

Clinical Study of Fibrin Glue Tissue Adhesive Versus Suture Technique for Conjunctival Autograft in Pterygium Surgery

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A B S T R A C T

Introduction: Pterygium is fibrovascular growth which starts from limbus & encroaches towards centre of cornea which causes redness of eyes, grittiness & watering of eyes. The aim of study was to clinically co-relate results of conjunctival closure in pterygium surgery using fibrin tissue adhesive versus 10 – 0 Black silk suture.

Material and Methods: The study was carried out in Prakash Hospital & Research centre, Islampur. A comparative study was performed in fifty patients (50 eyes) with nasal pterygium. All nasal pterygium surgeries were done using 10 – 0 Black silk sutures (25 eyes) and fibrin glues (25 eyes) to attach the conjunctival autograft from Jan 2018 to Jan 2019. Outcome measures were duration of surgery, complications, post operative discomfort & recurrence of pterygium. Follow up of post operative cases were done on 1st 7th, 14th & every 2 months there after. All data were evaluated by Statistical Methods comparative study was done in both groups in the form of operation period & rate of recurrence.

Results: Average operative time was 20 min (15 -20) in fibrin glue and 30 -45 min in suture group. The symptoms such as pain, photophobia, F. B. Sensation, watering & chemosis were significantly less in patients treated with, fibrin glue than suture. 2 cases of recurrence in suture group & 1 case of pyogenic granuloma in fibrin glue were reported.

Conclusion: The use of fibrin glue in pterygium surgery significantly reduces operative time and patient symptoms pain and discomfort.

Keywords: Fibrin glue, 10 – 0 Black Silk, Conjunctival Excision, Conjunctival Autograft.

INTRODUCTION

Pterygium is classified into various types as follows

Classification of Pterygium

- I) According to site - i. Nasal ii. Temporal
 II) According to progress - i. Progressive ii. Regressive
 iii. Recurrent

III) i. Type 1 ii. Type 2 iii. Type 3

IV) i. True Pterygium ii. Pseudopterygium

Treatment modalities for pterygium are medical line as well as surgical removal with bare sclera technique is easy method commonly done in India with chances of recurrence. After pterygium surgery the conjunctival defect can be corrected by use of either with amniotic membrane graft or conjunctival autograft. Use of tissue adhesive such as fibrin glue is most favourite method for securing conjunctival autograft. There is limitation of published data comparing fibrin glue versus 10-0 suture from the Indian subcontinent. Hence, we conducted this study to clinically correlate the results of conjunctival closure in pterygium surgery using fibrin glue tissue adhesive versus 10-0 Black silk.

MATERIAL AND METHODS

The study was conducted in Prakash Institute of medical

Sciences and research, hospital Islampur as per proper guidelines for doing research in human. The study was submitted to ethical committee of medical college for approval of article for departmental as well as college ethical committee we designed a clinical study to know the outcome of 10-0 Black silk suture and fibrin glue tissue adhesive for securing conjunctival autograft for comparative results. Fifty patients (fifty eyes) who presented at the outpatient department of Ophthalmology, hospital were included in the study after obtaining a well-informed consent, explaining the purpose, and potential risk of the surgical intervention.

Inclusion criteria

- Primary unilateral nasal pterygium coming for surgery and with any of the following indications for surgery—encroachment on center of cornea causing visual impairment due to affection on visual acuity & causing recurrent discomfort.
- Pterygium growth progressing >1 mm over the cornea from the limbus.

Exclusion criteria

- Patients on anticoagulants therapy.
- Patients having previous narrow or open angle glaucoma.
- Patients with diseases of eyelids & ocular surface

abnormalities for e.g., blepharitis, Sjogren syndrome, and dry eye

- History of previous ocular surgery or trauma.

The patients were allocated to Groups I and II according to their willingness to spend for the surgery. After doing all preoperative investigations 25 patients were undergone nasal pterygium excision with conjunctival autograft secured with 10-0 Black silk & named group I. The other 25 patients were undergone nasal pterygium excision and conjunctival autograft is secured with fibrin glue & named group II. The cost for 10-0 Black silk suture is Rs. 500 & for fibrin glue is Rs. 2800. The type of growth of pterygium was measured in terms of 2 parameters, the length of pterygium & the density of pterygium. The length of nasal pterygium was measured by slit lamp and density of pterygium was measured according system use by Tan et al. (Type 1: Atrophic, Type 2: Mild inflammation, and Type 3: Moderate/severe inflammation or showing active growth). All nasal pterygium excision surgeries were done under operating microscope. Operation time required for both methods were recorded. Pre & post operative corneal astigmatism was calculated in both groups & comparison was done Visual acuity, slit-lamp examination, and determination of intraocular pressure were performed after the operation. Post operative complications were noted as displacement of graft, break in graft, subconjunctival haemorrhage, chemosis, contracture, granuloma & degree of inflammation. Pterygium may grow after surgical excision. The study was conducted as per proper guidelines for conducting research in human subjects. The data was

