

# Study Of The Surgical Outcome Of Sutureless Glueless Conjunctival Autograft In Pterygium Excision Surgery.

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Received: May 2018

Accepted: June 2018

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## ABSTRACT

**Background:** Pterygium is a hyperplastic elastoid wing shaped degenerative condition of the subconjunctival tissue which proliferates as vascularized granulation tissue infiltrating the cornea destroying the superficial layers of stroma and Bowman's membrane causing corneal distortion and significant amount of astigmatism. Conjunctival autograft is a relatively new and effective surgical technique with good aesthetic results in the management of primary pterygium. **Objective:** To evaluate the surgical outcome in terms of recurrence and other complications of sutureless glueless conjunctival autograft in pterygium excision. **Setting:** Department of Ophthalmology, Teerthanker Mahaveer Medical College and Research Centre, Moradabad, Uttar Pradesh. **Methods:** Prospective interventional non randomized hospital based case series was carried out in 50 eyes with primary pterygium. Pterygium excision with limbal conjunctival autograft without glue or suture was performed in all patients. The patients were followed post operatively on day 1, day 7, 1 month and 6 months. Recurrence and other complications were noted at each visit. **Results:** Mean age of the study population was 36.96±11.39 years, 64% were males with maximum patients (72%) presenting in the age group of 20-40 years. The overall complication rate was 10%. Graft retraction was seen in 4%, Conjunctival Cyst in 2% and 1 case showed Graft Rejection. Recurrence rate was noted to be 2% at the end of 6 months. **Conclusion:** Sutureless glueless conjunctival autograft following pterygium excision is a simple, safe and economical procedure for the treatment of pterygium having excellent outcome.

**Keywords:** Pterygium, sutureless, glueless conjunctival autograft, recurrence.

## INTRODUCTION

The term 'pterygium' has its origin from the ancient Greek word (pteryx) = wing and (gion) = fin. Therefore, pterygium is described as a triangular 'wing-like' growth consisting of conjunctival epithelium and hypertrophied subconjunctival connective tissue that occurs nasally or temporally in the interpalpebral fissure, encroaching onto the cornea.<sup>[1]</sup>

The worldwide prevalence rates vary between 0.3-2.9%,<sup>[2,3]</sup> higher in the 'Pterygium Belt' having geographical latitudes of 40° north and south of the equator,<sup>[1]</sup> the peri-equatorial region which includes India.

The UV Type B light in solar radiation has been implicated as a major environmental risk factor in

the pathogenesis of pterygium.<sup>[2,3]</sup> Hence, men with outdoor work are affected more commonly than women.<sup>[4]</sup>

Pterygium is a hyperplastic, elastoid wing shaped degenerative condition of the sub-conjunctival tissue which proliferates as vascularized granulation tissue to infiltrate the cornea destroying the superficial layers of stroma and bowman's membrane.<sup>[5,6]</sup>

Molecular genetic alterations like loss of heterozygosity, point mutations of proto-oncogenes such as k-ras and alterations in the expression of tumour suppressor genes such as p53 or p63 have pointed towards pterygium being a proliferative rather than a degenerative condition.<sup>[7]</sup>

The tractional force of contractile elements within the pterygium lead to mechanical distortion and flattening of the cornea in its horizontal meridian resulting in hypermetropic with the rule astigmatism.<sup>[8,9]</sup>

### The indications for pterygium surgery are:

- Visual Impairment
- Recurrent Inflammation
- Motility Restriction
- Cosmetic Disfigurement.

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Various surgical techniques have developed over time for the treatment of pterygium such as bare sclera technique, transposition of pterygium to fornix (Mc Reynolds operation), excision with simple closure of wound, along with adjuvant therapies to reduce recurrence-like beta irradiation, thiotepa, mitomycin-c, 5-fluorouracil, conjunctival autograft, limbal stem cell transplant, amniotic membrane graft and buccal mucosal graft.<sup>[10]</sup>

The conventional conjunctival autograft surgery used sutures to secure the graft in place. It was more time consuming and was accompanied by discomfort to the patient for several weeks. To avoid these complications a no stitch surgery using fibrin glue as an adhesive to secure the graft came into practice.<sup>[11-14]</sup>

Fibrin glue is manufactured from human plasma and carries the risk of transmitting diseases,<sup>[15]</sup> mainly hepatitis A and parvovirus B19.

