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ORIGINAL ARTICLE

STUDY OF INFERIOR LIMBAL CONJUNCTIVAL AUTOGRAFT FOR PRIMARY PTERYGIUM

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ABSTRACT: Pterygium is triangular sheet of fibrovascular tissue enchroaching on the cornea which is disturbing to patient for sight and the surgeon for its recurrences. **AIM**: 1) To study the recurrence following Inferior Limbal Conjunctival Autograft in cases of primary pterygium. 2) To study change in astigmatism following Inferior Limbal conjunctival autograft. **MATERIAL AND METHODS**: 30 consecutive patients from September 2012 to September 2013 presenting with primary pterygium were screened and randomly selected in the ophthalmology OPD at Sri Siddhartha Medical College, Tumkur and were operated. Patient with recurrent, double headed and complicated pterygium were excluded. The patients were evaluated for 1 year after the surgery. **OBSERVATION**: In our study 63% of the patients were outdoor workers and 70% were males. Post- operative 53.33% patient had improvement in vision and 33.33% had stabilization of visual acuity. Self-Limiting graft oedema was the commonest complication in post-operative period. At the end of 1 year 53.33% patient had change in astigmatism and 40% patient showed stabilization of astigmatism. We had 6.66% cases of recurrence at the end of 1 year. **CONCLUSION**: Thus in our study we conclude that use of Inferior Limbal Conjunctival autograft in a primary pterygium can prevent recurrence and provide acceptable outcome at the primary surgery with no sight threatening complication. This can be the procedure of choice in patients who are glaucoma suspects and patients with recurrence after a superior conjunctival autograft.

KEYWORDS: Pterygium, autografts, recurrence and astigmatism.

INTRODUCTION: Since the days of susruta, the world's first ophthalmic surgeon pterygia is known as a triangular sheet of fibro vascular tissue which appears on conjunctiva disturbing the patient for its appearance and the surgeon for its tendency to reoccur.

Causative factors are increased light exposure, dust, dryness, heat and wind. The pterygium belt extend 35 degrees north and 35 degree south.[1]

Several surgeries were suggested like pterygial head transplantation, conjunctival flap, autografts, amniotic membrane transplantation but successful management of pterygia is constant challenge to the ophthalmologists due to high recurrence rate (2.1 to 8.7%).[2]

Meta- analysis comparing the pterygium recurrence after various surgeries by Zhengh K, Cai J, Jhanji V et al showed Limbal Conjunctival Autograft was having lower recurrence compared to bare sclera and bulbar conjunctival autograft.[3]

Conjunctival autograft is considered as the effective method to combat recurrence, the superior conjunctiva has long been advocated as a source of the conjunctival flap or graft, while the inferior conjunctiva has been suggested for this purpose only more recently.[4, 5]

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We have tried to study the procedure of inferior conjunctival, autograft for all primary pterygia, by randomly selecting patients attending the Ophthalmology OPD, at Sri Siddhartha Medical College, Tumkur.

Inferior limbal conjunctival autograft Rao SK, Wong AK – Studied the safety and efficacy of inferior of conjunctival autograft in surgical treatment of recurrent pterygium and recorded a recurrence of 18.2% after a follow up of 16.2 months.[6]

Kim reported a 5.6% recurrence rate over a mean follow-up period of 20 months in patients treated with his inferior conjunctival flap rotation technique for primary pterygium.[7]

Syam reported a 3.3% recurrence rate over a mean follow-up period of 27.3 months.[8]

These reports suggest that the inferior conjunctiva and superior conjunctiva are equally useful graft sources associated with comparable recurrence rate.

MATERIALS AND METHODS: 30 consecutive patients from September 2012 to September 2013 presenting with primary pterygium were screened and randomly selected in the ophthalmology OPD at Sri Siddhartha Medical College, Tumkur and were operated for pterygium excision and inferior limbal conjunctival autograft after informed consent. The procedure used in this study was in accordance to the tenets of Deceleration of Helsinki and an informed consent was obtained.

All patients in the age group 20-80 with primary pterygium and moderate enchroachment on the cornea were included in the study and were subjected to visual acuity testing, slit lamp examination, fundus examination, refraction and keratometry.

Patients with recurrent pterygium, double headed pterygium, complicated pterygium and symblepheron were excluded.