submitted to ethical committee of department and medical college. The informed written consent of every patient was taken who were undergone nasal pterygium excision. Patient were divided into 2 groups 25 patients undergone pterygium excision with 10-0 Black silk suture securing for conjunctival autograft and other 25 patients were undergone nasal pterygium excision with securing conjunctival autograft with fibrin glue tissue adhesive, explaining them the complications related to procedure.

All the data were evaluated by standard deviation and statistical analysis method.

Peribulbar block was given, the head of the pterygium was excised from the cornea after giving a cut at its neck and body. The pterygium was excised with conjunctival scissors. conjunctival defect was measured with the help of castrovijo calipers, and 1 mm oversized free limboconjunctival graft was taken from the superior quadrant of conjunctiva of the same eye. The graft was placed on bare sclera with limbal side towards limbus. In Group I patients, 10-0 Black silk sutures were taken at 4 quadrants to secure graft to rest of conjunctiva. The suture ends are cut to minimize irritation. In group II drop of fibrin glue tissue adhesive poured over bare sclera and conjunctival autograft was placed over it to seal the defect. Cotton buds were used to secure graft in proper anatomical position and 3 min interval was given to allow the graft to adhere [Figure 2a-d]. The eye was patched with a sterile eye pad in both groups.

Postoperative follow-up: All patients were put on steroid- antibiotic combination drops (Moxifloxacin and Dexametholone). Dressing was done on the next day. Patients were followed for next 6 months. Post operative complications were noted on subsequent follow-ups on post operative day 1, 7, 14 and after 1 month for symptoms of pain, intolerance to light, watering on grade scale. Pain-grade 0: no pain, grade 1: pain on movement, grade 2: pain at rest. Photophobia- grade 0: no photophobia, grade 1: mild, grade 2: severe. Watering- grade 0: no watering, grade 1: outdoors in wind, grade 2: indoors. Recurrence was noticed by any new fibrovascular growth on same site of operation more than 1 mm.

RESULTS

All 50 patients with nasal pterygium undergoing pterygium excision and conjunctival autograft secured with 10-0 Black silk & fibrin glue tissue adhesive & completing follow-up of 6 months were studied.

Average operative time was 16 min (range, 12–20 min) in the fibrin glue group and 32 min (range, 30–45 min) in the Black silk suture group. The surgery time was less in fibrin glue

	Group I (suture group)	Group II (fibrin glue group)
No.	25	25
Age	47	42
Gender (%)		
Male	48	52
Female	52	48
Rural background	84	60
Urban background	16	40
Pterygium classification		
Type 2	13	13
Type 3	12	12
Length from limbus (mn)	2.32	2.26
Mean follow-up period (months)	14±1	13±1
Maximum follow-up period (months)	16	16
Minimum follow-up period (months)	10	10

Table-1: Statistical data of patients in the fibrin glue and suture group

	Day 1						Day 14					
	Group I			Group II			Group I			Group II		
	0	1	2	0	1	2	0	1	2	0	1	2
Watering	7	15	3	25	0	0	25	0	0	25	0	0
Chemosis	10	12	3	15	10	0	25	0	0	25	0	0
Photophobia	15	10	0	22	3	0	25	0	0	25	0	0
Pain	1	20	4	25	0	0	25	0	0	25	0	0

Table-2: Complaints of patients in fibrin glue and suture groups (day 1 and day 14 postoperative)

	6 months		Total	1year		Total
	Group I	Group II		Group I	Group II	
	(suture group)	(fibrin glue group)		(suture group)	(fibrin glue group)	
Dehiscence	0	0	0	0	0	0
Ridge	0	0	0	0	0	0
Pyogenic granuloma	0	1	1	0	1	1
Subgraft hemorrhage	3	0	3	3	0	3
Chemosis	15	2	15	15	2	15
Contracture	0	0	0	0	0	0
Recurrence	2	0	2	4	0	4