All these lead to the development of sutureless glueless conjunctival autografting for covering the bare sclera after pterygium excision.

The main challenge towards surgical management of pterygium is its recurrence, evidenced by fibrovascular growth across the limbus into the conjunctiva. Among the many surgical techniques available for pterygium excision, none of them is universally accepted due to the variability in the rate of recurrence.

Conjunctival autograft transplantation following pterygium excision presents the advantage of restoring the structure of the limbus with the stem cells facilitating corneal epithelial healing.<sup>[16]</sup>

Today conjunctival auto-transplantation is widely used in pterygium surgery, as it is safe and effective surgical technique producing good aesthetic results.

This study was undertaken to evaluate the outcome of sutureless glueless conjunctival autograft in primary pterygium excision in terms of intra operative and post-operative complications and to assess the recurrence rate of this technique in our setting.

## MATERIALS AND METHODS

Prospective interventional non-randomised hospital based case series was carried out at the Department of Ophthalmology, Teerthanker Mahaveer Medical College and Research Centre, Moradabad, Uttar Pradesh between January 2016 and December 2016. 50 eyes of patients of either sex above the age of 18 years with primary pterygium were selected and a written informed consent was obtained from each. Patients with recurrent pterygium, bilateral pterygium, pseudopterygium, scarred superior conjunctiva, cicatricial ocular surface disease, history of ocular surgery within 6 months, corneal degenerations and dystrophies, history of ocular trauma, on anticoagulant therapy, having deranged coagulation profile, dry eye syndrome and collagen

vascular diseases were excluded as these could affect the final outcome Of the study. Necessary clearance was obtained from the Institute's Ethical and Research Committee before the initiation of the study.

A detailed history was taken. Preoperative ocular examination included uncorrected visual acuity, refraction and assessment of best- corrected visual acuity, slit lamp biomicroscopy, baseline intraocular pressure (IOP) by Goldmann applanation tonometer, indirect ophthalmoscopy for evaluation of the posterior segment and photographic documentation of the pterygium.

### Grading of Pterygium was done on basis of length of corneal involvement

- ❖ Grade 1 – Pterygium invading < 1.5 mm of cornea.
- ❖ Grade 2 - Pterygium invading > 1.5 mm of cornea.
- ❖ Grade 3 - Pterygium invading over half the radius of cornea.
- ❖ Grade 4 - Pterygium reaching almost upto the centre of cornea.

### Surgical technique

Topical antibiotic eye drops (Moxifloxacin 0.5%), 4 times a day, were instilled one day before surgery. All surgeries were performed by a single experienced surgeon under operating microscope with similar operating conditions. Asepsis was strictly maintained. Peribulbar block was given with 7:3 mixture of 3.5ml of 2% Lignocaine and 0.5% Bupivacaine with 1.5ml of 150 units/ml of Hyaluronidase injection. Painting and draping of the assigned eye was done with betadine solution and a universal eye speculum was placed. The neck of pterygium was grasped and lifted up with the help of a fine toothed forceps, while the head of the pterygium was gently avulsed from the cornea, keeping the same constant tractional force throughout. The corneal surface was scrapped using 3.2mm crescent to remove any residual tissue and to make the corneal surface smooth. Gentle dissection was carried out between the conjunctiva and the sclera with the help of straight or curved Vannas scissors, to resect the pterygium mass that included both the superior and inferior borders. Only the thickened portions of conjunctiva and the immediate adjacent and subjacent Tenon's capsule showing tortuous vasculature was excised to prepare a clean and smooth graft bed. Cautery was not used throughout the surgery, except tamponade with cotton-tipped applicator whenever required to check excessive haemorrhage. Corneal care was taken by continuous saline irrigation throughout the procedure. The bare area of the sclera was measured using Castor-Viejo calipers. Markings for graft harvest were made on the supero-temporal conjunctiva with the help of trypan blue. Careful dissection between donor graft conjunctiva and Tenon's layer was done while fashioning the 1 mm

