

Original Research Article

Effect of tissue glue versus suture in pterygium surgery in a tertiary care center of North-East India

Monalisa Deori*, J. J. Kuli, Bharati D. Boruah

Department of Ophthalmology, AMCH, Dibrugarh, Assam, India

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***Correspondence:**

Dr. Monalisa Deori,

E-mail: babli.de.301990@gmail.com

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ABSTRACT

Background: Pterygium is a triangular fibrovascular tissue of conjunctiva encroaching on to the cornea. Currently, conjunctival autograft technique after excision is reported as the most suitable and safest method. The autograft transplantation can be done either with the help of suture or tissue adhesives. Objective of the study was to evaluate the effects of tissue glue versus suture in limbal conjunctival autograft transplantation among the patients undergoing pterygium excision.

Methods: A prospective study was carried out in a tertiary eye care hospital. 60 patients with primary pterygium underwent limbal conjunctival autograft transplantation. They were enrolled into two groups, group-A (tissue glue, N=30) and group-B (suture group, N=30). Operative time, postoperative patient comfort and recurrence of pterygium were assessed. The patients were followed-up for 6 months.

Results: The mean surgical time in fibrin glue group (23.56±2.80) was significantly less compared to suture (30.78±2.20) group with $p < 0.001$. Postoperative discomfort in terms of pain, lacrimation and foreign body sensation was significantly less with fibrin glue in comparison to suture ($p < 0.05$). Postoperative complications like redness, subconjunctival hemorrhage, graft edema and graft retraction were significantly more in suture group during late postoperative period. Recurrence of pterygium was noted in two patients (6.67%) in suture group and one patient in fibrin glue group (3.33%) which was not statistically significant ($p > 0.005$).

Conclusions: The use of fibrin glue for securing the limbal conjunctival autograft in pterygium surgery significantly reduces the operating time and postoperative discomfort.

Keywords: Pterygium, Fibrovascular, Limbal conjunctival autograft, Tissue glue

INTRODUCTION

Pterygium is a triangular fibrovascular subepithelial ingrowth of degenerative bulbar conjunctival tissue onto the cornea.¹ Literature suggests that limbal stem cells acts as a barrier against conjunctival epithelial cells from migrating onto the corneal surface.² Damage of these limbal stem cells caused by chronic sun exposure can lead to invasion of pterygium onto the cornea.^{3,4} Currently, conjunctival autograft after pterygium excision is reported to be the most suitable and safe method having low rates

of recurrence and few complications. Few studies have also suggested the use of limbal conjunctival autograft technique in pterygium excision.^{5,10} However, fixation of the autograft using sutures have some of the disadvantages like prolonged operating time, postoperative discomfort, suture abscess, button holes, and granuloma formation which usually requires a second procedure for removal.⁶

These complications pertaining to suturing techniques can be overcome by the use of fibrin-based tissue glue.⁷⁻⁹ To date, only few published data have reported the use of

fibrin glue versus suture in pterygium study from the Indian subcontinent.⁹⁻¹² The aim of the study was to evaluate the effects of fibrin-based tissue glue versus suture in limbal conjunctival autograft transplantation after pterygium excision.

METHODS

One-year hospital based prospective study was done in a tertiary care centre. Approval from the institutional ethical committee was taken. The study was conducted in the department of ophthalmology, Assam Medical College & Hospital, Dibrugarh, from the period of July 2018 to June 2019. Total 60 patients were included in the study and they were enrolled into two treatment groups after being randomized by odd or even number. The statistical analysis of data was performed using the computer program, Statistical Package for Social Sciences (SPSS for Windows, version 20.0 Chicago, SPSS Inc.) and Microsoft excel 2010. Results on continuous measurements were presented as mean±standard deviation and were compared using student t test.

Discrete data were expressed as proportion and percentage were analysed using chi square test and Fischer's exact test (where the cell counts were <5 or 0). For all analyses, the statistical significance was fixed at 5% level (p value<0.05).

Inclusion criteria

Patients with primary pterygium irrespective of sex and occupational status were included.

Exclusion criteria

Patients less than 20 years with pseudopterygium and recurrent pterygium. Patients on anticoagulant therapy, systemic disease like hypertension and diabetes mellitus, pre-existing glaucoma.

History of previous ocular surgery or trauma and known hypersensitivity to any component of fibrin glue. In all patients detailed clinical history and examinations were done and recorded on a predesigned and pre-tested proforma.

Surgical technique

All the cases were operated in the eye OT (Operation theatre) by an experienced single surgeon following the standard procedures. All the surgeries were performed using an operating microscope.

Instruments used during the operative procedure were shown (Figure 1).



Figure 1: Tissue glue 8-0 vicryl suture and instruments.

