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A Comparative Analysis Of The Effect Of Fibrin Glue Versus Sutures On Clinical Outcome In Patients Undergoing Pterygium Excision With Conjunctival Autografts

Ophthalmology

KEYWORDS: Conjunctival autograft, Fibrin glue, Pterygium excision , suture

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ABSTRACT

Purpose: To compare the effect of using fibrin glue or 10-0 nylon sutures on the clinical outcome of patients undergoing pterygium excision and conjunctival autografting.

Methods: We took 44 patients who underwent pterygium excision and conjunctival autografting and were followed up for more than 3 months. The operation duration, postoperative inflammation, complications, and recurrence rates were compared between groups of 21 patients (21 eyes) for whom fibrin glue was used (fibrin glue group) and 23patients (23 eyes) for whom suturing was performed with 10-0 nylon (suture group) in pterygium excision and conjunctival autografting.

Results: The operation duration was 25.45± 4.32 minutes in the fibrin glue group and 42.40 ±7.48 minutes in the suture group (p = 0.0001). Seven days after the operation, the fibrin glue group showed milder conjunctival inflammation than the suture group (p = 0.000). Postoperative complications and corneal recurrence rates were not statistically different between the two groups.

Conclusions: The use of fibrin glue in pterygium excision with conjunctival autografting is likely to be a more effective, safer procedure than suturing.

INTRODUCTION

Pterygium is a wing-shaped fibrovascular tissue that has proliferated onto the cornea. Ultraviolet radiation and hot, dusty, windy, dry, smoky environments are regarded as risk factors for pterygium [1-3]. Surgical removal is the treatment of choice, and pterygium removal with conjunctival autografting has been considered the best and most suitable approach that can lower the recurrence rate of pterygium [4].

Conjunctival autografting using fibrin glue is an emerging theme in pterygium surgery in recent years. Many reports, dating back to the early 2000s, have stated that operation duration and postoperative symptoms such as pain, photophobia, and foreign body sensation decreased when fibrin glue was used as a substitute for suturing in pterygium surgery [5-9].

In this study, we retrospectively compared the efficacy, postoperative inflammation, complications, and recurrence rates between a group of Asian patients for whom fibrin glue was used (fibrin glue group) and that for whom 10-0 nylon was used (suture group) in pterygium excision and conjunctival autografting.

MATERIALS AND METHODS

We studied 44 patients who underwent pterygium excision and conjunctival autografting

(using fibrin glue in one group and sutures in another) from march 2016 to december 2016 at Department Of Ophthalmology at M.L.B Medical College, Jhansi.

Inclusion criteria were as follows:

1. Primary unilateral nasal pterygium consenting for surgery and with any of the following indications for surgery – encroachment on visual axis, inducing visually significant astigmatism, causing recurrent irritation, or cosmetically bothersome to the patient. (progressive pterygium).
2. Pterygium growth >1 mm over the cornea horizontally from the limbus
3. a follow-up period of more than 3 months after surgery .

Exclusion criteria

1. Patients with recurrent pterygium, which is accompanied by symblepharon or limitation of duction.
2. Patients on anticoagulants
3. Patients with preexisting glaucoma
4. Patients with immune system disease, eyelid or ocular surface diseases, for example, blepharitis, Sjögren syndrome, and dry eye
5. History of previous ocular surgery or trauma

Informed consent was obtained from all patients. The study sample finally consisted of 44 patients (44 eyes): 21 patients (21 eyes) in the fibrin glue group and 23 patients (23 eyes) in the suture group.

Best-corrected visual acuity (BCVA), slit-lamp examination.. The degree of growth of the pterygium was evaluated in terms of the following 2 parameters: the length of the invading head from the limbus and density of the pterygium alone. The length of the invading head was calculated using a slit lamp, and the density of the pterygium was graded according to the system used by Tan et al. [10] (type 1: atrophic, type 2: mild inflammation, and type 3: moderate/severe inflammation or showing active growth). Patients underwent surgery between march 2016 to december 2016 with conjunctival autografting using fibrin glue in one group and 10-0 nylon sutures in in another group .

Surgical technique

Surgery was performed under local anesthesia using 2% lignocaine . The pterygium was dissected from the apex using a straight beaver blade. The pterygium body and underlying fibrovascular tissues were delineated from the conjunctiva and removed. The upper conjunctiva was harvested and placed into the lesion. The grafted tissue was continuously sutured with 10-0 nylon, including 4 interrupted sutures, or it was sealed with fibrin glue. The sutures with

10-0 nylon were buried.