oversized conjunctivo-limbal graft from the superior bulbar conjunctiva. Care was taken to prevent buttonholes and graft rollover. The dissected graft was flipped over the cornea, and then including the palisades of Vogt which contain limbal stem cells, the graft was excised from the limbal attachment using Vannas scissors. The graft was slid over the cornea without lifting the tissue off the cornea, towards the bare sclera and it was spread and positioned such that the limbal polarity was maintained. The edges of the graft were placed below the undermined edges of the surrounding conjunctiva of the host bed. The scleral bed is viewed through the transparent conjunctiva and to ensure residual bleeding does not re-lift the graft. Small central haemorrhages were tamponaded with direct compression using sponge-tipped applicator until haemostasis was achieved, usually within 8–10 minutes. The eye was then patched and bandaged for 24 hours with 0.5% moxifloxacin eyedrops. Patients were put on oral analgesic – anti-inflammatory (Diclofenac+ Paracetamol) tablets twice daily for 3 days. After surgery, biomicroscopic examination was performed on the first day, and topical antibiotic (Moxifloxacin 0.5%) and steroid (Prednisolone acetate 1%) drops four times a day were prescribed which were tapered in subsequent weeks. Artificial tears (Carboxy methyl cellulose 0.5%) was given four times a day. Patients were followed up at day 7, at 1 month and then at 6 months. Snellen visual acuity and slit lamp microscopic examination were performed at each follow up. The primary outcome measure was recurrence and secondary measures were other complications.

Recurrence was defined as the reappearance of any fibrovascular tissue past the limbus onto the clear cornea in the area of previous pterygium and it was labelled as treatment failure.

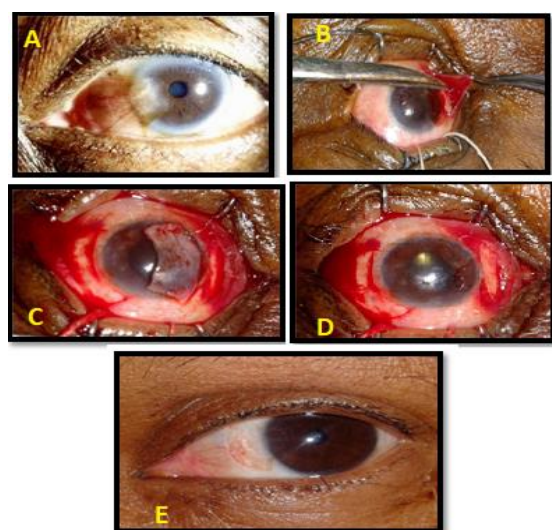


Figure 1. surgical technique A. Fleshy nasal pterygium. B. Thorough excision of pterygium. C. Over-sized graft D. Allowing the graft to adhere to bare sclera. E. Post-operative picture of graft fixation with autologous blood after 1 month.

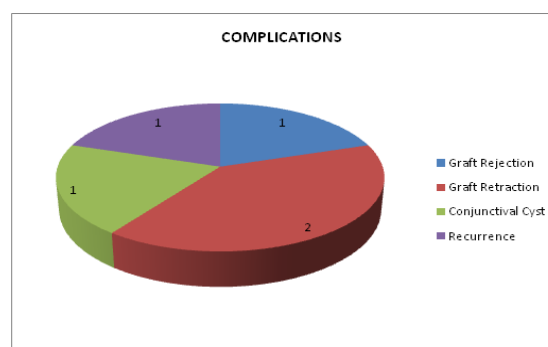
Complications were any adverse event related to the surgery in the intra and post-operative period, the graft or the drugs prescribed.

Statistical analysis of the collected data was done using appropriate tests of significance.

## RESULTS

Parameter	Findings
Males	32
Females	18
Mean Age	36.96±11.39 years
Males	37.84±12.60 years
Females	35.39±8.97 years
Age Groups	
20-40 years	36 (Males – 22 Females – 14)
41-60 years	9 (Males – 6, Females – 3)
More than 60 years	5 (Males – 4, Females – 1)
Occupation	
Indoor	14
Outdoor	36
Eye Involvement	
Right	27
Left	23
Duration of Symptoms	
Less than 6 months	12
6 months – 1 year	28
More than 1 year	10
Vascularity of Pterygium	
Vascular	45
Atrophic	5
Laterality	
Nasal	49
Temporal	1
Complications	10
Graft Rejection	1
Graft Retraction	2
Conjunctival Cyst	1
Recurrence	1