Under strict aseptic and antiseptic condition, surgical site and eye lashes were cleaned with 5% Povidone iodine solution and a sterile drape was put in the affected eye. Local analgesia of the conjunctiva was obtained by the instillation of 0.5% proparacaine hydrochloride drops topically. A lid speculum was applied to separate the eyelids. After that 1ml of 2% lignocaine hydrochloride with adrenaline was injected sub-conjunctivally beneath the body of the pterygium to obtain the anaesthesia. The head of the pterygium was either avulsed using a toothed forceps or excised from the cornea by assessing the cleavage plane with a No.15 surgical blade. The body of pterygium along with the underlying tenons was dissected nasally, care was taken to avoid damage to the medial rectus muscle. The abnormal fibrovascular tissue located under the conjunctiva was carefully dissected from the overlying conjunctiva and then excised using a scissor. The involved part of the cornea was scraped cautiously and meticulously to remove all the elements of the pterygium using no.15 surgical blade. Dimensions of the bare scleral bed was measured with a calliper and then marked on the ipsilateral superotemporal quadrant of the bulbar conjunctiva. A small nick was given first on the fornical end and a careful dissection was done to obtain a conjunctival limbal autograft in matching size. Care was taken to make as tenon's free a graft as possible. After reaching the limbal edge, the graft was flipped over onto the cornea and approximately 0.5 mm of clear corneal dissection was carried out to include the limbal tissue.

The flap was then excised using a sharp scissor. The limbal edge of the graft was placed on the limbus of the host scleral bed with stromal side down. At this stage, depending on the group allocated to the patients, the autograft was secured either with fibrin glue or 8-0 absorbable vicryl suture.

In group-A

Scleral bed was carefully dried first, then one drop of fibrin sealant was put over the stromal side of the graft and another drop was put on the scleral bed. A non-toothed forcep was used to flip the graft onto the bare scleral defect with stromal side down and a proper limbal-limbal orientation was maintained. The graft smoothened out and left there for at least one minute for drying.

Reconstitution

The fibrin glue was prepared as per the manufacturer's directions. The first component, the fibrinogen solution was prepared by mixing the fibrinogen powder with the aprotinin solution. The second component, the thrombin was prepared by mixing the thrombin powder with calcium chloride solution provided in the kit. Both the components were then withdrawn in two separate sterile syringes in equal amounts and placed into the duploject injector. A joining piece was attached to the 2-syringe nozzle of the duploject to facilitate mixing of the two syringe components which then attached to an application cannula. When the common plunger was depressed, the fibrin solution and the thrombin solution were combined, in equal volumes, to form the resulting fibrin sealant that was directly applied to the designated site. The reconstituted solution should be used by applying locally as soon as possible and not later than 4 hrs.

In group-B

8-0 vicryl suture was used to fixate the graft to the underlying episcleral bed. At first, four interrupted cardinal sutures were applied at four corners of the graft, two sutures on the limbal side and two sutures were put on the medial side. Then rest of the interrupted sutures were placed in between the cardinal sutures as per the requirement, except on the limbal side. At the end of the procedure an antibiotic-steroid combination eye drop was put in the conjunctival cul-de-sac and the eye was patched overnight. No intraoperative complications occurred in any group.

The operative time was noted in each patient starting from the insertion of the lid speculum to its removal at the end of surgery. Postoperatively, moxifloxacin and dexamethasone combination eye drop was given four times a day for two weeks and tapered over next two weeks and a lubricating eye drop was given for four weeks. Follow-up of the patients were done on day one, one week, one month, 3 months and 6 months. The patients were assessed for the following outcome variables (pain, foreign body sensation and lacrimation) using a questionnaire and were graded on a scale of 0 to 3 as: absent- no symptom, mild- patient had tolerable symptom and present occasionally, moderate- tolerable symptom present throughout the day or intolerable symptom present occasionally, severe- intolerable symptom present throughout the day. The operated eye was evaluated for

presence or absence of complications using slit-lamp biomicroscopy. Recurrence of pterygium was noted at three and six months postoperatively. Recurrence was defined as regrowth of tissue from the area of excision up to or across the limbus onto the cornea.

RESULTS

60 eyes of 60 patients with primary pterygium as shown were enrolled in two groups (Figure 2). The patients were assessed at day 1, one week, one month, three and six months. The two groups were comparable in terms of operative time, postoperative symptoms and graft related complications as well as recurrence. Majority of the patients were between 30-49 years of age, however no statistically significant difference was noted between the two groups.



Figure 2: Pre-operative primary nasal pterygium.

The operative time in majority of the patients (93.33%) in group-A was from 20 to 30 minutes and in group-B was 31 to 40 minutes in 40% patients and the remaining 60% patients required 20 to 30 minutes, which was statistically significant($p < 0.001$) as shown (Table 1).

