Efficacy of autologous fibrin glue versus sutures for conjunctival autograft in pterygium surgery: A 1-year randomized controlled study

Rekha BK, Sheetal V. Girimallanavar

Background and Aim: In recent times, the use of fibrin glue has reduced operating time and postoperative complications associated with sutures. Since it is a plasma-derived product, it has few drawbacks. The objective was to compare the efficacy, postoperative complications, and operating time of autologous fibrin glue and sutures for attaching conjunctival autografts in pterygium surgery. Materials and Methods: A total of 44 patients with primary pterygia were selected and divided into two groups: Group 1 (n = 22) underwent conjunctival autograft placement with autologous fibrin glue, whereas Group 2 (n = 22) patients underwent conjunctival autograft placement with sutures after pterygium excision. Patient demographics, history, and ocular examinations were noted; they were followed-up and examined after surgery until 3 months. Primary outcomes were postoperative pain, foreign body sensation, lacrimation, discomfort, graft retraction, graft displacement, subgraft hemorrhage, and recurrence rate. Secondary outcomes included intra- and post-operative complications. SPSS 16 was used to analyze the data. Results: The mean operative time was significantly less in Group 1 compared to Group 2 (22.1 ± 5.43 vs. 25.2 ± 2.61 min; P = 0.004). The intensity of postoperative pain was significantly lower in the group 1 than in the group 2 on postoperative day 1 and after 1st week (P < 0.05). However, foreign body sensation, lacrimation, and discomfort were significantly lower in Group 1 than in Group 2 after 1st week of surgery. No recurrence was observed in both groups during the 3-month follow-up period. In addition, no serious intra- and post-operative complications were encountered. Conclusion: Autologous fibrin adhesive was effective in conjunctival autografting among the patients undergoing pterygium excision. It significantly reduced operative time, postoperative outcomes, and complications.

Key words: Autologous blood, conjunctival autograft, pterygium, suture

Pterygium, a common ocular disorder, is prevalent in several parts of the world with an incidence rate ranging from 0.3% to 29%.[1] Although various anti-inflammatory drugs and lubricants are available to reduce the discomfort, surgical intervention is the only ultimate choice opted for pterygia.[2] However, the techniques of pterygium excision (bare sclera technique or Mc Reynolds operation) were associated with high recurrences. Hence, techniques with less recurrence were developed, which include conjunctival autograft, limbal and limbal–conjunctival transplant, conjunctival flap and conjunctival rotation autograft surgery, amniotic membrane transplant, cultivated conjunctival transplant, and other adjunctive therapies. Among these, conjunctival autograft has been advocated as the most popular treatment modality in the surgical management of recurrent pterygia.[3,4]

All the above techniques use fibrin glue and sutures for autograft fixation. Traditionally, suturing is the most common method; however, it has drawbacks such as, increased operating time, postoperative discomfort, inflammation, buttonholes, necrosis, giant papillary conjunctivitis, scoring, and granuloma formation. Further, fibrin glue is widely used due to its advantages that include easy fixation of the graft, shorter operation time, and reduced complications and postoperative discomfort. Recent reports favor the use of fibrin glue above sutures; however, it is a plasma-derived product and has the potential risk of prion disease transmission and anaphylaxis in susceptible individuals. Adding to this, the availability and economic considerations are not in the reach to all sections of population.[5,6]

Hence, to address the aforementioned issues, autologous fibrin was introduced. In autologous fibrin, the fibrinogen is synthesized from patient’s own blood in contrast to fibrin adhesive, where the fibrinogen is synthesized from pooled donor plasma.[11] However, this is a new approach and the available literature proving the efficacy of autologous fibrin above sutures for conjunctival autograft in pterygium is scanty. Therefore, the present study was undertaken to assess efficacy and safety of the use of the autologous fibrin glue in comparison with sutures (8-0 vicryl) in the attachment of a conjunctival autograft in primary pterygium surgery.

Materials and Methods

This 1-year randomized controlled study was conducted at an outpatient Ophthalmology department from January 2013 to...
December 2013. The study included 44 patients with primary pterygium divided into two groups of 22 each based on the computer-generated randomization. The Group 1 (n = 22) underwent conjunctival autograft placement with autologous fibrin glue, whereas Group 2 (n = 22) patients underwent conjunctival autograft placement with sutures after pterygium excision. However, patients with history of ocular surface infections, ocular trauma, bleeding abnormalities, and anticoagulant therapy were exempted from the study. The patients were monitored and followed up for a minimum period of 3 months. The study was approved by the Ethical and Research Committee before its commencement. All the patients with primary pterygium who had given written informed consent were included in the study.

