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Fibrin glue versus sutures for Attachment of the conjunctival graft in pterygium surgery

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Abstract

Pterygium is a fibrovascular proliferation of subconjunctival tissue that crosses the limbus and develops on the cornea. It's a chronic condition brought on by a degenerative disease of the ocular surface. The eyes are irritated, the tear film is disrupted, and the patient's eyesight worsens. The purpose of this study was to evaluate the efficacy of sutures vs fibrin glue adhesive for securing the conjunctival autograft during pterygium surgery. Methods: There were a total of, participants in this prospective comparison research. The participants, all of whom had primary pterygium of at least one eye, were randomly assigned to one of two groups (A and B), each of which had 25 people. The results showed that the two groups' best corrected visual acuity (BCVA) did not vary significantly before and after surgery. The research found that the fibrin glue group required significantly less time (264.5 minutes) than the suture group. (38+ 2,2). Within the suture group, graft retraction is the most frequent consequence. After a mean follow-up time of 7.2 months, the recurrence rate in this trial was 8% in the glue group and 13% in the suture group. fibrin glue is superior to 8/0 vicryl sutures for attaching the free conjunctival autograft during pterygium surgery due to its ability to reduce operating time, postoperative pain, and recurrence rate.

Key words: fibrin glue, sutures, Attachment of the conjunctival graft, pterygium surgery.

1. Introduction

The ocular surface is prone to a number of illnesses, including pterygium. Wing (Greek: ptergyum) and fin (Greek: pterygium) combine to form the term pterygium. Sushruta, the first documented ophthalmic surgeon, was the first to describe it about the year 1000 BC. [1] Pterygium is a triangular, creeping, fibrovascular proliferation of the subconjunctival tissue in the medial and lateral palpebral fissures of the eye.

UV (ultraviolet) radiation, hot and dry weather, wind, dusty atmosphere, and length of exposure are only few of the environmental irritants that have been linked to skin cancer. However, prolonged exposure to sunlight's ultraviolet (UV) radiation is by far the most prevalent cause of eye damage, followed closely by chronic irritation from dry and dusty environments. [2].

Pterygium is thought to be made up of elastic fibrovascular tissue under the microscope. The conjunctival epithelium covers the pterygium except for the top. On the surface of the pterygium, you can observe extensions of fibrous tissue, and as the head presses down on the cornea, Bowman's layer becomes implicated and is damaged. These holes are filled by fibrous connective tissue. Furthermore, classic histopathological features of persistent inflammation are seen. Lymphocytic infiltration, including plasma cells, mast cells, and T lymphocytes, is present. An increase in degenerative collagen fibres, aberrant elastic fibres, and newly created blood vessels is possible. Histopathology reveals a pathognomonic elastotic degradation of conjunctival stroma and an accompanying hyperproliferative fibrotic response [3].

Invasion of fibrovascular tissue from the bulbar conjunctiva onto the cornea characterises pterygium, a frequent and degenerative ocular surface condition. Pterygium is a growth above the visual axis that causes persistent ocular discomfort, tear film disruption, induced astigmatism, and worsened vision. Pterygium is often treated by surgical removal. Patients with recurrences or late stages of illness often undergo conjunctival autografting since it has been proved to be the best surgical method with minimal rates of recurrence and morbidity [2]. Conjunctival autografting is thus becoming the preferred method of pterygium surgery over alternatives like amniotic membrane transplantation. Pterygium surgery relies heavily on the conjunctival autograft as a means of repair. Both sutures and fibrin glue are viable options for graft fixation. The results of surgeries employing fibrin glue vs those using sutures have been examined in clinical investigations. Considerations like how long the operation takes, how much pain patients experience afterward, and how often complications arise are also part of the assessment [4].

After pterygium removal, the best and equivalent success rates are recorded for treatment with conjunctival autografts or amniotic membrane grafts. Typically, sutures are used to attach these grafts to the naked sclera bed. In addition to defeating the intended objective of the surgical intervention, the presence of these sutures is thought to trigger a modest inflammatory response, resulting in discomfort, grittiness, and wetness in the postoperative period. Even though the risk of recurrence in these individuals is modest, it is thought that the inflammatory reaction to these sutures is to blame. Suture implantation during surgery and subsequent removal are both time-consuming and laborious. As a byproduct of blood clotting, fibrin glue is made up of two different proteins: fibrinogen and thrombin. Combining two components triggers a reaction similar to the last stages of the coagulation cascade [5].

