

Comparison of fibrin glue and suture technique in pterygium surgery performed with limbal autograft

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Abstract

- **AIM:** To compare the efficiency and safety of fibrin glue to suture technique in pterygium surgery performed with limbal autograft.

- **METHODS:** A prospective randomised clinical trial was carried out in 58 eyes of 58 patients operated for primary nasal pterygium. Autologous conjunctival graft taken from the superotemporal limbus was used to cover the sclera after pterygium excision. In 29 eyes, the transplant was attached to the sclera with a fibrin tissue adhesive (Beriplast P) and in 29 eyes with 8-0 Virgin silk sutures. The Mann-Whitney χ^2 test was used for statistical analysis. Postoperative patient discomfort (pain, stinging, watering) and biomicroscopic findings (hyperemia, edema) were graded. Patients were followed up at least for six months.

- **RESULTS:** Subconjunctival hemorrhage occurred under the graft in one patient in group 1. In seven cases of group 2, sutures were removed at the 15th day because of granulomatous tissue reaction. Patient symptoms were significantly less and biomicroscopic findings were better in group 1. Pterygium recurrence was seen in one case of group 1, and 2 cases of group 2. Average surgery cost was higher ($P<0.05$) and surgery time was shorter ($P<0.05$) in fibrin group.

- **CONCLUSION:** Using fibrin glue for graft fixation in pterygium surgery causes significantly less postoperative pain and shortens surgery time significantly.

- **KEYWORDS:** fibrin glue; limbal autograft; pterygium surgery

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INTRODUCTION

Pterygium is an abnormal fibrovascular proliferative tissue extending to the cornea in interpalpebral area. There has been debate on its etiology, pathogenesis and treatment for years and there is still no consensus on these topics. Recently, limbal stem cell disturbances resulting from conjunctival exposure to ultraviolet light is most commonly accepted explanation for its occurrence. Recurrence of the pterygium is the most often problem encountered after surgery. Many studies have been done in last decade about pathogenesis and treatment of pterygium. Starting with bare sclera technique (D'Ombrain 1948), antimetabolic agents (Meacham 1962), amniotic membrane transplantation (Panzardi 1964) and autologous conjunctival transplantation (Kenyon 1985) are important developments in this era [1]. In autologous limbal conjunctival autograft technique, bulbar conjunctiva including limbal tissue is fixated on the exposed scleral bed after pterygium excision either sutures or fibrin glue. Reported recurrence rates with this technique are between 2% and 39% in the literature. Fibrin is a biologic glue. It is absorbable and easy to use. Fibrin glue can be stored at room temperature or in the refrigerator [2]. It is a blood derivative product. It mimicks the last step of the coagulation cascade. The tissue which will be used (amniotic membrane, conjunctival flap, lamellar corneal graft) for grafting must be prepared beforehand. Surface of the area which will be glued is dried with a cellulose sponge, fibrin glue is applied and the tissue prepared earlier is laid on. Excessive glue escaping through the tissue edge is removed either with a blunt instrument or a cellulose sponge [3]. In this prospective, randomised, and controlled clinical study, autologous limbal conjunctival autograft technique was performed on primary pterygium patients either with suture or fibrin glue. Two techniques were compared in terms of patient comfort, objective findings in the early post-operative period, duration and cost of the operations, as well as recurrence rates at six months.

MATERIALS AND METHODS

Materials Fifty-eight eyes of 58 patients with primary pterygium who were operated on between Jan. and Apr. 2009

were included into study. Informed consents were taken from all the participants before the surgery. Authors adhered to the tenets of the Declaration of Helsinki during study. After general ophthalmologic examination, patients were randomized to have surgery with fibrin glue (Group 1) or sutures (Group 2). If at least 5 patients were going to be operated on the same day, fibrin glue was chosen. If there were less than 5 patients to be operated, suture technique was preferred. Surgery time was noted from the first incision until the lid speculum was removed.