Grade of Pterygium	Total	20-40 Years	40-60 Years	More than 60 Years
1	11	8	3	0
2	23	8	14	1
3	12	8	2	2
4	4	2	0	2



50 eyes with primary pterygium underwent excision with sutureless glueless conjunctival autograft. Maximum patients were in the age group of 20-40 years (72%), out of which 22 were males and 14 were females. Most patients 28 (56%) presented between 6 months to 1 year from the time of first noticing the disease. A significant relation ( $p=0.010$ )

was noted between duration of pterygium and its grade. In our study 45 (90%) patients had progressive vascular pterygium while in the rest 5 (10%) cases it was atrophic. There was a significant difference in the distribution of presence of vascularity between different age groups ( $p=0.001$ ). Younger patients had more vascular and progressive pterygia. Relation between vascularity of pterygium and its grade was found to be significant. In our study, Grade 1 pterygium was found in 11 (22%) patients, Grade 2 in 23 (46%), Grade 3 in 12 (24%) and Grade 4 in 4 (8%) cases. Grade 3 and Grade 4 pterygium were found to be significantly more among 41-60 years age group ( $p=0.004$ ). On the first post-op day, 2 cases showed graft retraction (4%) which were treated with tapering dose of topical steroid eye drops and were closely followed. Conjunctival re-epithelialization occurred within 3 weeks of surgery. One case of Conjunctival Cyst formation (2%) and one of Graft Rejection (2%) were noted at 1 month after surgery. Recurrence (2%) was seen in one case at the end of 6 months. A good cosmetic outcome was achieved in all cases. 2 (40%) complications were seen in the age group of 40-60 years.

## DISCUSSION

There have been many attempts to reach a consensus about the surgical and medical management of pterygium.

The foremost concern of avoiding recurrences and complications and providing rapid and safe recovery with minimal discomfort to the patient has lead surgeons to abandon the old surgical methods of bare sclera, use of sutures and glue in conjunctival autograft and adopt a less time consuming and relatively superior technique of sutureless glueless conjunctival autografting following pterygium excision.

The present study was undertaken with 50 patients to study the surgical outcome of sutureless glueless conjunctival autograft for primary pterygium excision.

In our study, mean age of the study population was  $36.96 \pm 11.39$  years. Maximum patients were in the age group of 20-40 years (72%), out of which 22 were males and 14 were females. 18% were in the age group of 41-60 years while 10% patients were more than 60 years of age. These results were consistent with the studies of Malik et al,<sup>[17]</sup> Sharma et al,<sup>[18]</sup> Dasgupta et al,<sup>[20]</sup> Rangu et al,<sup>[21]</sup> Rathi et al and Bhargava et al,<sup>[4,22]</sup> who reported the maximum incidence of pterygium in the age group ranging between 30-50 years. Though the study conducted by de Wit et al,<sup>[19]</sup> found the mean age of presentation to be much higher i.e.  $73.7 \pm 7.7$  years. Therefore, it would be safe to suggest that pterygium presents mostly in the fifth decade of life in the Indian subcontinent.

Our study revealed male preponderance of the disease with male:female ratio of 1.8:1 which was comparable with the sex ratio in the studies conducted by Malik et al,<sup>[17]</sup> Rangu et al and Bhargava et al,<sup>[21,22]</sup> while studies by Sharma et al,<sup>[18]</sup> Dasgupta et al and de Wit et al reported a higher incidence of the disease in females.<sup>[19,20]</sup> The female majority in the above studies can be explained by the fact that pterygium is a cosmetic blemish and this is the major presenting complaint seconded by blurring of vision.