Table-3: Postoperative Complications associated with pterygium excision in the fibrin glue and suture groups (6 months and 1-year follow-up)

group as compared to suture group. Bleeding was seen in two patients of suture group (Group I). Patient complaining of eyeache, grittiness & watering were noticed for every group and values were compared to standard statistical analysis methods. All complaints at 1st, 7th, days were significantly less in fibrin glue [for chemosis and photophobia (P = 0.001) for pain and watering (P < 0.001)] [Table 2]. Preoperative BCVA(best corrected visual acuity) was (suture group with visual acuity 6/6 (28%) and with 6/9 (60%) with 6/12 (12%). For Glue group with visual acuity 6/6 (16%) with 6/9 (36%) with 6/12 (48%) and BCVA day 1 postoperative was (suture group with visual acuity 6/6 (88%) 6/9 (12%) and for glue group with visual acuity 6/6 (100%) (P = 0.83) and BCVA at 1 month after the operation was 6/6 in both groups. Corneal

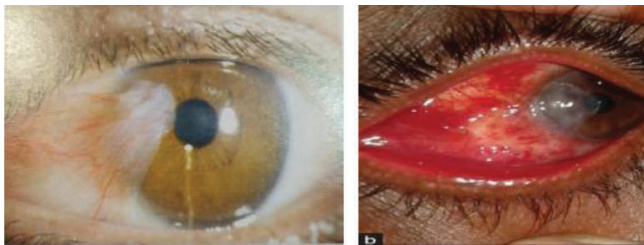


Figure-1 (a) Presurgical photograph of the suture group 1) Postsurgical photograph suture group

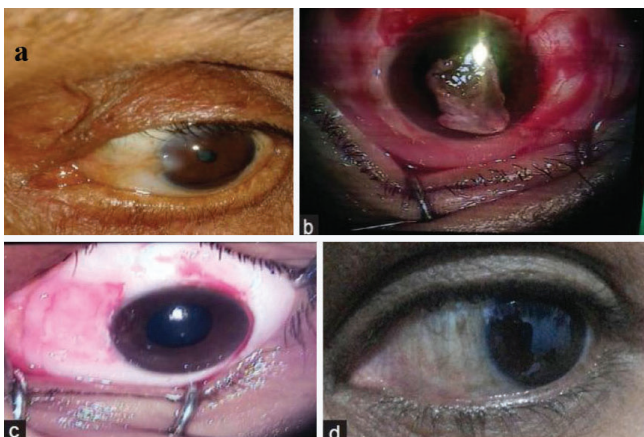


Figure-2: (a) Presurgical fibrin glue group (b) Intraoperative with the free conjunctival graft (c) Intraoperative conjunctival graft attached with fibrin glue (d) postoperative fibrin glue group

Name	Type	Number of patients	Technique	Follow-up	Recurrence
Uy et al., 2005 ¹⁷	Randomized clinical trial	22	11 cases fibrin glue, 11 cases sutures	2 months	No
Bahar et al., 2007 ¹⁹	Randomized clinical trial	181	42 fibrin, 39 vicryl suture	1 year	11.9% fibrin, 7.7% with vicryl
Huevera et al., 2012 ²³	Retrospective study	51	14 suture and 37 fibrin glue	49.06 months	4 suture group 2 glue group
Jiang et al., 2008 ²⁴	Prospective	40	20 fibrin glue, 20 nylon 10-0 suture	1 years	5% with fibrin, 10% with nylon
Hall et al., 2009 ²⁰	Randomized clinical trial	50	25 fibrin, 25 vicryl	1 year	None with fibrin, 4% with vicryl
Rubin et al., 2011 ²⁶	Randomized Clinical trial	47	21 fibrin, 26 nylon 10 to 0	6 months	4.76% fibrin, 7.69% suture
Current study	Prospective	50	25 fibrin, 25 10-0 Black silk	Maximum 16 months Minimum 10 months	0% in fibrin, 12% with suture

Table-4: Statistical analysis about pterygium recurrence after surgery using a conjunctival autograft

astigmatism was (suture group = 2.256 diopters) (glue group = 2.372 diopters) significantly reduced in the both group to (suture group = 0.392 diopters) (glue group = 0.368 diopters). Postoperative visual acuity in both groups i.e. suture group & fibrin glue group having not that much difference. There was 2 cases of subconjunctival hemorrhage in the suture group (8%) and none in fibrin glue group. In case of fibrin glue group, there was 1 case of pyogenic granuloma (4%) There were no other complications recorded.