In the fibrin glue group, each syringe of fibrin glue, which is filled with clottable plasma protein or thrombin solution respectively, was prepared with a 24-gauge needle. These components were applied simultaneously to the exposed sclera, using as little as possible, by pushing the double syringe device at the same time. Both wound margins were held together with tooth forceps to ensure adhesion. Gentamycin and dexamethasone were injected into the inferior subconjunctival space for a total of 0.3 mL after the operation to reduce postoperative inflammation and prevent pterygium recurrence . The operation duration was considered as the time from when the lid retractor was placed until its removal at the end of surgery. After surgery, all patients were prescribed combination topical tobramycin and fluorometholone (tapered gradually) and topical carboxymethylcellulose as lubricating 4 times daily for 2 weeks.

Postoperative follow-up

BCVA, slit-lamp examination, and determination of intraocular pressure were performed at 1st day and 1,3 and 4 th Week and at 2 to 3 months after the operation. In the suture group, 10-0 nylon was stitched at the edges at 14 days after the operation, and the anchoring suture along with the limbus, which was supposed to reduce recurrence, was removed at 28 days after the operation. The anterior segment was photographed at 1 and 24 weeks after the operation, and corneal topography was examined at 4 weeks after the operation.

The degree of postoperative inflammation was classified into 3 grades: mild, moderate, and severe inflammation **(Fig. 1A-1C)**. Postoperative complications were examined, including dehiscence, dislodge, ridge, sub-graft hemorrhage, chemosis, necrosis, contracture, and granuloma. An additional stitch was taken in the case of a dislodged graft, and severe granulomas were surgically removed when medication could not reduce the granuloma. Recurrence of pterygium was defined as newly developed fibrovascular tissue invading the cornea to cross the limbus.

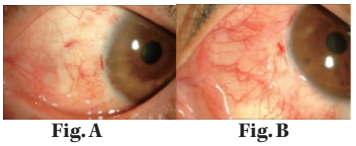

Fig. A **Fig. B**

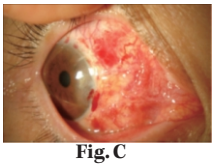

Fig. C

FIG. 1. (A-C) The standard anterior segment photographs showing inflammation at 1 week after the operation (A, mild inflammation; B, moderate inflammation; C, severe inflammation).

RESULTS

There were 10 men and 11 women in the fibrin glue group and 12 men and 11 women in the suture group. The mean age (SD) was 62.43 ± 9.44 years in the former and 54.96 ± 10.37 years in the latter. The mean head length of the pterygium from the limbus was 2.88 ± 1.24 mm and 2.92 ± 1.14 mm in the fibrin glue group and suture group, respectively (p = 0.92). In both groups, all the pterygiums corresponded to type 2 or type 3 . The mean follow-up period was 4.45 ± 1.5 months and 9.53 ± 2.99 months in the fibrin glue group and suture group, respectively (p = 0.0001) **(Table 1).**

TABLE 1. Demographic data of patients in the fibrin glue and suture group

	Fibrin glue group	Suture group	p-value
Number	21	23	
Gender			
Men	10	12	0.12
Women	11	11	
Age (yr)	62.43 ± 9.44	54.96 ± 10.37	0.017
Pterygium classification			
Thickness‡ (eyes)			
Type 2	13	14	
Type 3	8	9	
Length from limbus (mm)	2.88 ± 1.24	2.92 ± 1.14	0.92
Operative Time	25.45 ± 4.32	42.40 ± 7.48	0.00001
Follow-up period (mon)	4.45 ± 1.5	9.53 ± 2.99	0.00001

Values are presented as mean ± standard deviation.