In the present study 36 (72%) patients were outdoor workers while 14 (28%) were indoor ones. Out of the 36 outdoor workers, 17 (47.2%) had Grade 2 pterygium and 10 (27.8%) had Grade 3 pterygium. Among the indoor workers, 6 (42.9%) had Grade 2 pterygium and 4 (28.6%) had Grade 1 pterygium. Majority of the patients presenting to the OPD are from a rural background who are either engaged in farming or are labourers, exposing them to the external environment of harsh UV rays, dust, wind and smoke. Females in our setting are exposed to chullah smoke while cooking. These conditions point towards the possible etiological factors behind the disease process. Catherine A McCarty et al,<sup>[23]</sup> in his study found that 6.7 % of the rural population had pterygium and found 43.6% attributable risk of sunlight and pterygium. D J Moran<sup>2</sup> in examination of more than 100 000 Arborigines and non-arborigines in rural Australia, found a strong positive correlation between climatic UV radiation and pterygium prevalence providing further evidence of a causal relationship.

In this study, only one patient had a temporal pterygium while the remaining 49 cases were of nasal pterygium. Sevel and Sealy's study on 100 temporal pterygia has warned ophthalmologists about an underlying malignancy in patients with temporal pterygium.<sup>[24]</sup> Malignant change should be considered if there is unusual evidence of invasion, extension and if it becomes vascular. B Ramasamy et al,<sup>[25]</sup> reported a case of temporal pterygium which on biopsy turned out to be conjunctival intra epithelial neoplasia.

In our study, Grade 1 pterygium was found in 11 (22%) patients, Grade 2 in 23 (46%), Grade 3 in 12 (24%) and Grade 4 in 4 (8%) cases. Grade 3 and Grade 4 pterygium were found to be significantly more among 41-60 years age group ( $p=0.004$ ). 34 (56.66%) patients out of 60 were of Grade 2 pterygium in the study by Dasgupta et al.<sup>[20]</sup> Bhargava et al,<sup>[22]</sup> in their study found highest number of Grade 3 pterygium in 17 eyes, Grade 1 and 2 in 12 eyes each and Grade 4 in 11 eyes.

The overall complication rate was 10% in our study. Subjective complaints like discomfort, lacrimation and mild pain were observed at post-op day1 which almost resolved within a week. On the first post-op day, 2 cases showed graft retraction (4%) which were treated with tapering dose of topical steroid eye



drops and were closely followed. Conjunctival re-epithelialization occurred within 3 weeks of surgery. One case of Conjunctival Cyst formation (2%) and one of Graft Rejection (2%) were noted at 1 month after surgery. Recurrence (2%) was seen in one case at the end of 6 months. A good cosmetic outcome was achieved in all cases. 2 out of 5 complications were seen in the age group of 40-60 years.

#### Comparing the Recurrence Rates among various studies on suturefree gluefree conjunctival autograft

Study	Eyes	Follow-Up Period (Months)	Recurrence (%)
De Wit et al <sup>[19]</sup>	15	9	0 (0)
Singh et al <sup>[26]</sup>	10	12	1 (10)
Sharma et al <sup>[18]</sup>	80	3	1 (1.25)
Bhargava et al <sup>[22]</sup>	52	12	1 (1.92)
Malik et al <sup>[17]</sup>	40	12	1 (2.5)
Nanda et al <sup>[27]</sup>	50	6	0 (0)
Dasgupta et al <sup>[20]</sup>	60	6	1 (1.67)
Rangu et al <sup>[21]</sup>	20	6	0 (0)
Rathi et al <sup>[4]</sup>	50	6	1 (2)
Our Study	50	6	1 (2)

Bhargava et al<sup>[22]</sup> had post-operative complications like graft displacement in 4 cases (7.69%) on 1st post-operative day and mild graft edema was noted in 4 (7.69%) cases in first week. There was hematoma below graft in 3 (5.76%) cases and in 1 case it persisted for 1 month. Recurrence was seen in 1 (1.92) case in the 12-month follow-up period. Dasgupta et al<sup>[20]</sup> found graft dehiscence in 1 (1.67%) case and recurrence in 1 (1.67%) case. Whereas, studies conducted in the United Kingdom by de Wit et al<sup>[19]</sup> and Shaw et al<sup>[28]</sup> amazingly show no complication or recurrence at all. Rangu et al<sup>[21]</sup> reported no recurrence in their study of 20 eyes though graft edema and graft retraction was seen in 2 (10%) cases each. Similar findings were reported by Nanda et al<sup>[27]</sup> with no recurrence in the 50 eyes treated with suture less glue less conjunctival autograft. Singh PK et al<sup>[26]</sup> compared placing of conjunctival autograft with fibrin glue and with autologous blood. He found that the rates of recurrence were the same 10% in both the groups. However, complications like graft displacement and graft retraction were more common in patients grafting with autologous blood (10%) than in those grafting with the glue, though the difference was not statistically significant ( $p=0.3185$ ). In another prospective interventional case series by Foroutan et al<sup>[29]</sup> 15 eyes from 13 patients with primary nasal pterygium were included for conjunctival autograft surgery. Of the 13 patients, 76.9% were male. The mean age of the patients was  $37.26 \pm 12.61$  (SD) years (range 23-60). The mean follow-up period was  $34.67 \pm 2.96$  months (range 25-36). Three eyes (20%) developed autograft retraction that resolved completely with continued eye patching. Two eyes (13.33%) developed total graft dehiscence, and sutures were used for reattachment of the graft in its