Demographic data including, age, gender, occupation, complaints, and through history of all the patients were documented in a predesigned pro forma. Visual acuity was measured by Snellen's chart and best corrected visual acuity was recorded. A detailed anterior segment examination was performed under slit lamp biomicroscope for diagnosis of pterygium and characteristics such as, grade, type, and site were recorded. Pterygium was graded according to Tan et al.[13] classification as: Grade 1 (atrophic) with episcleral vessels under the body of the pterygium, not covered and clearly distinguishable; Grade 2 (intermediate) with episcleral vessel covered partly and indistinguishable; and Grade 3 (fleshy) with episcleral vessels totally covered. Based on the progression of pterygium, a thick, fleshy, and vascular pterygium with few infiltrates in the cornea was considered progressive and thin. Whereas, pterygium that is attenuated with less vascularity and no infiltrates in the cornea was considered to be nonprogressive. Pterygium was labeled nasal or temporal based on the location, while patients with both nasal and temporal pterygium in the same eye were diagnosed as “Double Headed pterygium.” Investigations such as keratometry, intraocular measurement, lacrimal sac patency, bleeding time and clotting time, random blood sugar, and blood pressure were also performed.

**Surgical intervention and follow-up**

A single experienced surgeon performed all the surgeries under an operating microscope. Briefly, under peribulbar anesthesia, the lids were separated by putting the wire speculum. A superior rectus bridle suture was inserted using 4-0 black silk and clipped to the drapes. By taking care of underlying medial rectus muscle and the overlying conjunctiva, the body of the pterygium with the involved Tenon's capsule was excised. Then, abnormal tissue at the limbal end of the pterygium was aggressively resected. The size of the conjunctival graft that is required to resurface the exposed sclera was determined using Castroviejo calipers in three directions – extent across the limbus, maximum circumferential extent across the bed, and maximum distance from limbus. Then, the bridle suture was used to rotate the globe downwards by exposing the superior limbus and conjunctival surface. Using a Westcott's scissors, the graft was then excised starting at the fornical end. Special care was taken to attain a very thin graft without button holing. Once the limbus was reached, the graft was flipped over on to the cornea and the Tenon's attachments at the limbus was dissected. The flap was then excised to include the limbal tissue. After excising the graft, patients in Group 1 and Group 2 were then operated by different methods.

In Group 1 patients, the conjunctival limbal graft was skidded onto the cornea. It was then rotated and moved on the scleral bed with fine nontoothed forceps without lifting the tissue of the cornea. To ensure the original orientation of the juxtalimbal border towards the cornea, the graft was placed on the bare sclera. The sclera bed was then viewed through the transparent conjunctiva to ensure that residual bleeding does not lift the graft. Small central hemorrhages observed were tamponed with direct compression. Finally, the free graft was held for 8-10 min with the application of mild pressure over it.

In group 2 patients, the conjunctival limbal graft was skidded onto the cornea. It was then rotated and moved on the scleral bed with fine nontoothed forceps without lifting the tissue of the cornea. A limbus–limbus orientation was then maintained. The graft was smoothened out in its bed and an interrupted 8-0 vicryl suture was used to secure the position of the graft. This was followed by the removal of the superior rectus bridle suture. At last, two drops of antibiotics were instilled in the conjunctival cul-de-sac and the eye was patched.

Finally, the operating time was measured right from insertion of lid speculum to its removal at the end of the surgery. In both the groups, after intervention, topical steroid eye drops were instilled six times a day for 2 weeks and then tapered for next 4–6 weeks. Lubricating drops were used for four times/day for 6 weeks. The timing of suture fall-off or absorption was noted.

All patients were followed-up regularly for minimum three months: day 1, 1st week, 6th week, and 3rd month. All eyes were examined on slit lamp for any complications and recurrence of pterygium. At every visit, patients were assessed for the outcome variables such as, pain, foreign body sensation, lacrimation, and discomfort during blinking. The outcome variables were assessed using a questionnaire and the responses were graded on a scale of 0–3 as: absent (no symptoms), mild (patients with tolerable symptoms present occasionally), moderate (tolerable symptoms present throughout the day), and severe symptoms (intolerable symptoms present throughout the day). The operated eye was evaluated for the presence or absence of hemorrhage and displacement of graft. The overall appearance of the eye was assessed and graded as red. Primary outcome including, postoperative pain, foreign body sensation, lacrimation, discomfort, graft retraction, graft displacement, subgraft hemorrhage, and recurrence rate; and secondary outcome including intra- and post-operative complications were assessed and recorded. Complications such as, graft edema, graft extrusion, graft dehiscence, graft contraction, and granuloma formation are showed in Figures 1-3.
Statistical analysis
Data were analyzed using SPSS 16 (SPSS Inc., Chicago, USA). The categorical data were expressed in terms of rates, ratios, and percentages, and the continuous data were expressed in terms of mean ± standard deviation. Categorical data were compared using Chi-square or Fisher's exact test. At 95% confidence interval, \( P < 0.05 \) was considered as statistically significant.

Results
All the patients completed the 3-month follow-up period. The demographic characteristics of patient in both groups are summarized in Table 1. The mean age of patients in Group 1 and 2 was 50.5 ± 14.81 years and 48.9 ± 13.23 years, respectively. There was no statistically significant association between the groups in terms of gender, grade of pterygium, type of pterygium, site of pterygium, occupation, presenting complaints. However, significant association was observed between the groups with respect to operative time.