Preoperative BCVA (logMAR) was 0.382 ± 0.09 and 0.23 ± 0.088 respectively in fibrin glue and suture group respectively and was insignificant **(Fig. 2A)** . Post operative BCVA after 1 month after was 0.39 ± 0.092 and 0.21 ± 0.088 in the fibrin glue and suture group respectively , the difference between these two parameters being significant (p = 0.001) **(Table 2).** However, corneal astigmatism was significantly reduced in the fibrin glue group from 5.11 ± 2.11 diopter to 0.91 ± 0.53 diopter (p = 0.0001) and similar significant reduction in astigmatism was found in suture group from 4.10 ± 1.43 to 1.38 ± 0.75**(Fig. 2B)** . Though postoperative reduction in astigmatism between the two groups were insignificant (0.24) .The operation duration was 25.45 ± 4.32 minutes in the fibrin glue group, which was remarkably shorter than that in the suture group 42.40 ± 7.48 minutes, p = 0.00001) **(Fig. 2C).** At 7 days after the operation, 8 out of 21 eyes (38.09%) showed moderate to severe conjunctival inflammation in the fibrin glue group, whereas 22 eyes (95.65%) in the suture group showed moderate to severe inflammation (p = 0.000) **(Fig. 2D).** After 21 days, conjunctival inflammation almost subsided in both groups, and the degree of conjunctival inflammation was not significantly different between the two groups.

TABLE 2. Ocular manifestations of patients in the fibrin glue and suture groups

	Fibrin glue group (21 eyes)	Suture group (23 eyes)	Total (44 eyes)	*p*-value *
Preoperative BCVA (logMAR)	0.382 ± 0.09	0.23 ± 0.09		0.45
Postoperative 1 mon BCVA (logMAR)	0.39 ± 0.092	0.21 ± 0.088		0.001
p-value	0.76	0.47		
Preoperative corneal astigmatism (D)	5.11 ±2.11	4.10 ± 1.43		0.70
Postoperative 1 mon corneal astigmatism (D)	0.91 ± 0.53	1.38 ± 0.75		0.24
p-value	0.0001	0.0001		

Values are presented as mean ± standard deviation.

Fig. 2A

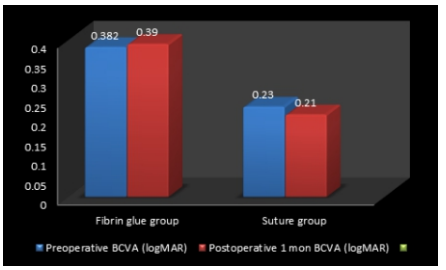

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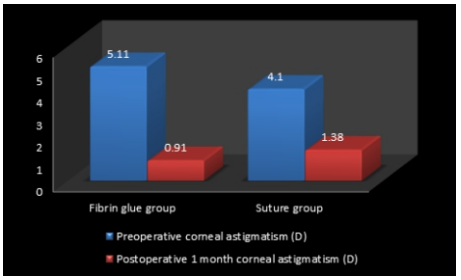
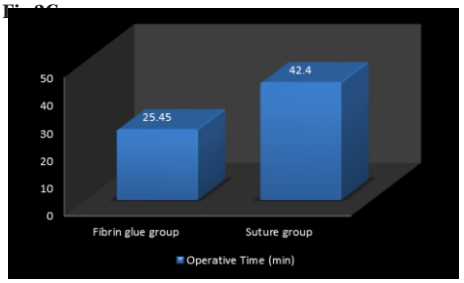
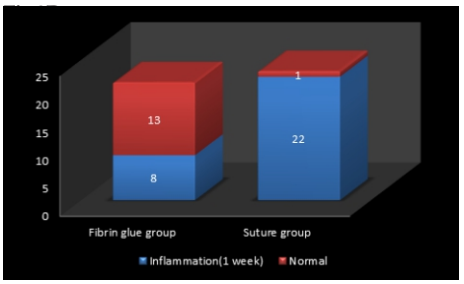
Fig 2B







The rate of complication, including dehiscence, ridge, proliferative granuloma, sub-graft hemorrhage, chemosis, dislodgement, and contracture, did not significantly differ between the two groups **(Table 3).**

The recurrence rate of corneal pterygium within three months of the surgery was 5.% (1 of 21 eyes) in the fibrin glue group and 22.0% (5 of 23 eyes) in the suture group; however, the difference in the recurrence rate was not statistically significant (p = 0.058).

TABLE 3. Complications associated with pterygium excision in the fibrin glue and suture groups

	Fibrin glue group (21 eyes)	Suture group (23 eyes)	p-value*
Inflammation(1 week)	08	22	0.00
Dehiscence	6	5	0.6
Ridge	3	1	0.25
Pyogenic granuloma	4	1	0.12
Sub-graft hemorrhage	6	9	0.46
Chemosis	2	3	0.67
Contracture	2	2	0.92

DISCUSSION

There are several kinds of surgeries that excise the pterygium and repair the conjunctiva. Among these, the excision of the pterygium with conjunctival autografting is considered to be the procedure of choice in terms of efficacy and long-term stability [4,12]. It was reported that the recurrence rate in the case of conjunctival autografting was much lower than that in the case of primary closure or amniotic membrane grafting [4]. Adjunctive therapies such as mitomycin C, β-irradiation, and excimer laser have also been used to decrease the recurrence rate of pterygium in spite of potentially sight-threatening side effects [13-15]. This is the basis for selecting conjunctival autografting as our surgical protocol.

