

Original article

A Comparative Study of use of fibrin glue and vicryl suture in conjunctival autograft transplantation following Pterygium Excision

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Abstract:

Introduction: Use of sutures for securing conjunctival autograft following pterygium excision has several drawbacks. We aimed to compare the use of 8-0 Vicryl sutures versus fibrin glue for fixating conjunctival autografts in patients undergoing pterygium surgery.

Materials and Methods : A prospective interventional clinical study was carried out in a tertiary eye hospital. Sixty patients (60 eyes) with primary pterygium were randomised to undergo pterygium surgery using either 8-0 Vicryl sutures (30 eyes) or fibrin glue (30 eyes) to attach the conjunctival autograft. The patients were followed up for 12 months. Outcome measures were duration of surgery, complication, post-operative discomfort and recurrence of pterygium.

Observations and Results : In the suture group, the mean operation time was 34.3 min (range 30-41 min) and in the fibrin glue group it was 13.13 min (range 11-17 min) { $p < 0.001$ }. Post-operative discomfort was significantly lower in the fibrin glue group than in the suture group ($p < 0.001$). The incidence of complications were similar in both groups (4 each). At the end of follow-up, pterygium recurrence was observed in one eye (3.33%) in the fibrin glue group and in three eyes (10%) in the suture group ($p < 0.05$).

Conclusion : Application of fibrin glue instead of sutures for attaching the free conjunctival graft in pterygium surgery resulted in shorter surgical time, less post-operative discomfort and lower recurrence.

Introduction:

A pterygium is a fibrovascular neof ormation which arises in the conjunctiva and grows towards and encroaches the surface of the cornea and which in addition to being cosmetically unacceptable causes foreign body sensation, burning, tearing and blurred vision . Most of these symptoms are related to active inflammation of the pterygium . In some patients

with advanced pterygium, there can be diplopia and dimness of vision.^[1]

Therapeutic options for pterygium are primarily surgical. Excision of pterygium with bare sclera technique is the most commonly practiced method in India with high rates of recurrence at the site of excision. Various methods to prevent this recurrence have been devised like post operative β irradiation

with Sr-90, intra operative and post operative application of 5 Fluorouracil and Mitomycin but serious post operative complications have put a question mark over the justification of their use.^[2]

Studies have evidenced Limbal Stem Cell (LSC) dysfunction in pterygium and the barrier role that LSC plays against conjunctival overgrowth on the cornea . Their deficiency at the limbus allows conjunctivalization of corneal epithelium along with fibrovascular tissue overgrowth.^[3] This phenomenon is true for primary and recurrent pterygium . Thus, one can aim to reduce the number of recurrences by including the LSC in conjunctival autograft . Kenyon et al^[4] introduced the concept of conjunctival autografting in 1985 for treatment of recurrent pterygium with same efficacy as the previous methods . With this method, there is 5-7% recurrence in the USA and 16% failure in geographic areas of high UV-ray exposure.^[5]

In ocular surface transplantation techniques, the conjunctival autografts is generally secured to the bare scleral bed with the help of sutures. Use of tissue sealants like fibrin glue which mimics the final steps of natural clotting mechanism is also increasingly becoming popular to achieve the same purpose.^[6] While several studies have documented shorter operating time and improved postoperative comfort with fibrin glue compared to vicryl suture and a few have shown reduced recurrence, there is lack of published data on this subject from the Indian subcontinent where pterygium is highly prevalent.^[7]

This study intended to compare the outcomes of the aforementioned ocular surface transplantation techniques where conjunctival autografts are secured to the bare sclera bed with the help of 8-0 Vicryl sutures in one half and tissue sealants/bioadhesives in the other half of the patients with pterygium

attending a tertiary eye hospital in West Bengal, India.

We aimed to assess the comparative outcomes and success rates of the two techniques of pterygium surgery, namely pterygium excision with conjunctival autograft secured with 8 - 0 Vicryl sutures with secured using fibrin glue. Our specific objectives were to evaluate the outcomes of the two surgical technique in terms of surgical time, complications, post operative pain and discomfort, resolution of symptoms post operatively, graft uptake and recurrence.

Material and methods:

We designed a prospective interventional clinical study to report the long-term outcomes of sutureless pterygium surgery and to compare it to conventional pterygium surgery (where sutures were used to attach the conjunctival autograft). Clinical data collection was undertaken following appropriate ethical approval. 60 consecutive patients (60 eyes) who presented at the outpatient department and the oculoplasty clinic at the Regional Institute of Ophthalmology, Kolkata were included after obtaining a well informed consent, explaining the purpose and potential risk of the surgical intervention. The criteria for inclusion were a) Primary unilateral nasal pterygium b) Pterygium growth > 1 mm over the cornea horizontally from the limbus. The exclusion criteria were a) Recurrent pterygium b) Sign of other significant pathology / active disease on complete ocular examination c) Known trauma to the eye with pterygium d) Known previous surgery on the affected eye e) Uncontrolled glycaemic status.

