

Original article:

Clinical outcome of Conjunctival auto-grafting in Pterygium surgery using Fibrin glue and sutures

Dr Yusuf Rizvi¹, Dr Pragya Rai², Dr Ashutosh Dokania³

¹Assistant Professor Department of Ophthalmology, Rohilkhand Medical College, Bareilly.

²Resident, Department of Ophthalmology, Rohilkhand Medical College, Bareilly.

³Professor Ophthalmology, Rohilkhand Medical College, Bareilly.

Corresponding Author: Dr Yusuf Rizvi, Department of Ophthalmology, Assistant Professor
Rohilkhand Medical College, Bareilly- 243006

Abstract:

Background; Conjunctival auto-grafting in Pterygium surgery has been well accepted. Both tissue adhesives and sutures have been employed to affect a smooth graft. Comparative evaluation of clinical outcomes using either fibrin glue or sutures for graft fixation are few and need objective assessment.

Purpose: To compare clinical parameters of conjunctival auto-graft fixation following Pterygium surgery using either fibrin glue or sutures.

Settings & Design; A prospective randomised study conducted on patients undergoing Pterygium surgery with conjunctival auto-graft fixation employing either sutures or commercial fibrin glue at Rohilkhand Medical college, Bareilly, performed by a single surgeon during a study period of July 2013 & December 2014.

Methods; 64 eyes of 60 patients with progressive Pterygium undergoing excision surgery with conjunctival auto-graft fixation were categorized into 2 study groups on the basis of mode of graft fixation. Group A patients had graft fixation with 8/0 Polygalactin sutures while in Group B, commercial fibrin glue was used to achieve graft adherence. Primary outcome measures evaluated were surgical time, postoperative congestion, lacrimation, foreign body sensation & graft adherence. Statistical analysis was done employing SPSS version 17 software on the computer.

Results; Mean age of Group A patients (41.83 ± 3.92) years compared well with mean age of group B, (39.64 ± 3.74). Maximum patients reported were in the fourth decade of life (33.2%). Marked male preponderance was noted with 40 males in a total of 60 patients. Mean duration of surgery for fibrin glue group was 19.67 minutes, which was significantly less than mean duration for suture group, 33.52 minutes; $p < 0.001$. Overall patient comfort was also noted higher in the glue group, with a significantly lower postoperative mean grade congestion of 0.16 against 0.68 of suture group at week 1; $p = 0.0008$. Similarly Mean grade of postoperative lacrimation of 0 against 0.72, foreign body sensation of 0.16 against 1.28 and graft adherence of 0 against 0.12, at the end of first week highlighted a better clinical efficacy of the glue adhesive technique in comparison to sutures. A single case of recurrence was noted at 6 months follow up with suture technique against none following glue adhesion.

Conclusion; Conjunctival auto-grafting in Pterygium surgery employing fibrin glue is a superior technique in terms of clinical efficacy & patient comfort when compared to graft apposition with sutures.

Key Words: Conjunctival auto-graft, Fibrin glue, Pterygium excision

Introduction

Pterygium is described as a wing shaped fibro-vascular tissue that has proliferated on to the cornea.^[1] It is one of the oldest ocular disease known in the history of medicine with a reported

prevalence varying from 0.7% to 31%.^[2] The disease is particularly prevalent in the tropical zones suggesting a causal role of ultra violet radiation & exposure to heat, dry, windy conditions.^[1,3] Histologically it is explained as a

hyaline & elastotic degeneration of subconjunctival tissue. Recent studies suggest dysplastic and fibroblastic cell invasion theory that partially explain accelerated recurrences following excision and even carcinoma in situ.^[6]