The patients were evaluated post operatively at day 1, 1week, 4 week, 12 week, 24week, 32week and 52 weeks. Visual acuity, Slit lamp examination for graft evaluation, keratometry and refraction was done during post-operative visits.

OBSERVATION AND DISCUSSION:

Age group affected	**No. of Patients**
20 - 40 years	08(26.66%)
40 – 60 years	19 (63.33%)
60 – 80 years	03(13.33%)
Gender Distribution	**No. of Patients**
Males	18(60%)
Females	12(40%)
Site Distribution	**No. of Patients**
Nasal	21(70%)
Temporal	09(30%)
Working Pattern	**No. of Patients**
Outdoor	19(63.33%)
Indoor	11(36.66%)

Table 1: Demographic features of the Patients

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In our study working age group males who were outdoor workers were maximally affected with nasal pterygia. Thus in countries which fall in pterygial belt, most of outdoor workers are exposed to U.V radiation and are prone to pterygium formation.[1]

Types of Astigmatism	Cases
With the rule astigmatism(WTR)	19(63.33%)
Against the rule Astigmatism (ATR)	08(26.66%)
Neutral	01(3.33%)
Inconclusive	02(6.66%)

Table 2: Presentation of pterygia with types of astigmatism (n= 30)

When the vertical meridian of astigmatism is more myopic than the horizontal, it is called with the rule astigmatism and in against the rule, it is more hypermetropic.

Out of 26.66% patient who had against the rule, 1 patient had operated pseudophakia with scleral tunnel scar. In 2 patients the astigmatism could not be calculated due to severe corneal encroachment.

Corneal Encroachment	Visual acuity			
	6/9 - 6/6	6/12 - 6/24	6/60 - 6/24	< 6/60
1—2 mm	3	3	2	0
2—3 mm	3	4	5	3
≥ 4mm	0	0	3	4
Total	6(20%)	7(23.33%)	10(33.33%)	7(23.33%)

Table 3: Pre-operative visual acuity in Comparison to Corneal Encroachment

For the purpose of applying chi-square test, data in 2nd and 3rd row and 1st and 2nd column are clubbed.

Most patients had visual acuity between 6/24 to 6/60 and relation between visual acuity and corneal encroachment was not statistically significant on applying chi-square test, X^2=2.57, OR =6.43, 95% CI = 0.85-62.7, P=0.935.

Patients with lesser corneal encroachment had better visual acuity; however our study does not consider cataract, pseudophakia, and other pathologies which contributed to low vision.

Pre-Operative corneal encroachment in mm	Visual Acuity			
	6/9 - 6/6	6/12 – 6/24	6/60 – 6/24	< 6/60
1.5 - 2 mm	5	1	1	0
2 - 3 mm	3	6	2	3
≥ 4 mm	0	3	4	2
Total	**8(26.66%)**	**10(33.33%)**	**7(23.33%)**	**5(16.66%)**

Table 4: Post-operative Visual Acuity Outcome

Post op visual acuity was improved by 1 to 4 lines on snellen's visual acuity chart in 53.33% cases, 33.33% showed stabilization of vision.

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Cause for improvement was decrease in astigmatism, clearing of visual axis, regular and a stable tear film. Thus 96.66% patients showed stabilization of vision post-operative. In our study 56.66% patients had a change in astigmatism.

1 patient had reduced visual acuity due to dellen formation which improves to pre op levels at the end of 4 visits.

Complications	Cases
Graft Oedema < 2 weeks	20(66.66%)
Graft Retraction	01(3.33%)
Infective Scleral Necrosis	0
Non Infective Scleral Necrosis	01(3.33%)
Corneal dellen	01(3.33%)
Sutural Granuloma	01(3.335)
Sub-Tenons Granuloma	0
Giant pappillary Conjunctivitis	0
Symblepheron	0
Donor Bed Scarring	0
Donor Site Limbal Stem cell Deficiency	0

Table 5: Long Term Complications Following Limbal Conjunctival Autograft

Graft oedema less than 2 weeks was the commonest complication seen in 66.6%.

Non-infective scleral necrosis presented 2 week after surgery was seen in 1 (3.33%) case, this patient presented with pain, watering, photophobia and had a pale white graft on examination and tenderness. Swabs taken were negative recovered after 2 weeks with oral prednislone. At the end of 6 weeks, patient came with a recurrence.