The purpose of this study was to evaluate the efficacy of sutures vs fibrin glue adhesive for securing the conjunctival autograft during pterygium surgery.

2. Patients and Methods

Study design:

Comparative prospective non controlled

The study included 50 eyes of 50 patients presented the outpatient clinic of ophthalmology department in Benha University Hospital during the period from January 2020 to June.

Inclusion criteria

Patients with primary pterygium exclusion criteria.

Exclusion criteria

Patients with recurrent pterygium:

Conjunctival or corneal pathology

previous ocular surgery.

The study will be approved by the ethics committee on research involving human subjects of Benha faculty of medicine .

Written informed consents had been obtained from all patients.

Preoperative patients evaluations demographic data.

Age – sex – occupation – residence – ocular examination

*visual acuity by Snellen chart refractive error by autorefractometer and best corrected visual acuity test.

*IO P measuring by applanation tonometer

*Anterior segment examination by slit-lamp biomicroscopy.

Pterygium examination

The degree of pterygium growth was evaluated in terms of two parameters .

1:The length of the invading head from the limbus which was measured using the slit lamp

2:The density of the pterygium which was graded according to the system used by **Tan et al** [6]

Grad(1)(atrophic) episcleral vessels under the pterygium body are cleary distinguished.

Grade (3) (fleshy) episcleral vessels totally obscured grade (2) (intermediate) all other pterygia not falling into these 2 grade

Patients were randomly classified into two groups each one consisted of 25 patients .Pterygium excision and conjunctival autografting were performed for all patients.

The conjunctival autograft was attached to the bare sclera by

Fibrin glue in group (A) and by 8\0 vicryl sutures in group (B)

The duration of the surgery was recorded.

Surgical technique

The operations were done according to standard sterile ophthalmic procedures and using operating microscope.

local anaesthesia :lidocaine hydrochloride 1% was injected under the pterygium body and subconjunctivally .

Sterile drapping was applied .

The pterygium head was excised from the cornea using blade 15 is the body of the pterygium was separated from the underlying sclera and the surrounding conjunctive by blunt and sharp dissections using conjunctival scissors.

The wound bed was scraped to clean the cornea.

bleeding was controlled with pressure by cotton buds .

No cautariation was done .

The area of conjunctival defect was measured by a caliper .

Lidocian solution was injected subconjunctivally to balloon out the area of the graft and separate it from the under -lying tenons capsule .

(Upper temporal conjunctival quadrant)

The conjunctival limbal graft one mm oversized relative to the dimensions of the graft bed was excised by using conjunctival forceps and vannas scissors . care was taken to prevent buttonholes and graft rollover.

The dissected graft was flipped over the cornea excision was made from limbal attachment . the free graft then was placed on top of the cornea and kept moist.

Patients in group (B)

8-0 Vicryl sutures were used to fix the four corners of the graft to the episclera with single suture

The three sides were then sutured to the recipient conjunctiva with

Few sutures sparing the limbal side .

The sutures were cut flush to minimize irritation

The fibrin glue used in the study was fibrin glue (scientia AC labore)

Composition :fibrin seolaut formed

Of two component :lyophilized

Human thrombin and lyophilized human fibrinogen .

Each individual unit of pheresis plasma used for production was tested and found to be not reactive for HB.AG ; HIVI&II antibodies

HCV anti bodies by licensed assay methods.

Sero negative plasma units further examined by nuclear acid testing .

Fibrin glue identification two vials

The first labled blue containing white lyophilized powder of thrombin second vial labled red containing pale yellow round cake of fibrinogen when disolved thrombin is added to disolved fibrinogen it is converted to adhesive fibrin network within 30 seconds , which used to attach the conjunctival graft to the under lying sclera.

Preparation of fibrin glue

Sterile water for injection was injected in the thrombin and fibrinogen vials the exact recommended volume is one cc in each vial.

Gently the vials were swirled for one minute .

The vials are allowed to stand for 5 minutes to ensure complete protein rehydration.

The thrombin solution was taken by sterile syring and injected into the fibrinogen vial.

The activated fibrin was ready to be used.