Treatment of Pterygium is essentially surgical. In tropical countries, it is the next common ophthalmic procedure after cataract surgery. Older techniques of Pterygium excision leaving a bare sclera behind have given way to a number of modifications that include head transposition, application of anti-mitotics like Mitomycin C & amniotic membrane grafting.^[7] Currently Conjunctival auto-grafting following Pterygium excision is accepted as the established procedure with least reported recurrence.^[8] This may be modified to encompass limbal stem cell transplantation to achieve better results. Harvested graft is usually from the supero-temporal bulbar conjunctiva with fixation achieved through interrupted sutures of either 10/0 Nylon or 8/0 Polygalactin (VICRYL) sutures. Such grafts carry the limitation of greater postoperative pain, congestion, watering besides an increased surgical time. Trial of tissue adhesives like fibrin glue have accorded better results. Fibrin glue is commercially available as Reliseal or Baxter proprietary preparations. Admixture of its twin components fibrinogen & thrombin simulate natural physiological phenomenon of blood clotting. The formed viscous clot arrests bleeding, glues adjoining tissues & supports healing process. More importantly it gets absorbed naturally through endogenous fibrinolytic enzymes causing minimal tissue reaction. Studies scrutinizing graft adherence with the twin procedures of sutures and fibrin glue are few. This study had been envisaged to examine the postoperative outcomes of these procedures and statistically compare their clinical efficacies.

Materials & methods

This was a prospective randomized comparative study conducted on 64 eyes (60 patients) with primary Pterygium undergoing surgical intervention during the study period between July 2013 & December 2014. A written informed consent was taken from all patients following clearance from the Institutional Ethical board. A random assignment was done regarding the opted surgical technique for all eyes undergoing surgery. 32 eyes underwent Conjunctival auto-grafting employing 8/0 Vicryl interrupted sutures. Remaining 32 eyes had auto-graft fixation with tissue adhesive fibrin glue. Tisseel fibrin glue kit (fibrin sealant) by Baxter, Vienna was used for 3 to 4 patients in a single sitting. A single surgeon performed all surgeries in order to curtail surgeon related factors influencing the outcome of the study.

The inclusion criteria was, all patients presenting with primary progressive Pterygium encroaching at least 2 mm on to the cornea.

Exclusion criteria included the following;

- (i) Patients with Recurrent Pterygium
- (ii) Patients with stationary regressive Pterygium unlikely to threaten vision
- (iii) Patients with ocular surface infection or pre-existing epiphora
- (iv) Patients with ocular trauma
- (v) Any systemic disease likely to affect surgical outcome like Diabetes mellitus, collagen disease or bleeding disorders.

Surgical Technique: All cases were taken for surgery under peribulbar anaesthesia with 1 cc of 2% Xylocaine additionally injected subconjunctivally beneath the body of Pterygium & the graft harvesting site at the supero-temporal quadrant of bulbar conjunctiva. Head dissection of Pterygium was undertaken with crescent blade, while body was carefully dissected till the insertion

of horizontal rectus muscle. Following removal of underlying tenons, the exposed bare sclera was measured with callipers. A 1 mm oversized, tenon free conjunctival graft was fashioned from bulbar conjunctiva at the supero temporal aspect of interpalpebral fissure with careful dissection to include limbal stem cells. The graft was kept epithelial side up onto the bare scleral surface.

In suture group, the graft was carefully secured with 8-10 interrupted sutures of 8/0 Vicryl.

Graft in the glue group was attached with admixed components of fibrin glue, using a dual injector syringe. A single drop each of the constituted glue was spread over bare scleral surface & beneath the conjunctival graft. Firm pressure applied with a cotton tipped applicator for 2-3 minutes to ensure graft adhesion. A 0.5 ml of sub-conjunctival injection of Dexamethasone with gentamicin was given in the inferior fornix followed by pressure bandage of the eye for 24 hours.

Postoperative Evaluation: Surgical time was evaluated using a stop watch. Time interval commencing from placement of bridge suture to the application of sub-conjunctival injection was recorded as the surgical time for each conducted surgery.

Grading of postoperative congestion was done as per the suggested norms of a Toronto University study^[2],

Grade 0 : No dilated corkscrew vessel in graft

Grade 1 : 1 bright red dilated corkscrew vessel crossing the graft bed margin

Grade 2 : 2-3 bright red dilated corkscrew vessels crossing the graft bed margin

Grade 3 : > 3 bright red dilated vessels crossing the graft bed margin

Grading of postoperative lacrimation was adapted from the suggested norms by Lim^[3] using a subjective scale from 0 to 4. Grading of postoperative foreign body sensation was similarly

carried on a scale of 0-3 as suggested by Karalezli.^[4]

Graft adherence was scaled as per the Toronto University guidelines as noted^[2];

Grade 0: apposition of graft on all 4 sides

Grade 1: Gaping/ displacement noted on 1 side of graft

Grade 2: Gaping noted on 2 sides

Grade 3: Gaping noted on 3 sides of graft

Grade 4: Graft completely displaced from scleral bed

All clinical parameters were evaluated on the next postoperative day, following 1 week, 2 weeks & 6 weeks.