Fibrin glue is a blood-derived product which consists of a fibrinogen component and a thrombin component. It imitates the final stages of the coagulation cascade when two components are mixed. Recently, its spectrum of use in medicine is broad, including neurosurgery, plastic surgery, surgery in otolaryngology, and eye surgery [16-18]. In ophthalmology, fibrin glue is being used in strabismus surgery, corneal surgery, amniotic membrane transplantation, and conjunctival closure following pterygium [19-21] . Using a questionnaire, Uy et al. [6] found that fibrin glue, when used for attaching conjunctival autografts, caused less postoperative discomfort than 10-0 nylon. Several other studies also reported similar results, but most of them used questionnaires to evaluate the degree of postoperative symptoms such as pain, photophobia, foreign body sensation, irritation, epiphora, and itching [5,7,8,22-24]. We supported these subjective findings of previous reports by evaluating an anterior segment photograph using an objective grading system.

Srinivasan et al. [9] also used standardized slit lamp photographs and demonstrated that fibrin glue produced less postoperative inflammation than suture. Our data showed some discrepancy with that reported by Srinivasan et al. [9]; they reported no difference in inflammation between the fibrin glue or suture group at 1 week, but inflammation was reduced significantly in the fibrin glue group after 1 to 3 months. On the contrary, we reported significantly less inflammation in the fibrin glue group than suture group at 1 week, and no difference in inflammation between these groups at 1 month. This disparity may be explained by the use of different suture material in each study. Srinivasan et al. [9] used multiple interrupted 10-0 polyglactin sutures that were slowly resolved over time. This could be a potential source of chronic inflammation. On the other hand, we used non-absorbable 10-0 nylon, which can trigger inflammation in the earlier period before removal of the stitches. After the stitches were removed at 10 to 14 days after the operation, there was no suture-related side effect on inflammation, which explains the absence of clinical inflammation at 1 month in our study. Nevertheless, our study corresponded well with Srinivasan et al. [9] who stated that fibrin glue was less likely to induce inflammation than suture. The main constituent of fibrin glue is the same as that found in human beings, and hence it is less immunogenic

Regarding other complications in glue-assisted pterygium surgeries, previous reports did not present much of a difference between glue-assisted and conventional pterygium surgeries [7,25]. However, we found that dehiscence was greater in glue-assisted pterygium surgery, albeit not significantly greater. In our study, 4 cases of pyogenic granuloma were observed in fibrin glue group and 1 case of it in suturing group. This incomplete adaptation between the glued conjunctiva can activate fibroblasts or cause grafts to necrotize. This raises the possibility of increasing the risk of fibrosis in the surrounding graft or recurrence of the pterygium if the graft does not survive. The exact mechanism involved in the formation of pyogenic granuloma has not been completely elucidated, but associations with abnormal vascular endothelial cell growth, cytokine abnormalities, and fibroblasts activation have been postulated [26,27].

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 [8,25] documented that the fibrin glue group showed lower recurrence rates than the suture group, whereas other reports [7] stated the converse. Hall et al. [23] reported similar recurrence rates for the two groups. In our study, the small number of cohort patients and a short follow-up period could not determine the long-term recurrence rate of glue-assisted

pterygium surgery. Nevertheless, we believe that less inflammation in the earlier postoperative stage may be related to a small chance of recurrence; this hypothesis corresponds with the result of a previous report on correlation between inflammation and recurrence [4].

CONCLUSION,

In conclusion , glue-assisted pterygium surgery shortened the operation duration and reduced early postoperative inflammation as compared to suture-assisted pterygium surgery. The difference in complication rates between the two groups did not reach statistical significance, although dehiscence and pyogenic granulomas were observed more frequently in fibrin glue group. Glue-assisted pterygium surgery seems to be another option for the pterygium surgery considering its comparable clinical outcome to suture-assisted pterygium surgery, and the fact that it is associated with less discomfort due to a sutureless wound.

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