Patient in group (A)

Activated fibrin was applied over the bare sclera and spread out with cannula the free graft was placed and spread out onto the bare sclera coated by activated fibrin using two conjunctival forceps.

Care was taken to ensure that the limbal side of the graft opposed the limbal side of the bed, and the other graft sides were opposed to the edges of the recipient conjunctiva.After a drying period of 5 minutes,

the redundant margins of the graft were excised by scissors and lid speculum was removed.

Neomycing \ polymyxin B eye drops and dexamethasone

Ointment was applied to the eye and pressure patch was kept on for 24 hours.

Tobradex eye drops were applied 4 times daily and tobradex eye ointment at night for one month after surgery for all patients in both groups

Post operative follow up

All patients were followed up on the first day after surgery and these on weeks 1,2,4,8

At every follow up visit the follow was done

Visual acuity was measured

Patients were asked about symptoms as pain ,lacrimations and irritation

Slit lamp examination was done and the following were recorded

Subconjunctival hemorrhage

Conjunctival cyst

Granuloma – dellen

Graft complications :

Suture loss- dehiscence – retraction Overlying the limbus .

Pterygium recurrence was defined as any fibrovascular tissue passed the limbus by more than one mm.

Statistical analysis

All the collected data were reported tabulated and statistically analyzed using SPSS (statistical package for the social sciences) Software where the following statistics were applied:

a)Descriptive statistics:

In which quantitative data were presented in the form of mean (x) standard deviation (SD) and qualitative data were presented in the form of numbers (No) and percentages(%)

b)analytical statistics:

The used tests of significance included chi-squared test (x^2) was used to study association between qualitative variables.

P value of > 0.05 was considered statistically non-significant

P value of < 0.05 was considered statistically significant.

3. Results

Table (1) Comparison between the two studied groups as regard visual acuity.

BCVA	Group a	Group b	Test of sig	
			T test	P value
Pre				
Range	0.02-014	0.02-0.16	U=366.5	0.203
mean±sd	0.08±0.04	0.07±0.3		
Post 1				
Range	0.02-0.16	0.02-014	U=360	0.201
mean±sd	0.07±0.05	0.06±0.3		
Post 2				
Range	0.02-0.16	0.02-0.14	U=364	0.204
mean±sd	0.08±0.05	0.02-0.03		

T:student t-test U= Mann Whitney test
VA: visual acuity log MAR
pre: pre operative
post 1: post operative ofter one month.
post2: postoperative after two month.

There was no significant difference between the preoperative and postoperative, best corrected visual acuity (BCVA) in the two groups.

Table (2) Comparison between the two studied groups as regard surgical time**.**

Surgical time (minutes)	Group a	Group b	p
Min – max	22-32	34-44	<0.01
Mean ±sd	26±4.5	38±2.2	

There was statistically significant difference between the two groups as regard the surgical time.

Table (3) Graft related complications in The two studied groups.

Graft complication	Group a No 25 eyes		Group b No 25 eyes		P
	no	%	no	%	
Overlying limbus	5	20%	6	24%	
Retraction	2	4%	5	20%	0.04
Dehiscence	7	28%	4	16%	0.02
Contracture	2	8%	3	12%	0.02
loss	no		no		0.03

Dehiscence was the most common complication in group A (Fibrin glue) and there was a statistically significant difference between the two groups.

Graft retraction was the most common complication in group (B) (suture group) and there was a statistically significant difference between the two groups as regard this complication.

There were no statistically significant differences between the two groups as regard the remaining other complications

Table (4) Pterygium recurrence rate after the end of the follow up period in the two studied groups.

	Group a No 25 eyes		*Group b No 25 eyes*		*p*
	No	**%**	**No**	**%**	
Recurrence rote	2	8%	4	16%	0.102

There was no statistically significant difference between the two groups as regard pterygium recurrence at the end of Follow up period.

4. Discussion

Best-corrected visual acuity (BCVA) was not significantly different between the two groups before and after surgery. These results showed that the two methods are comparable in this respect.

There is a clear correlation between the length of time spent in surgery and the success rate.

The proficiency of the surgeon is also connected to the length of the operation. Learning curves and differences in skill level, according to Ti et al. [7], are to blame for the varying success rates of sutured conjunctival autografts. These findings show the efficacy of fibrin glue in reducing downtime.