Postoperative management schedule for all operated cases was similar that included a steroid antibiotic drop combination of 0.5% Moxifloxacin and 1% Prednisolone acetate started from the first postoperative day. The combination was initially prescribed 6 times a day that was subsequently tapered to 4, 3 & 2 times in subsequent weeks. Sutures were removed after 1 month for all patients in the suture group. A late followup of 6 months was carried out to observe recurrence.

Results

The composite demographic features of the suture group (group A) and fibrin glue group (group B) of patients were comparable. Mean age of Group A patients was 41.83 ± 3.92 as compared to Group B, 39.64 ± 3.74 years: ($p > 0.05$). Male female ratio of Group A was 21 : 09 as compared to 19 : 11 in Group B. The mean duration of surgery was markedly less in the Fibrin glue group; 19.67 (Range 14.45 to 23.78) minutes. This contrasted with a much longer mean surgical time of 33.52(Range 27.33 to 43.46) minutes. This was a highly significant difference, $P < 0.001$.

On a numerical basis postoperative congestion on the first day showed near equivalence between the 2 groups. 19 patients of fibrin glue group & 18 of suture group showed Grade 1 congestion; ($p =$

0.1563). In the fibrin glue group 2 patients had absolutely quiet eye with a grade 0 congestion, while none had grade 3 congestion. None of the suture group patients had grade 0 congestion while 5 had grade 3 congestion on next postoperative day. Mean grade postoperative congestion was 1.32 in the fibrin glue group and 1.64 in suture group, on first postoperative day (p= 0.0952). But at the end of first week, postoperative congestion was significantly less in fibrin glue group, 0.16 against 0.68 in suture group (p = 0.0008); Refer table-2. Difference in Mean grade congestion was significantly less at all subsequent observed intervals; Refer table- 3. While complete resolution of congestion was observed by second week in fibrin glue group, 7 of the 32 eyes continued to have a grade 1 congestion in suture group, even after 6 weeks postoperatively. Other clinical parameters of patient comfort including postoperative lacrimation and foreign body sensation revealed a significantly improved outcome for fibrin glue group, particularly from first week onwards. Highly significant differences were noted in postoperative lacrimation from the

Table 1 – Group wise Mean duration of surgery

Technique	Mean duration of surgery ± SD (minutes)
Group A (Suture technique group)	33.52 ± 5.163
Group B (Fibrin glue group)	19.67 ± 4.714

Table 2 - Numerical distribution of Postoperative congestion

Grade of congestion	No. of patients (Day – 1)		No. of patients (Week – 1)		No. of patients (Week – 2)		No. of patients (Week – 6)	
	Group - A (sut)	Group - B (FG)	Group A (sut)	Group - B (FG)	Group A (sut)	Group- B (FG)	Group A (sut)	Group B (FG)
Grade 0	0	02	10	24	21	31	25	32
Grade 1	18	19	12	07	11	01	07	0
Grade 2	09	11	07	01	0	0	0	0
Grade 3	05	0	0	0	0	0	0	0
X ² value	5.213		21.427		10.983		10.867	
P value	0.576		< 0.0001		0.0009		0.0009	

very next postoperative day in favour of fibrin glue group with p values of 0.003, 0.001 & 0.001 at day 1, week 1 & week 2, respectively; Refer table 4. However this parameter was comparable between the two groups, at 6 weeks postoperatively, probably due to suture removal, one month following surgery. Symptom of foreign body sensation was significantly less in fibrin glue group in the initial 2 weeks of observation with consistent p values of 0.0001; refer table 5. However there was no significant difference at 6 weeks postoperatively, highlighting the role of suture knots in producing this symptom.