Methods The day on which fibrin glue was going to be used, fibrin glue (Beriplast P/Combi-set Aventis 1mL, CSL Behring, PA, USA) was taken from hospital pharmacy at least half an hour before the operation. After keeping under room temperature for 30 minutes, fibrin glue set was opened and prepared in a sterile manner. One fibrin glue was used for average 5 patients. All surgeries were performed under local anesthesia. Surgical site and eye lashes were cleaned with 50g/L Povidone iodine and sterile drape was put in place. After insertion of a wire speculum, 20g/L Lidocaine plus adrenaline was injected into the pterygium body. Pterygium head was dissected from the cornea with a surgical blade. Pathologic fibrovascular tissue located under the conjunctiva was carefully dissected and removed with tenotomy scissors. Dimensions of the bare scleral bed was measured with a caliper. A free conjunctival limbal autograft in matching size was harvested from superotemporal conjunctiva. Special care was taken for making the graft completely Tenon free. Limbal side of the graft was placed on the limbus of the host scleral bed. In group 1, fibrin glue was used to secure the graft. Scleral bed was carefully dried with a cellulose sponge, one drop of glue was put under the graft and another drop was put on the scleral bed. Limbal graft was placed on the scleral bed and left there for 30 minutes for drying. In group 2, 8/0 virgin silk (Surgisilk, Sutures Ltd., Wrexham Wales, UK) separate sutures were used to fixate the graft in place. After passing through episclera and conjunctival graft sutures were tightened and cut short. Superotemporal donor area was left open in both groups.

No complications occurred in either group. Postoperatively topical lomefloxacin and dexamethasone drops were given to the patients 4 times a day. Overnight pressure patching was applied for the group 1 patients and topical medications were started the day after. Patient visits were scheduled at the 3rd and 10th days as well as the 1st, 3rd and 6th months. Photographs of all the patients were taken before and after the operation. Objective signs like hyperemia and graft edema were assessed under slit-lamp. Complaints of patients like pain, stinging, watering were asked and graded at the 3rd and 10th

days.

Patient complaints like as pain, watering and stinging were graded as 0 (nil); If patient has no complaint, 1 (mild); If patient has some complaints which are easily tolerable, 2 (moderate); Some complaints and discomfort not effecting the daily activities and sleep, 3 (serious); Complaints and discomfort influencing daily activities and sleep. Graft edema was also graded in the same manner: 0 (nil); graft is tightly attached to the sclera and no graft edema, 1 (mild); graft is attached to the limbus but there is mild graft edema, 2 (moderate); graft is moderately edematous at limbal level, 3 (serious); heavy graft edema. Hyperemia was also graded similarly: 0 (nil); no dilated vessels on the graft, 1 (mild); few dilated vessels on the graft, 2 (moderate); dilated and engorged vessels on the graft, 3 (serious): dilated and engorged vessels either on the graft or host conjunctival margin along the graft. Recurrences were evaluated at the 1st, 3rd and 6th months. Pterygium tissue extending 2mm beyond the limbus was accepted as recurrence.

Statistical Analysis All data were evaluated by using SPSS version 15.0 (SPSS Inc, Chicago, IL, USA) package programme. Mann-Whitney U test was used for comparison of symptoms and signs of two groups. T test was used to compare two groups in terms of operation cost and surgery time as well as recurrence rates. $P < 0.05$ was considered statistically significant.

RESULTS

Symptoms and Signs A total of 61 eyes of 61 patients were operated. Three patients from group 1 were excluded from the study since their limbal grafts were not in place at the third postoperative day. Total 58 eyes of 58 patients were included into study. There were 29 eyes in both groups. Twenty-nine of the patients were male and 29 were female. There were 15 (52.8%) female and 14 (48.2%) male in group 1; 14 female (48.2%) and 15 (52.8%) male in group 2. Mean age was 48.4 ± 13.3 (18-79) years in group 1 and 52.6 ± 12.1 (34-79) years in group 2. When compared with t test, there was no statistically significant difference in two groups in terms of mean age and sex distribution ($P > 0.05$).

Patients were examined at the 3rd and 10th postoperative days and at the 1st, 3rd and 6th months. Patient complaints of stinging, watering and pain were scored for each group and values were compared with Mann-Whitney U test (Table 1). All the three complaint scores at the 3rd and 10th days were lower in fibrin group.

In the same manner, objective signs at the 3rd and 10th days were scored and compared with Mann-Whitney U test. Hyperemia at the 3rd and 10th days was significantly less in group 1. However, there was no statistically significant

Table 1 Statistical comparison of patient symptoms and signs between group 1 and group 2 (*P* value, Mann-Whitney *U* test)

Time	Stinging	Watering	Pain	Hyperemia	Graft edema
At the 3 rd day	<0,0001	<0,0001	=0,001	=0.001	=0,6
At the 10 th day	=0,006	<0,0001	<0,0001	= 0.008	= 0,14

Table 2 Comparison of mean surgery time, cost and complications in group 1 and group 2

	Group 1 (Fibrin)	Grup 2 (Suture)
Mean surgery time (min)	23.42 ± 13.34 ^a	41.45 ± 3.20
Mean surgery cost (Turkish Lira)	34.90 ± 13.12 TL	14,48 ± 5.06 TL
Complications:		
Hemorrhage under the graft	1 (3,4%)	0
Dellen	1 (3,4%)	0
Conjunctival cyst	1 (3,4%)	0
Granuloma	1 (3,4%)	7 (24,1%)

^a*P*<0.05 vs group 1(*t* test)

difference between two groups in terms of graft edema at the 3rd and 10th days.