correct position. Two eyes (13.33%) developed recurrence of pterygium, one of them had already a total graft dehiscence. In 13 eyes (86.66%), the conjunctival grafts were appropriately adhered to the bed and surrounding conjunctiva without suturing in the final visit. These results are similar to our study. In a similar study by Sharma et al<sup>[18]</sup> graft retraction occurred in 3 eyes (3.75%) and recurrence was seen in 1 eye (1.25%) after 3 months of follow up. In Malik KPS<sup>[17]</sup> study, graft dehiscence was seen in 5%, graft retraction in 7.5% and recurrence in 2.5% cases. Rathi et al<sup>[4]</sup> reported graft loss in (1) 2%, chemosis in 2(4%) and recurrence in 1 (2%) cases.

In our study, recurrence was seen in a 32 years old female with outdoor activity who had grade 1 progressive, nasal pterygium in right eye of duration between 6 months to 1 year.

In a study by Lewallen et al (1998),<sup>[30]</sup> patients younger than 37 years showed a higher risk of pterygium recurrence. In another study by Sharma A et al (2000),<sup>[31]</sup> all cases of recurrence occurred in patients below 40 years of age.

De Wit et al<sup>[19]</sup> postulated that the opposition of the lids to the bulbar conjunctiva provides a natural biological dressing and confers a unique wound-healing environment. Apart from a physical barrier, the lids provide compression, a smooth frictionless surface, and a vascular bed with immune capability in close proximity to the injury site. Specifically, the risk of graft retraction as described by Tan<sup>[32]</sup> appears to be no greater without suturing or fibrin glue as long as meticulous dissection of the sub-epithelial graft tissue is respected.

Therefore, it can be said that as there is an even tension across the whole of the graft interface and no direct tension on the free graft edges, there is reduced stimulus for subconjunctival scar tissue to form. Conjunctival autografting without sutures and glue is today recognized as the procedure of choice for pterygium surgery, in terms of its efficacy and safety, and represents the 'gold standard' to which other procedures may be compared. An excellent cosmetic result is possible with this technique.

#### Limitations

The study was non-randomised and non-comparative and had a small sample size. The patients were followed for a short duration in the follow-up period. There was neither an attempt to quantify adhesive strength of autologous blood nor to correlate learning curve, visual improvement, and socioeconomic factors that could otherwise have affected the surgical outcome, directly or indirectly. A prospective randomised controlled trial with a larger study population and a longer follow-up period is warranted to substantiate our findings.

## CONCLUSION

The present study was undertaken with 50 patients to evaluate the efficacy of sutureless glueless

conjunctival autograft in primary pterygium excision and the complications associated with this procedure.

This study suggests that autologous fibrin in blood is a useful alternative method for graft fixation in pterygium surgery, having excellent outcome, being less time consuming, avoids suture related problems and cost of fibrin glue.

Thus, autologous in-situ blood coagulum is a useful method for graft fixation in pterygium surgery with shorter operating time and less post-operative discomfort.

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**How to cite this article:** Chauhan R, Devendra J, Rastogi PS, Chander A, Mehrotra G. Study Of The Surgical Outcome Of Sutureless Glueless Conjunctival Autograft In Pterygium Excision Surgery. Ann. Int. Med. Den. Res. 2018; 4(4):OT01-OT06.

**Source of Support:** Nil, **Conflict of Interest:** None declared