Degree of graft adherence was high for the patients in the fibrin glue group even though the extent of adhesion was comparable at 6 weeks with all 64 eyes revealing grade 0 adherence. This has to be weighed against the fact that 3 of the 32 patients among the suture group required re-suturing for graft dehiscence, 1 to 3 weeks after the initial surgery.

Only 38 of the 60 patients turned up for followup at 6 months. 1 of these patients of the suture group presented with recurrence.

Table 3 - Mean grade postoperative congestion

Postoperative congestion	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)
Day	Day - 1		Week - 1		Week - 2		Week - 6	
Mean grade	1.64	1.32	0.68	0.16	0.36	0.03	0.36	0
Range	0-3	0-2	0-2	0-1	0-1	0-1	0-1	0
SD	0.74	0.55	0.61	0.37	0.48	0.027	0.48	0
SE	0.15	0.11	0.13	0.07	0.10	0.012	0.10	0
P value	0.0952		0.0008		0.0006		0.0006	

Figure 1 – Graphical representation of mean postoperative congestion

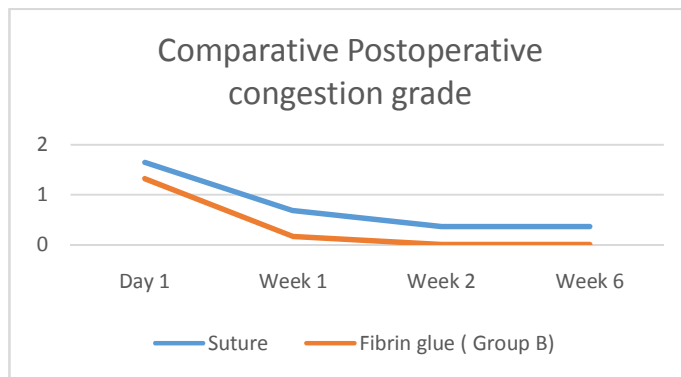


Table 4 - Mean grade postoperative Lacrimation

Postoperative lacrimation	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)
Day	Day - 1		Week 1		Week -2		Week - 6	
Mean grade	2.0	1.24	0.72	0	0.32	0	0	0
Range	0-3	0-2	0-2	0	0-1	0	0	0
SD	0.75	0.59	0.45	0	0.47	0	0	0
SE	0.15	0.12	0.09	0	0.10	0	0	0
P value	0.0003		0.0001		0.0001			

Table 5 - Mean grade foreign body sensation

Postoperative foreign body sensation	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)
Day	Day - 1		Week 1		Week -2		Week - 6	
Mean grade	2.56	0.8	1.28	0	0.56	0	0	0
Range	0-3	0-2	0-2	0	0-1	0	0	0
SD	0.50	0.63	0.45	0	0.50	0	0	0
SE	0.10	0.13	0.09	0	0.10	0	0	0
P value	0.0001		0.0001		0.0001			

Table 6 – Mean graft adherence grade

Postoperative graft adherence	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)	Group A (suture)	Group B (FG)
Day	Day – 1		Week 1		Week -2		Week – 6	
Mean grade	0.68	0.36	0.12	0	0.12	0	0	0
Range	0-1	0-1	0-1	0	0-1	0	0	0
SD	0.47	0.48	0.32	0	0.32	0	0	0
SE	0.10	0.13	0.07	0	0.07	0	0	0
P value	0.0234		0.0767		0.0767			

Discussion

Conjunctival auto-grafting has currently been accepted as the procedure of choice for surgically managing Pterygium.^[8] The technique has reported least recurrence (2-39%) when compared to Bare sclera, head transposition, primary closure & amniotic membrane grafting. Graft apposition has been conventionally tried with sutures. This procedure poses additional challenge in the form of increased surgical time, suture related complications like granuloma formation and giant papillary conjunctivitis in addition to occasional graft rejection. Tissue bio-adhesives promise quick membrane reposition in addition to reduced postoperative complications.^[9] Fibrin based adhesives first introduced in 1909 have gained popularity on account of their low inflammatory reaction & natural bio-degradable properties.^[10,11] These adhesives have a lower tensile strength in comparison with Cyanoacrylate adhesives. Fibrin glue has one part consisting of fibrinogen mixed with factor XIII and aprotinin. Other part consists of thrombin and calcium chloride solution. Both parts are prepared from banked and well controlled human blood. Mechanism of action is by thrombin which splits the fibrino-peptides into fibrin monomers that aggregate by cross linking forming a fibrin clot. Speed of coagulation is determined by Thrombin concentration.