Table 1: Operative time.

Operative time (minutes)	Group-A (tissue glue)		Group-B (suture)	
	n	%	n	%
20-30	28	93.33	18	60.00
31-40	2	6.67	12	40.00
Total	30	100.00	30	100.00
Mean±SD	23.56±2.80		30.78±2.20	
P value	<0.001			

Majority of the patients had mild pain in group B (73.33%) compared to patients in group A (60.00%), on first postoperative day (Figure 3), which was statistically significant shown in (Table 2). Mild lacrimation was reported by 60% patients and 40% patients experienced moderate lacrimation in group A. In group-B, majority of the patients (73.33%) experienced moderate lacrimation, 10% patients reported severe lacrimation and 16.67% had mild lacrimation. This difference was statistically significant ($p = 0.001301$). Foreign body sensation was

statistically higher in group B patients as compared to group A, as shown in Table 2. However, pain and lacrimation did not differ between the two groups during the follow-up at one week and one month. Mild to moderate foreign body sensation still persisted at one week and one month in group B which was significant as compared to group A.



Figure 3: Limbal conjunctival autograft using fibrin glue.

Table 2: Postoperative assessment of pain, lacrimation and foreign body sensation at day 1.

Severity	Group-A (tissue glue)		Group-B (suture)		P value
	n	%	n	%	
Pain					
Absent	9	30.00	0	0.00	0.007383
Mild	18	60.00	22	73.33	
Moderate	3	10.00	7	23.33	
Severe	0	0.00	1	3.33	
Lacrimation					
Absent	0	0.00	0	0.00	0.001301
Mild	18	60.00	5	16.67	
Moderate	12	40.00	22	73.33	
Severe	0	0.00	3	10.00	
Foreign body sensation					
Absent	1	3.33	0	0.00	<0.001
Mild	25	83.33	0	0.00	
Moderate	4	13.33	30	100.00	
Severe	0	0.00	0	0.00	

Graft related complications

The two groups were comparable in terms of redness, subconjunctival hemorrhage (Figure 4), graft oedema and retraction (Figure 5) as shown (Table 3). Redness and graft oedema was comparable between the two groups ($p>0.05$). Graft retraction and subconjunctival hemorrhage was more in group-A compared to group-B ($p<0.05$). No secondary surgical intervention were required as retraction was noted on nasal side and the limbal side of the graft was on its place (Table 4). In group-B, one patient with suture loss was noted at one-week follow-up. No treatment was required as the sutures on limbal side of the graft were in its place. The following findings did not differ between the two groups at one-month follow-up. However, one patient with conjunctival cyst formation and graft dehiscence was observed in group-B during at one month follow-up visit.



Figure 4: Post-operative complications showing graft haemorrhage following use of vicryl suture.

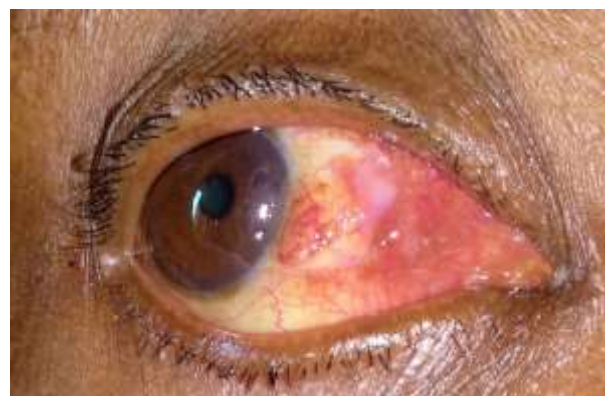


Figure 5: Post-operative complication showing graft retraction following the use of fibrin glue.

Table 3: Post-operative complications at day 1.

Complications	Group-A (tissue glue)		Group-B (suture)		P value
	N	%	N	%	
Redness	30	100.00	30	100.00	1
Sub-conjunctival haemorrhage	10	33.33	6	20.00	0.24291
Graft oedema/chemosis	10	33.33	7	23.33	0.39007
Graft retraction	7	23.33	1	3.33	0.02269
Others	30	100.00	30	100.00	1

Table 4: Post-operative complications at 1 week.

Complications	Group-A (tissue glue)		Group-B (suture)		P value
	N	%	N	%	
Redness	16	53.33	20	66.67	0.29184
Sub-conjunctival haemorrhage	10	33.33	2	6.67	0.00982
Graft oedema/chemosis	2	6.67	0	0.00	0.150323
Graft retraction	4	13.33	2	6.67	0.38942
Others	0	0.00	1	3.33	0.313244

Recurrence of pterygium was evaluated at three and six months (Table 5). One patient in group B had recurrence at three-months postoperative period (3.33%). At 6 months follow-up one patient in each group had recurrence. This difference was statistically not significant ($p>0.05$).