Reduced surgical time, simplified technique with less graft handling, and reduced inflammation are all benefits of using fibrin glue during conjunctival autograft transplantation. As a result, it's possible that better outcomes can be achieved consistently, regardless of surgeon experience levels.

The research found that the fibrin glue group required significantly less time (264.5 minutes) than the suture group. (38+ 2,2)

Research conducted by Koranyi et al. [8] compared fibrin glue to 7/0 vicryl Suture. They looked examined postoperative patient complaints and the length of the procedure.

Patients experienced less pain and the procedure took less time when fibrin glue was used. Furthermore, they stated that the price of one fibrin glue was equivalent to the price of five sutures, and that the price of one fibrin glue could be used for as many as seven patients, so the overall cost of surgery was the same for both groups.

The fibrin glue and 10/0 nylon suture were utilised on 11 patients in the Uy et al. [9] investigation.

Pain after surgery, foreign body sensation, sensitivity to light, and tearing during recovery were all measured and compared between the two groups. They determined that the fibrin group had much less complaints overall. Matches up with the findings of this investigation. In most cases, graft dehiscence occurred. problems in the fibrin glue group (7 instances, 28%) This correlates with findings by Srinivasan et al. [10] and Romano et al [11]. The success rate of graft uptake may be increased with careful graft preparation (thin donor conjunctival autograft devoid of Tinon's capsule). According to Foroutan. [12]

, 13.33% of instances had graft dehiscence, which he ascribed to a lower concentration of thrombin and fibrinogen in autologous glue compared to a commercial preparation.

Dehiscence may cause graft loss in fibrin glue situations as well.

Experts recommend taking measures to prevent it, such as making sure the conjunctival autograft and conjunctive are well adherent and that no remnants of Tenon's capsule are present between the graft and the conjunctiva.

Within the suture group, graft retraction is the most frequent consequence. Tan et al. proposed dissecting the sub-epithelial graft tissue very carefully to determine the cause, which they believe to be subconjunctival fibrosis. A natural biological dressing is provided by the apposition of the eyelids to the bulbar conjunctiva, which creates a one-of-a-kind wound healing environment and a smooth, frictionless surface, as hypothesised by a number of authors [13, 14].

Fibrin glue has several intraoperative benefits, such as allowing the use of buttonhole grafts and helping

surgeons work faster with patients who are uncooperative and constantly shift their eyes. Maintaining a dry sceral bed before to putting the adhesive and the graft, training the patient to avoid scratching their eyes, and patient selection may all lower the chance of graft dehiscence, but it should still be considered a possibility.

The most typical issue after the excision of a pterygium is its return. factors contribute to its etiopathogenesis. Reduced inflammation after surgery may be to blame. as well as a prompt adhesion of the graft, which is essential in preventing fibroblast ingrowth, hastening vasculization of the graft, and preventing recurrence. This adhesion cannot be accomplished by sutures since they only secure the graft's borders without also adhering the graft to the underlying episclera. A deciding factor might be the relative tensile strengths of sutures and fibrin glue.

Pterygium recurrence after several surgical procedures, including glue-assisted and suture-assisted autografting, has been debated.

After a mean follow-up period, this research found that recurrence occurred in 2 instances (8%) in the glue group and 3 cases (12%) in the suture group. 7 months and 2 weeks. In a randomised controlled trial including 58 patients, Yuksel et al. [15] found that those treated with fibrin glue had much less complaints than those treated with sutures. When Farid and Pirnazar [16] evaluated the incidence of recurrence after pterygium excision with autograft in 47 eyes, they found that the rate was 2% in the suture group and 1% in the fibrin glue group, respectively. Recurrence rates were much lower in the tissue adhesive group (3.7% vs. 20%) than in the suture group. In a study of 50 patients having pterygium excision, Karalezli et al. [17] found that pterygium recurrence was not reported in the fibrin glue group, but occurred in two eyes (8%; p0.05) in the suture group. Long-term recurrence rates could not be calculated in our research because to the limited number of patients and short duration of follow-up.

5. Conclusion

When used to secure the free conjunctival autograft during pterygium surgery, fibrin glue reduces the length of the procedure, the severity of postoperative pain, and the frequency with which the tumour returns. if we contrast it to the use of 8-0 vicryl sutures.

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