Serum based autologous fibrin glue even though economical faces the difficulty of preparation and inconsistencies in bio-adhesion due to low concentration of thrombin & fibrinogen. In a study by Singh PK et al^[12] that compared outcome of conjunctival grafting achieved by fibrin glue to that of autologous blood, a higher graft displacement and retraction was noted in the autologous blood group.

Commercially available Fibrin glue even though expensive & carrying risk of HIV transmission has been found efficacious in routine settings. Its cost factor can be curtailed by clubbing cases in a single OT as was tried during the study.

Kenyon and associates were first to describe transplantation of free autografts of superotemporal bulbar conjunctiva from same eye to close wounds following excision of advanced or recurrent pterygium. Nearly 80% of the 57 eyes they tried the technique, had recurrent pterygium. After a mean follow-up of 2 years they reported a recurrence in only 3 (5.3%) eyes.

Uy et al^[10] conducted a study on 22 patients with primary pterygium that underwent auto-graft procedure using fibrin glue and 10 0 Nylon sutures. They reported a shorter operating time and less postoperative discomfort with the use of fibrin glue. These results were substantiated by other studies that used Tisseel or Tissucol Duo as fibrin adhesive.^[11,14-16] Most glaring observation of all

these studies was the much reduced surgery time that helped in reducing patient morbidity.

Our own study reports a surgical duration time of 19 and 33 minutes for glue & suture technique respectively that compares well with reported times of 16 and 28 minutes by Bahar et al^[11] in their large series of 81 patients.

Postoperative complications were minimally reported with fibrin glue autografts. Srinivasan et al^[13] in a cohort study of 62 patients with fibrin glue auto-graft, reported graft dehiscence in 2 eyes. They concluded that intense eye rubbing in early postoperative period can lead to graft dehiscence. Our study noted graft retraction & dehiscence in 3 eyes in suture group that needed subsequent re positioning. None of the glued grafts presented with any dehiscence. Similarly recurrence was not observed in any patient with fibrin glue apposition as against 1 in suture group. In a prospective study on 35 eyes with primary pterygium intervened with autografts using both fibrin glue & vicryl sutures, Ritu Arora et al^[14] reports a recurrence in 2 of the 12 cases with suture adhesion against none with glue adhesion. Comparing histopathologically 24 eyes with primary pterygium undergoing limbal conjunctival autograft with vicryl & tissue glue, Ozdamar et al^[15] report improved histopathological status of graft with tissue glue, 6 months following surgery.

A number of studies designed on similar lines concur with the marked superiority of fibrin glue effected conjunctival graft adhesion as against sutures in terms of surgical time, patient morbidity & comfort and reported recurrence.^[15,16] Few

studies however examine the individual parameters of patient comfort on an objective scale. Our study noted a significantly less postoperative discomfort features of lacrimation and foreign body sensation in the fibrin glue group from the very next day. This gap widened with more significant differences noted at end of 1 & 2 weeks. However the differences seemed to resolve by 6 weeks with comparable indices ($p=$). Both lacrimation & foreign body sensation were suture related adversities of this surgery and hence resolved naturally following suture removal. Postoperative congestion was comparable on the immediate postoperative day as evidenced both numerically as well as mean congestion grade. The similarity was however short lived with patients from the glue group evidencing a quieter eye from the first week ($p = 0.0008$). Minimal congestion is noted to linger in suture group patients even 6 weeks after surgery despite suture removal at 4 weeks. Graft adherence has been equivocal for both groups as evidenced by higher p values, ($p>0.05$) despite 3 cases of suture group requiring re-suturing for graft dehiscence.

Even though just 1 case has reported with recurrence in the suture group, the propensity for suture related recurrence can't be undermined especially when the sample size is small & only 38 of the 64 cases reported for follow up.