After full pre-operative assessment and randomization , thirty patients underwent pterygium excision with conjunctival autograft secured with 8 –

0 Vicryl sutures and were allocated to Group A. The remaining thirty patients underwent pterygium excision with conjunctival autograft secured with fibrin glue and they were allocated to Group B. All the cases were compulsorily done under operating microscope and all surgical procedures were performed by the same surgeon to ensure consistency. Surgery time was noted from first incision until removal of the lid speculum.

Fibrin Glue Preparation : The fibrin was prepared according to the manufacturer's directions (ReliSeal, Reliance Life Sciences, India). In brief, freeze-dried protein concentrate and thrombin were reconstituted in fibrinolysis inhibitor solution and sterile water for injection, respectively, and were warmed for several minutes in a patented fibrinotherm device. Then, each solution was withdrawn into a separate disposable syringe.

Surgical technique : Local anaesthesia was done by injecting a mixture of 4- 5 ml of 2 % Lignocaine with Adrenaline and 0.5 % Bupivacaine premixed with hyaluronidase in the peribulbar space. The head of pterygium was completely excised from the cornea by crescent blade and body of pterygium excised with conjunctival scissor. Abnormal scar tissue from cornea was polished. Limboconjunctival defect was measured with the help of callipers and 1 mm oversized free limboconjunctival graft was harvested from the superotemporal bulbar conjunctival quadrant of the same eye. Careful dissection was done to remove all tenon tissue and subsequently graft was moved to nasal area and placed over the bare sclera with stromal side down and limus to limbus orientation. Surgical methods thus far were similar in both groups with only exception being that thermocauterisation was done to secure bleeding from the bare sclera in Group A while haemostasis

was achieved by application of a drop of fibrin glue in Group B. In Group A patients, 8-0 vicryl sutures were used so that four corners of the graft were anchored to the episclera with single sutures. Three sides were then sutured to the recipient conjunctiva with numerous sutures sparing the limbal side . The sutures were cut flush to minimize irritation. In Group B, a drop of sealer protein solution (human fibrinogen concentrate in aprotinin) and that of thrombin solution (thrombin in water for injection) which constitutes the Fibrin glue was applied to the bare sclera area (Photo 1). The prepared conjunctival autograft was slid onto the bare sclera in proper anatomical orientation (Photo 2). Weck cell sponges were used to smoothen the graft and three minute interval was given to allow the graft to adhere. The eye speculum was removed carefully and the eye patched with a sterile eye pad in both groups.

Post-operative follow up : All patients were put on steroid (Fluorometholone) eye drops 4 times daily for two weeks followed by twice daily for two weeks and an Antibiotic drop (Moxifloxacin) for two weeks. The first dressing was done on the next day and patients were followed-up after 1, 4, and 8 weeks and every 2 months thereafter for a total duration of 12 months. Patients were asked to fill out a questionnaire on postoperative day 1 and during every follow-up examination until the first month, grading their symptoms (pain, foreign body sensation, stinging and epiphora) on a scale of 1 to 3 with 1 being minimal symptom and 3 being maximum. Recurrence was evaluated after 1 month and was defined as any fibrovascular growth that passed the corneal limbus by more than 1 mm.

Statistical Analysis : All data were evaluated by using SPSS version 16.0 (SPSS Inc, Chicago, IL, USA) package programme. Mann-Whitney U test

was used for comparison of symptoms and signs of two groups. Unpaired t test was used to compare two groups in terms of surgery time as well as recurrence rates. $p < 0.05$ was considered statistically significant.

Observations and results:

A total of 60 patients (60 eyes) underwent surgical excision of nasal pterygium and all patients completed the 12 month follow-up. Sutures were used in 30 eyes (Group A) and fibrin glue was applied to 30 eyes (Group B) to attach the free conjunctival autograft. The mean age was 44.75 ± 11.2 years (range, 21 years to 62 years) and 51.67% of patients were males while 48.33% were females. 80% patients were from a rural background compared to 20% urban patients. No significant difference was found between the two groups with regard to age or sex ($p > 0.05$) (Table 1).

Surgery time : The mean surgical time for Group A was 34.30 minutes, ranging from a minimum of 30 min to a maximum of 41 min . The mean surgical time for Group B was 13.13 min , ranging from a minimum of 11 min to a maximum of 17 min. Surgical time was significantly shorter in the fibrin glue group (Group B) { $p < 0.001$ }.

Intra-operative complications : Only intra operative complication seen in 4 patients of each group was bleeding more than that usually seen in pterygium surgeries. It was observed that bleeding was prevented earlier by tissue glue intraoperatively compared to thermocauterisation . No case required sutures to close the conjunctival edges in the glue group.

Graft-related complications : The incidence of graft-related complications within 3 months of surgery was 13.33% (4 patients) in both the groups ($p=1.00$) (Table 2). Subconjunctival haematoma resolved spontaneously. The patients with graft loss

and conjunctival cyst formation were taken up for re-surgery.

Post-operative pain and discomfort : Patient complaints of pain, foreign body sensation, stinging and watering were scored for each group and values were compared with Mann-Whitney U test. All the four complaint scores at the 1st and 7th days were significantly lower in fibrin group ($p < 0.05$).