Surgery Time As may be seen in Table 2, group 1 and group 2 were compared in terms of surgery time. Mean surgery time was found shorter in fibrin group than suture group. This difference was found to be statistically significant with *t* test (*P*<0.05). Mean surgery cost in both groups were also compared with *t*test and fibrin technique was found to be significantly more expensive than suture technique(*P*<0.05).

Recurrence Rates Recurrence rates were assessed at the 1st, 3rd and 6th months. At the end of six months, pterygium recurrence was developed in 2 patients in group 1 (6.8%) and 4 in group 2 (13.7%). When two groups were compared with *t*test; recurrence rate was found significantly higher in group 2 than that in group 1 (*P*<0.05). Both recurrences were seen at the 6th month in group 1. Recurrences developed earlier in suture group: in one eye at the 1st month, in 1 eye at the 3rd month and in 2 eyes at the 6th month.

A hemorrhage was noticed under the graft in one case of group 1 on the second postoperative day. Additionally, temporary dellen formation lasting in one week was seen in one case of group 1. Conjunctival cyst was developed in 1 case of the same group. Dellen resolved after one week of lubrication treatment. Flouromethalon drops were used for the treatment of conjunctival cyst and it resolved in one week. Granuloma development was a significant problem in group 2. In 7 cases of this group, sutures were removed at two weeks because of granuloma development. No recurrence was seen in these patients during six months of follow-up (Table 2).

No intra-operative anaflactic reaction or infectious disease during follow-up was observed in our patients due to

fibrin-glue use. Likewise, no infection was occurred in either limbal conjunctival grafts or donor conjunctival site.

DISCUSSION

Although autologous limbal conjunctival grafting is an effective method in prevention of recurrence after pterygium surgery, suturing of the autograft is rather difficult and necessitates surgical experience and technical skill. Extending operation time during suturation is another problem for most of the surgeons^[4]. Furthermore, sutures may cause patient discomfort, dellen formation, symblepharon or graft rupture^[5,6]. Biological tissue glue, like fibrin glue, is an alternative method for securing the graft and it causes less complication and post-operative discomfort. Fibrin glue has widely been used in ophthalmology like as conjunctival wound closure, cataract surgery, oculoplastic or orbital surgery, filtering bleb dehiscence, lamellar keratoplasty and amniotic membrane transplantation^[2]. Ti *et al*^[4] showed that postoperative inflammation increases the risk of pterygium recurrence. Suzuki *et al*^[7] reported that silk or nylon sutures may cause conjunctival inflammation and Langerhans cell migration into the cornea.