Conclusion

Fibrin glue effected conjunctival autografting is a quicker, safer & patient friendly technique in pterygium surgery when compared to suture fixation of graft.

References

1. Moran DJ, Hollows FC. Pterygium and ultraviolet radiation : a positive correlation. Br J Ophthalmol 1984; 68 : 343-6
2. Srinivasan S, Dollin M, McAllum P, Berger Y, Rootman DS, Slomovic AR. Fibrin glue versus sutures for attaching the conjunctival autograft in pterygium surgery : a prospective observer masked clinical trial. Br J Ophthalmol. 2009 Feb ; 93(2) : 215-218.

3. Lim-Bon-Siong R, Valluri S, Gordon M, et al. Efficacy and safety of the ProTek (Vifilcon A) therapeutic soft contact lens after photorefractive keratectomy. *Am J Ophthalmol* 1998 ; 125 : 169-76.
4. Karalezli A, Kucukerdonmez C, Akova YA, Altan-Yaycioglu R, Borazan M. Fibrin glue versus sutures for conjunctival autografting in pterygium surgery : a prospective comparative study. *Br J Ophthalmol*. 2008 Sep; 92(9) : 1206-1210.
5. Darrel RW, Bachrach CA. Pterygium among veterans : an epidemiological study showing a correlation between frequency of pterygium and degree of exposure of ultraviolet in sunlight. *Arch Ophthalmol* 1963; 70 : 158-69.
6. Clear AS, Chirambo MC, Hutt MS. Solar keratosis, pterygium and squamous cell carcinoma of the conjunctiva in Malawi. *Br J Ophthalmol*. 1979; 63 : 102-9.
7. Rosenthal JW. Chronology of Pterygium therapy. *Am J Ophthalmol*. 1953 Nov; 36(11) : 1601-1616.
8. Prabhasawat P, Barton K, Burkett G, Tseng SC. Comparison of conjunctival autografts, amniotic membrane grafts and primary closure for pterygium excision. *Ophthalmology*. 1997; 104 : 974-85.
9. Koranyi G, Seregard S, Kopp ED. Cut and paste : a no suture small incision approach to pterygium surgery. *Br J Ophthalmol*. 2004; 88 : 911-4.
10. Uy HS, Reyes JMG, Flores JDG, Lim-Bon-Siong R. Comparison of Fibrin glue and sutures for attaching conjunctival auto-grafts after pterygium excision. *Ophthalmology*. 2005. April; 112(4) : 667-671.
11. Bahar I, Weinberger D, Gaton DD, Avisar. Fibrin glue versus vicryl suture for primary conjunctiva closure in pterygium surgery : long term results. *Curr Eye Res*. 2007 May ; 32(5) : 399-405.
12. Singh PK, Singh S, Vyas C, Singh M. Conjunctival autografting without fibrin glue or sutures for pterygium surgery. *Cornea*. 2013 Jan; 32(1) : 104-7.
13. Srinivasan S, Slomovic AR. Eye rubbing causing conjunctival graft dehiscence following pterygium surgery with fibrin glue. *Eye (Lond)*. 2007 Jun; 21(6) : 865-867.
14. Ritu Arora, J L Goyal, Jasneet Kang, Sudha Seetaram. Fibrin glue versus vicryl suture in limbal conjunctival auto graft in the management of primary pterygium : A prospective comparative study. *Curr Eye Res*. Aug 2008 to Mar 2009.
15. Ozdamar Y, Mutevelli S, Han U, Ileri D, Onal B, Ilhan O, et al. A comparative study of tissue glue and vicryl suture for closing limbal- conjunctival autografts and histologic evaluation after pterygium excision. *Cornea*. 2008 Jun; 27(5) : 552-558
16. Dong Min Cha, Kyeong Hwan Kim, Hyuk Jin Chol, Mee Kum Kim, Won Ryang Wee. A comparative study of the effect of Fibrin glue versus sutures on clinical outcome in patients undergoing pterygium excision and conjunctival autografts. *Korean J Ophthalmol*. 2012 ; 26(6) : 407-413.