Complaints	Cases(n=30)
Pain	5(16.66%)
Watering	10 (33.33%)
Foreign body sensation	15 (50%)
Visual blurring	0

Table 6: Commonest first post-operative day complaints

In our study 50% patients had foreign body sensation as the complaint on 1st post op day due to graft and sutures.

Keratometry shift	No. of Patients (n=30)
Change in keratometry	16 (53.33%)
Stable keratometry	12 (40%)
Recurrences	**No. of Patients (n=30)**
Recurrence of pterygia	02 (6.66%)
No recurrence of pterygia	28 (93.33%)

Table 7: Results at the end of 12 months

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There was change in keratometry with improvement and stabilization of vision in 53.33% patients. 40% showed no change in keratometry but stabilization of vision was seen in some of them due to other reasons.

2 patients who had severe corneal encroachment, keratometry could not be determined pre-operative. Keratometry change was evaluated using Baush and laumb keratometer, and not vector analysis. Most of our patients showed 0.25 to 1 diopter change in Keratometry.

In our study we had 2 recurrences, one patient had lost follow up and was non-compliant with treatment, on follow up he came with a recurrence of growth. 2nd patient with recurrence was the patient who had non -infective sclerokeratitis.

DISCUSSION: Pterygium is a constant challenge to the ophthalmologist due to high recurrence rate (2.1 to 8.7%).[2] The recent concept is that pterygium is a local Limbal stem cell deficiency and pterygium recurrence can be reduced if stem cells are included in the conjunctival autograft. Pterygium tissue shows increased abnormality in DNA repair as a result of UV radiation as seen by high incidence of microsattelite instability and heterozygosity.[9,10]

The recent studies have shown the increased DNA repair as a result of U.V radiation as seen by high incidence of microsattelite instability/heterozygosity in the limbal area.[9,10]

Recurrent pterygia shows over expression of P53 tumour suppressor gene that acts as a transcription factor to activate or repress the expression of growth controlling genes, thus explaining the findings in recurrent pterygia.[9, 10]

We observed in our study that the working age group between 40-60 year males, who were outdoor workers, was more affected.

A study by Srinivas Rao, Lekha T et al showed mean age group, for pterygium as 42.7±14.5 years, with preponderance up to 74.5% cases in males and 45.4% in females.[11]

The Epidemiological Study in middle age by Shu Fang et al[12] in 2006 showed male prevalence up to 59.41% and 48.65% in females.

The scattered light incident on the nasal limbus with peak intensity > 20 times, damage the nasal limbus cells more, leading to nasal side preponderance of pterygium compared to temporal pterygium.[13, 14]

Pterygium causes a mechanical pull along the direction of its growth and induces with the rule astigmatism.

In our study 63.33% patient had with rule astigmatism and 26.66%patient against the rule, of which 1 patient had operated pseudophakia with sclera tunnel scar. In 2 patients the astigmatism could not be calculated due to severe corneal encroachment.

In our study 96.66% patients had improvement and stabilization of visual acuity in the post-operative period. The improvement of visual acuity was due to improvement or stabilization of astigmatism, clearing of visual axis, stable tear film.

In our study 56.66% had a change in astigmatism, 1 patient had reduced visual acuity due to dellen formation which improved at end of 4 weeks.

In a study by Srinivas Rao et al[11] 43.4% eyes had improvement and 52.8% had maintained their visual acuity, thus 96.2% patients had stabilization of vision.

Our operative protocol of marking the limbal edge of the graft avoided graft inversion in our study.

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Figuerdo RS et al[15] used to mark the anterior surface of the graft, to prevent inversion. Commonest post-operative complain was graft oedema lasting less than 2 weeks, which was self-limiting Minimal graft retraction was seen which used to get self epithelised.

Non-infective sclerokeratitis was seen in 1 case, which responded to oral steroids of 40mg/day along with topical steroids. It resolved in 1 week, but recurrence of pterygium was seen at end of 6 weeks.

Similar case was reported by Sridhar Ashish et al[16] following conjunctival autograft in a 55year old, they managed by re-grafting with amniotic membrane graft, but the sclerokeratitis recurred and eventually responded to oral steroids.

Post- operative dellen formation was seen in 1 patient, due to excessive subepithelial fibrosis in the graft adjacent to the cornea and irregular pooling of tear film and graft elevation was noticed.