There were 2 cases of recurrence in group I at 2 months follow-up, and further, one case was added at 1-year follow-up. No recurrence was found in group B. The recurrences occurred in the 4th (1 patient) and 6th months (1 patient), 10 months (1 patient) in the suture group [Table 3]

DISCUSSION

Various studies have shown that limbal stem cells play important role in prevention of overgrowth of conjunctiva over cornea in disease of pterygium. Deficiencies of limbal stem cells play role in developing pterygium causing overgrowth of conjunctiva over cornea. This is important in primary as well as recurrent pterygium. So the incidence of recurrence of pterygium can be minimized by implanting limbal stem cells at bare sclera after securing it with conjunctival autograft. So the surgical excision of pterygium with conjunctival autograft is better line of treatment for avoiding recurrence & good result. It is studied that conjunctival autografting is better choice than just pterygium excision & amniotic membrane graft to avoid recurrence. Care should be taken to secure graft in anatomical position to implant LSC in position. Other therapies such as mitomycin-C, β -irradiation, and excimer have also treatment of pterygium with conjunctival autograft having best result rates

These grafts have been attached to the bare sclera bed using sutures. 10-0 Black silk sutures will induce inflammatory response in the form of symptoms of pain foreign body sensation & watering. The inflammatory response of sutures is believed to cause recurrence. Operation time in sutures group is more compared to glue group due to lengthy procedure & in some cases suture should be removed later on to lower irritation. Fibrin glue is tissue adhesive having blood derived products consisting of fibrinogen & thrombin component. Fibrin glue has also used in neurosurgery for the repair of dural leaks and for the treatment of atrophic rhinitis.⁹⁻¹¹

In ophthalmology, fibrin glue is being used in squint surgery, corneal surgery, amniotic membrane transplantation, and conjunctival closure following pterygium.¹²⁻¹⁴ In our study, one case of pyogenic granuloma was observed in fibrin glue group during the 2nd month follow-up and no cases of it in suture group. The exact mechanism involved in the formation of pyogenic granuloma has not known, but inflammatory response with abnormal endothelial cell growth, cytokines and fibroblast active response is noted. So it is better to secure graft in anatomical position to play role of LSC to prevent recurrence. We believe that pyogenic granulomas in this study were associated with a hyperactive inflammatory change in the circumstance of abundant vascular endothelial cell growth factors originated from ischemic tissue damage. It can lead to fibrosis or recurrence, causing the harms to

outweigh the advantages of less inflammation in the glued conjunctiva. There was not much difference in visual acuity in pre & post surgical cases. No any difference in corneal astigmatism was noted in both groups.

This suggested that both the techniques are equally good in these aspects. There were three episodes of subconjunctival hemorrhage in the suture group. Uy et al.,¹⁷ in their series of 22 patients, used fibrin glue in 11 patients, and 10/0 nylon suture in other 11 patients and compared two groups in terms of postoperative pain, foreign body sensation, and watering complaints. They concluded that all the complaints were significantly less in fibrin group [Table 4]. A significant difference was noted between the incidence of pain, photophobia, chemosis, and watering among the day 1 postoperative patients of fibrin glue group versus the suture group. This correlates with the other studies suggesting all symptoms are significantly less in glue group. All the postoperative patients recovered by day 14 postoperative in the suture group.

The recurrence rate of pterygium, depending on the surgery type such as glue-assisted or suture-assisted autografting, has been a matter of controversy. Some reports^{1,18} documented that the fibrin glue group showed lower recurrence rates than the suture group, whereas other reports¹⁹ stated the converse. Hall et al.²⁰ reported similar recurrence rates for the two groups. In our study the less number of patients and a short follow-up period could not determine the long-term recurrence rate of glue-assisted pterygium surgery. We believe that less inflammatory response in early postoperative period may be due to chances of recurrence. In our study, there were 2 cases of recurrence in Group A at 6 months follow-up and further 1 case at 1-year follow-up. There was no recurrence in Group B. Yüksel et al.²¹ conducted a prospective study on 58 cases and observed patients symptoms were significantly less in the fibrin glue group as compared to the suture group. There were 2 cases and 1 case of recurrence in the suture group and fibrin glue group, respectively. Farid and Pirnazar²² conducted a retrospective study to evaluate the rate of recurrence after pterygium excision with autograft in 47 eyes. The recurrence rate in tissue adhesive group was 3.7% compared to 20% in suture group ($P = 0.035$). Karalezli et al.¹ compared the use of fibrin glue versus sutures for fixating conjunctival autografts in 50 patients undergoing pterygium excision. Pterygium recurrence was not observed in fibrin glue group and two eyes (8%) in suture group ($P < 0.05$). However, according to Marticorena et al., Uy et al.,¹⁷ and Koranyi et al.,¹⁸ there was no recurrence in either group.

Regarding other complications in glue-assisted pterygium surgeries, previous reports did not present much of a difference between glue-assisted and conventional pterygium surgeries.

CONCLUSION

The use of fibrin glue tissue adhesive to attach the free conjunctival autograft in pterygium surgery reduces operating time, less postoperative discomfort, and no recurrence rate compared to 10-0 Black silk sutures. Shorter surgery times reduces the incidence of infection and minimize operation

time. The patients will return to their normal life due to grater post operative comfort.

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