Table 5: Recurrence of pterygium

Recurrence	Group-A (tissue glue)		Group-B (suture)		P value
	N	%	N	%	
At 3 months	0	0.00	1	3.33	0.313244
At 6 months	1	3.33	1	3.33	1

DISCUSSION

In the present study, the mean operative time in group A was significantly less compared to group B. Studies by Karalezli et al, Bahar et al and Jiang et al have also reported shorter operative time with fibrin glue in comparison to sutures. Symptoms of pain, lacrimation and foreign body sensation was more in patients treated with sutures compared to fibrin glue.¹³⁻¹⁵ These subjective symptoms were statistically significant on day one and one week of follow-up. However, no statistical difference found at one-month follow-up. Karalezli et al in a study reported that the intensity of pain, foreign body sensation, epiphora, and irritation were significantly less in the fibrin glue group than in the suture group at postoperative day one and day 10, $p<0.001$.¹³ However, no statistical difference was noted during the follow-up at day 30 between the two groups.

Other studies have also observed that the postoperative symptoms of pain, foreign body sensation and epiphora were significantly less with fibrin glue in comparison to 8-0 vicryl suture at day one and one week.^{10,15}

On the contrary, Srinivasan et al in 2009 found no significant difference in the degree of inflammation between the two groups at one-week postoperative period, $p=0.518$. However, during the subsequent follow-up, the degree of inflammation was significantly less in the fibrin glue group compared to the suture group, at one month ($p=0.019$) and 3 months ($p=0.001$).¹⁷ Subconjunctival hemorrhage under the graft was observed in 33.33% cases in group-A at postoperative day one

whereas in group-B it was noted in 20% patients. However, follow-up at one week, the subconjunctival hemorrhage still persisted in group-A compared to group-B, which was statistically significant, $p=0.00982$. On subsequent follow-up at one month, subconjunctival hemorrhage was completely absent in both the groups. Srinivasan et al in a clinical trial in 40 patients reported no statistical difference between the two groups in terms of subconjunctival hemorrhage at any point during the follow-up.¹⁷

On the contrary, Goswami et al found that the incidence of subconjunctival hemorrhage was higher in the suture group (30%) compared to fibrin glue (6.67%) group, which resolved spontaneously by 2 weeks.¹⁰ In our study, graft chemosis were more in group-A compared to group-B, which subsided at the end of the first month in either group of patients. Harvey et al in a comparative study reported that graft edema and subconjunctival hemorrhage was present in all eyes, and it gradually subsided over time.¹⁸ Ozdamar et al in a comparative study found that conjunctival hyperemia and chemosis were present in all patients after surgery, which gradually subsided over time.¹⁹

In the present study, graft retraction was significantly higher in group-A compared to group-B on immediate postoperative day 1, $p=0.02269$. The graft retraction was noted on the nasal side which subsided gradually without any secondary intervention. One patient showed conjunctival cyst formation and another patient with complete graft dehiscence in group-B whereas, in group-A no graft related complications were noted at one month postoperative. This difference was not statistically significant ($p=0.150323$). Ratnalingam et al in 2010, reported 2 eyes with graft displacement in fibrin glue group and 3 eyes with conjunctival cysts in the suture group at 6 months follow-up.²⁰ Another study by Karalezli et al reported two patients with partial graft dehiscence in the fibrin glue group.¹³

In our study, one patient (3.33%) in each group had recurrence showed recurrence at 3 months follow-up. At 6 months follow-up, one patient in group-B had a recurrence (3.33%). However, this difference at 3 months and 6 months was not statistically significant between the two groups. A similar prospective study reported recurrence in one patient (4%) at 3 months follow-up in the fibrin glue group and 3 patients (12%) in the suture group at third, fourth and fifth months of follow-up, which was

statistically insignificant.¹³ Yuksel et al, in a comparative study in 58 patients, showed recurrence in 4 eyes (one eye at 1st month, one eye at 3rd month and two eyes at 6 months) in suture group-B. Two eyes (6.8%) developed recurrence at 6 months in group-A. Their results showed a statistically significant difference between the two groups.¹⁶ Few other study have found no statistically significant difference between two groups.²¹⁻²³ This results were consistent with the present study.

However, the main limitation of these study was the cost of fibrin glue. This can be overcome in future by treating four to five patients on same day or by making the tissue glue available in government setup for the patients.

CONCLUSION

Tissue glue in conjunctival autograft transplantation following pterygium excision, showed better efficacy compared to suture in terms of pain, foreign body sensation, lacrimation and discomfort during blinking. Also, it significantly reduced the surgical time with fewer postoperative complications. Fibrin-based tissue adhesives is safe, effective and well tolerated in patients undergoing pterygium excision.

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