoperatively and postoperatively, it was observed that the percentage of cases with 6/6 vision increased from 22.5 % preoperatively to 55% postoperatively.

60% of cases had vision in the range of 6/9 -6/18 preoperatively which decreased to 37.5 % postoperatively.

17.5% of cases had vision of 6/24 -6/36 preoperatively which decreased to 7.5 % postoperatively.

In conclusion, there was improvement in vision following surgery.

The mean preoperative astigmatism was 1.64 D and the mean postoperative astigmatism was 1.43 D with reduction of astigmatism by 0.12 D .This is due to the release of tension by pterygium on the horizontal curvature of cornea.

The vision in patients with pterygium may be reduced either due to direct invasion of the visual axis or astigmatism induced by pterygium .pterygium surgery when successfully performed reduces the pterygium induced refractive astigmatism and improves visual acuity.

Conjunctival autografts do not have propensity for such long term complications such as scleral melting sometimes seen after mitomycin c usage in pterygium surgery .Disadvantages with this surgery however, include the need to use an operating microscope, the need for greater surgical skill with a distinct learning curve,and surgical disturbance of superior bulbar conjunctiva. Concerns exist about the outcome of future filtering surgery in such eyes. 5,6 .Hence our study excluded patients with open angle glaucoma.

Conclusion: Pterygium excision with conjunctival autograft is advantageous because of the low recurrence rate,excellent cosmetic results and few minor non sight threathening complications. Minor complications like limbal epithelial cyst occurs frequently with conjunctival autograft which may be caused by embedded conjunctival epithelium under the graft or recipient bed. Technically the procedure is straightforward ,does not require any special equipment or intra or postoperative use of potentially toxic medications such as mitomycin c ,Thiotepa for an essentially benign condition.Even though the procedure is tedious and requires operating

microscope, the merits outweigh the demerits and hence should be preferred method of surgery for effective management of pterygium.

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