This condition improved with patching and tears supplementation, but the astigmatism in this patient persisted.

Similar results seen in a study by Rao Srinivas, LekhaT et al.[11]

The commonest post-operative complain in our study was pain due to the sutures, seen for 1 week. A study by John Hovanesan et al[17] showed that 38% of sutured cases complained of pain as against only 4% of fibrin glue group had such complain. Hence they concluded that fibrin glue reduced both pain and foreign body sensation following limbal conjunctival autograft.

The change in keratometry in our study was evaluated by change in curvature pre and post-operative on Baush and Laumb keratometer and not by vector analysis, showed 0.25 to 1 diopter of change in our patients. In a similar study by Maheshwari et al[18] in 2003 regarding effect of pterygium surgery on astigmatism showed that the vision reduction in pterygium is due to a) direct invasion of visual axis b) Induced astigmatism c)pooling of tear film at the pterygium edge and d) mechanical traction by the pterygia. They quantified the abnormality by keratometry, topography and change in refraction.

They documented a change in refractive cylinder of about 4.6 ± 0.2 D. They found stable visual acuity in 58.33% and concluded that as the size of the pterygium, increases the amount of induced astigmatism increased and a successful pterygium surgery reduced the refractive astigmatism.

In our study recurrence was seen in 2 patients.1 patient had lost follow up and came after 4 weeks with a fibrovascular encroachment on the cornea, the probable cause could be inadequate inoculation at the recipient site or non-compliance of treatment.

The 2nd patient was the one who had post-operative non infective scleral necrosis and was managed conservatively.

In our study the graft was taken from inferior limbus as studied by Wong AK and Rao SK et al[19] who studied inferior limbal – conjunctival graft results for recurrent pterygium. We consider that the superior limbal grafts can be a potential disadvantage as it can cause donor site scarring thus compromising the success of any future filtering surgery.

Willey et al[20] evaluated regional heterogenicity in the limbal epithelium using immuno-histochemical technique of limbal epithelium in superior and inferior compared to medial and lateral region. Due to the shielding of superior limbal stem cells by lids they are supposed to have better protective ability.

Results by Wong et al[19] showed 18% recurrence in cases of recurrent pterygium and hence concluded that inferior Limbal conjunctival autograft is a safe and effective option and is the procedure of choice for suspected or proven glaucoma and in the patients who have undergone a superior limbal graft.

In our study we found 6.66% recurrence in case of primary pterygium with inferior limbal conjunctival autograft.

Kim reported a 5.6% recurrence rate over a mean follow-up period of 20 months in patients treated with his inferior conjunctival flap rotation technique for primary pterygia.[7]

Massaoutis reported a 5.25 recurrence rate among primary ptergium patients receiving a minimum excision technique combining with mini inferior conjunctival transplantation.[21]

A study by Hiroki, Kawano, Koji et al showed that the success rate and recurrence rate following inferior limbal conjunctival autograft with Mitomycin C was 96% and 0% respectively.[22]

In a study by Hirst LW et al[23] in Brisbane Queensland showed 50% recurrence by 120 days after pterygium surgery and 97% recurrence by 12 months. Hence they suggested a 1 year follow up.

CONCLUSION: Pterygium has been a challenge to both the surgeon and the patient due to its tendency to reccur. Limbal conjunctival autograft is a procedure which considers that damage to limbal stem cell is the cause of pterygium and hence replacement of limbal stem cell can prevent recurrence though it can induce iatrogenic limbal stem cell deficiency at the donor bed. This procedure is hence the procedure of choice for recurrent pterygium. This has learning curve and is a time consuming surgery.

Thus in our study we conclude that use of Limbal Conjunctival autograft in a primary pterygium can prevent recurrence and provide acceptable outcome at the primary surgery with no sight threatening complication.

Since we used inferior Limbal Conjunctival autograft, we conclude that it can be propagated and due to low recurrence rate post-operatively, it can be concluded that actinically exposed inferior limbal stem cells used in inferior grafts are equally effective as superior Limbal conjunctival autograft.

This procedure can be preferred in the patients who need to undergo glaucoma surgery and need undisturbed superior conjunctiva and in patients with recurrence of pterygium after a failed superior conjunctival autograft.

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