Koranyi *et al*^[5] compared 7/0 vicryl suture to fibrin glue in their study. They assessed postoperative patient complaints and operation times. They found that patient discomfort was less and operation time was shorter in fibrin glue group. In addition, they reported the cost of 1 fibrin glue was equal for 5 sutures when one fibrin glue was used for 6-7 patients. They also reported pterygium recurrence was significantly less in fibrin group. Uy *et al*^[8] 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; all the complaints were significantly less in fibrin group. Also no vision loss or symblepharon formation was seen in any patients. Mean operation time was found also significantly shorter in fibrin glue group. Calculated average cost of both type of surgery was found the same. Bahar *et al*^[9] combined intraoperative mitomycin C application with 7/0 vicryl and fibrin glue use in their study. Postoperative patient satisfaction was found as significantly better and operation time as significantly shorter in fibrin glue group. Farid *et al*^[10] compared fibrin glue with 8/0 vicryl, Srinivasan *et al*^[11] and Jiang *et al*^[12] with 10/0 nylon and they all reported similar results. Likewise, 8/0 virgin silk suture was compared to fibrin glue in current study. Postoperative complaints and hyperemia was found less in fibrin group in parallel to these results. However, there was no statistically significant difference between two groups in terms of graft edema at the 3rd or 10th days of surgery. All the complaints and pathological signs regressed at the end of first month in either group of patients. Another advantage of fibrin glue use is easy fixation of the graft and shorter operation time. Mean operation time was found significantly shorter in fibrin glue group in parallel to literature. In our study, 1 fibrin glue was used for average 5 patients. 1mL of fibrin glue has a volume enough for 9-10 patients. Average operation cost tends to decrease with increasing patient number scheduled for surgery. It was found 34.90±13.12 TL in fibrin group and 14.48±5.06 TL in suture group. If fibrin glue had been used for more patients in the same day average cost of the operation would have been cheaper than suture. However, in practise, to operate pterygium patients in the same day in order to reach certain patient number may increase patient waiting time for the operation. Thus, it is not always possible to reach a desirable patient number. In literature, Koranyi *et al*^[5] reported the cost of 0.5mL of fibrin glue was equal to the price of five 7/0 vicryl sutures. Likewise, Bahar *et al*^[9] reported 2mL of fibrin glue was equal to five 7/0 vicryl sutures. Uy *et al*^[8] used 1mL of glue for 5 to 10 patients in the same day and lowered the cost down to 10 to 20 USD which equals 15 to 30 TL currently. Jiang *et al*^[12] concluded 2.5mL of fibrin glue was equal to four 10/0 nylon suture and enough for 10 patients in the same day. They also stated that; if 10 patients could be operated on the same day operation cost would become even cheaper than suture.

Pterygium recurrence rate after limbal autografting with suture is reported 0% to 40% in the literature^[13]. Koranyi *et al*^[5] reported recurrence rates as 8% in fibrin group and 20% in suture group at the end of the six months. Uy *et al*^[8] reported no recurrences in both groups in two months of

follow-up but they agreed that period rather short to define the recurrence rate. Özdamar *et al*^[13] also encountered no recurrences during 6 months of follow-up and they attributed that success to limbal conjunctival autografting. Jiang *et al*^[12] observed recurrence rate 5% in fibrin group and 10% in suture group at one year. In parallel to these results, recurrence rate at the end of 6 months of follow-up was found to be 6.8% in fibrin group and 13.7% in 8/0 virgin silk group in our study. This difference was found as statistically significant. In contrast to these results, Bahar *et al*^[14] found recurrence rate as 11.9% in fibrin group and 7.7% in suture group. They suggested that the reason for this result was fibrin coat leading to increased collagen accumulation and scar formation. Uy *et al*^[8] reported a subconjunctival hemorrhage under the graft, resolving in 3 weeks, in one of the patients of fibrin group. Same type of hemorrhage seen in one of our patients also resolved in 2 weeks. Bahar *et al*^[9] observed corneal dellen in one of their cases of suture group and treated it with lubrication^[17]. In contrast, dellen was encountered in one of our patients of fibrin group and regressed in one week with lubrication. Conjunctival cyst seen in fibrin group was treated with fluoromethalon drops and resolved in 10 days. Suture granuloma occurred in 7 patients (24.1%) of suture group. These sutures and granuloma tissues were removed at the 15th day. No granuloma recurrence was noticed during follow-up in any of these patients. Three patients operated on with fibrin glue were excluded from the study because of missing grafts at the 3rd day. No graft dislocation was seen in other patients enrolled in study. In literature, dislocation of the grafts secured with fibrin glue have been reported in only few cases but no graft loss has been reported to date. Patients with missing grafts said that they removed the pressure patchings (even though they were told to leave it there overnight) and rubbed their eyes on the evening of the operation. Fibrin glue is also vulnerable to mechanical forces during the operation even if it sticks well. Importance of post-operative care must be explained to the patients in details.

One of the most important issues of fibrin use is the risk of infection with parvovirus and prions. Although the infection risk is much lower than the other blood derivatives, patients must be informed before the operation^[9]. In our study, no anaphylaxis or infectious disease occurred in any patient during follow-up. Also, there is no report about any adverse reaction due to fibrin glue use in literature.

As a conclusion, fibrin glue is a safe and effective tool in pterygium surgery with conjunctival limbal autografting. The most important advantages of fibrin glue are shorter surgery time and less post-operative patient discomfort. As it is

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expensive, more patients should be operated in the same day to decrease the operation cost. This is not always easy in clinical practice, and operations should be planned well. Graft loss may be a problem if patients are not warned well. Although recurrence rate is lower in fibrin glue than suture, long term follow-up is needed for more accurate statement.

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