Recurrence : Recurrence was found in 3 patients (10%) in Group A and 1 patient in Group B (3.33%) on following up the patients for a period of 12 months ($p < 0.05$). The recurrences occurred in the fourth month in the fibrin glue group and in the fourth (1 patient) and sixth months (2 patients) in the suture group.

Discussion:

Treatment of pterygium with conjunctival autografts or amniotic membrane grafts after pterygium excision is reported to have the best and comparable success rates.^[8] These grafts have traditionally been affixed to the bare sclera bed using sutures. The presence of these sutures is believed to initiate a mild inflammatory response giving rise to symptoms of pain, grittiness and watering postoperatively and therefore negating the purpose of the surgical intervention. The inflammatory response to these sutures is also believed to be the cause of recurrence, albeit low, in these patients.^[9,10] The time consumption for the placement of sutures during surgery and the need to remove them later on makes it a lengthy and tedious process.^[11]

Fibrin glue is a two-component tissue adhesive that mimics the natural fibrin formation and is prepared from banked human blood. Fibrin glue has widely been used in ophthalmology in areas like conjunctival wound closure, cataract surgery, oculoplastic or orbital surgery, filtering bleb dehiscence, lamellar

keratoplasty and amniotic membrane transplantation.^[12]

Koranyi and associates were the first to report the use of fibrin glue for conjunctival transplanting in pterygium surgery in a prospective randomised study.^[13] They used Tisseel in 20 eyes of 20 patients and 7-0 Vicryl sutures in 23 eyes of 23 patients to secure the grafts. The authors demonstrated that the use of fibrin glue was associated with significantly less postoperative, shorter surgery time and pterygium recurrence compared to sutures. Studies by Bahar et al and A Karalezli et al also showed shorter operating time with fibrin glue as against sutures.^[14,15] In our study, surgery time was significantly shorter in with fibrin glue in comparison to 8-0 vicryl sutures which is consistent with previous studies.

Increased bleeding than usual was seen in a similar number of patients (four) in both groups. Interestingly, haemostasis was achieved earlier with fibrin glue compared to thermocautery which could be an added benefit of the use of this tissue adhesive. Post-operative symptoms of pain, foreign body sensation, stinging and epiphora were significantly lower with fibrin glue on the 1st and 7th post-operative days which is corroborative with the findings of previous studies by Koranyi G , et al^[13] , Harvey S et al^[16] and Irit Bahar et al^[14].

Within the first four months of follow-up, graft-related complications were seen in 4 patients in each group. The incidence of sub-conjunctival haematoma was found to be higher in the Group A (30%) than in the Group B (3.33%). Graft loss was noted in 2 patients (6.67%) in Group B but none in Group A for which we could find no probable explanation. Graft loss with fibrin glue has not been reported earlier in other studies. Subconjunctival haematoma resolved

spontaneously in about 2 weeks. The patients conjunctival cyst formation (1 in each group) were initially treated with fluorometholone drops for 2 weeks but following non-resolution had to be taken up for re-surgery. Re-surgery was also done in the 2 patients with graft loss. Overall, no serious complications were noted during the follow-up period of 12 months suggesting that fibrin glue may be considered safe for attaching conjunctival autograft as shown in previous studies by Harvey S et al^[16] , Ozdamar Y et al^[17] , Pfister et al^[18] , etc.

Prospective series in the literature report recurrence rates of 2-39 % after pterygium surgery using sutured conjunctival autografts.^[19] More severe inflammation may cause higher recurrence rates, and silk and nylon sutures placed in the conjunctiva can cause inflammation and migration of the Langerhans cells to the cornea.^[20] In a study of 461 eyes of 381 patients, Koranyi and associates reported that the recurrence rate was 5.3% in a fibrin glue group and 13.5% in a suture group over a mean follow-up of 23 months and similar findings were echoed in several other studies.^[19] In contrast to these results, Bahar found recurrence rate of 11.9% in fibrin group and 7.7% in suture group which they suggested to be due to the fibrin coat leading to increased collagen accumulation and scar formation.^[20] In our study, recurrence rate was low in the fibrin glue group (10%) compared to the 8-0 vicryl suture group (3.33%) over a follow up period of 1 year. This finding is particularly significant given the fact that most of our patients were from a high-risk group for pterygium occurrence (exposure to ultraviolet light and dry, hot weather as is the farmers).

Important issues with fibrin use are the risk of infection with parvovirus B19, HIV, Hepatitis B virus, and prions and considerably increased cost

compared to sutures.^[4] In our study, no anaphylaxis or infectious disease occurred in any patient during follow-up.

The relatively small number of patients and shorter duration of follow up compared to some other studies might be limitations of our study. Nevertheless, our study is important as it is a prospective, randomized clinical trial and of which there is a lack of published literature from the Indian subcontinent.

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Conclusion:

The use of fibrin glue to attach the free conjunctival autograft in pterygium surgery produces shorter operating time, less post-operative discomfort and lower recurrence rate compared to 8-0 vicryl sutures. Shorter surgery time logically translates into lower infection risk and saves valuable operating theatre time. The patient stands to benefit on account of an earlier return to normal life due to greater post-operative comfort.

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