The mean operative time was 22.1 ± 5.43 min and 25.2 ± 2.61 min in Group 1 and Group 2, respectively (\( P = 0.004 \)). The assessment of outcome variables in two groups from postoperative day 1–3 months is shown in Table 2. On postoperative day 1, the intensity of postoperative pain was significantly low among patients in Group 1 compared to Group 2. Whereas postoperative pain, foreign body sensation, lacrimation, and discomfort were significantly low among patients in Group 1 compared to Group 2 after 1st week of surgery. No significant difference was observed in graft displacement, graft retraction, and subgraft hemorrhage between the groups in the follow-up period (\( P > 0.005 \)).

Other postoperative and intraoperative complications associated with pterygium excision in two groups are shown in Table 3. Moreover, the difference observed between the groups was statistically significant (\( P = 0.0013 \)). Furthermore, the patients were followed up for 3 months and fatal recurrences were not noted in any of the eyes in patients in both the groups.

Discussion
Recurrence after surgical excision of pterygium has been considered as a major challenge for surgeons.\(^2\) Therefore, the surgeons should be conscious in choosing the ideal procedure, which not only reduces the operative time but also the complications and the recurrence. Hence, the present study intended not only to assess the efficacy and safety but also use of autologous fibrin glue in comparison with sutures for the prevention pterygium recurrence after the surgery.

Maximum incidence of pterygium is between 30 and 39 years.\(^1,4\) Although, the literature reported male
Table 1: Demographic and clinical characteristics of glue and suture groups underwent pterygium removal (n=22)

| Findings                     | Group 1, n (%) | Group 2, n (%) |
|------------------------------|----------------|----------------|
| Age                          |                |                |
| 20-29                        | 1              | 2              |
| 30-39                        | 5              | 6              |
| 40-49                        | 3              | 6              |
| 50-59                        | 6              | 3              |
| 60-69                        | 4              | 6              |
| >69                          | 3              | 1              |
| Gender                       |                |                |
| Male                         | 9 (41)         | 12 (52)        |
| Female                       | 13 (59)        | 10 (45)        |
| Type of pterygium            |                |                |
| Progressive                  | 22 (100)       | 22 (100)       |
| Site of pterygium            |                |                |
| Nasal                        | 19 (86)        | 21 (95)        |
| Temporal                     | 3 (13)         | 1 (4)          |
| Grade of pterygium           |                |                |
| Grade 1                      | 1 (4)          | 0              |
| Grade 2                      | 20 (90)        | 18 (81)        |
| Grade 3                      | 1 (4)          | 4 (18)         |
| Occupation                   |                |                |
| Outdoor                      | 12             | 15             |
| Indoor                       | 10             | 7              |
| Presenting complaints        |                |                |
| Fleshy mass                  | 22 (100)       | 22 (100)       |
| Diminution of vision         | 19 (86)        | 11 (50)        |
| Redness                      | 14 (63)        | 7 (31)         |
| Pain                         | 1 (4)          | 0              |
| Operative time (min)         |                |                |
| 11-20                        | 15 (68)        | 1 (4)          |
| 21-30                        | 5 (22)         | 21 (95)        |
| 31-40                        | 2 (9)          | 0              |

*Significant

Preponderance, our study showed female preponderance in one group, which may be due to the fact that quite majority of the patients come with cosmetic disfigurement for treatment. In addition, as most women in our study were from rural background more exposure to “challah” smoke might point toward etiological factors in development of pterygium. A progressive lesion/pterygia mostly occurs in the nasal side compared to temporal side, which is comparable with our study. In contrast, other studies reported pterygia in temporal side than nasal side. Grade 2 pterygia was observed in most of the patients in both the groups compared to Grades 1 and 3. Most of the patients in this study were outdoor workers, whereas the remaining were indoor workers. Hence, this suggests that pterygium is a significant public health problem in people who are exposed to external environment of dust, wind, smoke, and mainly due to sun exposure. Most of the patients in our study came with complaints of fleshy mass in the eye, in both the groups. This suggests that a cosmetic reason became the leading cause to drive the patients to the hospital.

Longer operating time is closely associated with increased postoperative reaction and amplified risk of infection, and thus, decrease in operating time has important implications. A meta-analysis study revealed statistically significant longer operating time for suture. A similar Indian study reported average surgical time as 21 min in the fibrin glue group as compared to 38 min in the suture group, which was comparable with our study. The pain scores during first postoperative week were significantly lower in the fibrin adhesive group both on day 0 and at each point of time during the first postoperative week and concluded that the use of fibrin tissue adhesive in securing the autologous conjunctival graft in pterygium surgery is beneficial than using sutures. Foreign body sensation and lacrimation were present in most of the patients in both the groups on 1st postoperative day. However, on consequent days, patients in Group 1 were more comfortable than those in Group 2. These results were in harmony with other studies assessing these parameters. All the patients in Group 1 reported less discomfort than in Group 2 on 1st postoperative day. Further, similar studies in different parts of the world reported the patient satisfaction with regard to subjective symptoms was significantly higher in fibrin adhesive group than the suture group at all follow-up visits. It was never noted that the graft got displaced in either of the two groups at any follow-up visits, which showed that both the groups were comparable. These observations were similar to other studies in the literature. With regard to graft retraction, none of the patients in Group 1 had retraction of graft at any time of follow-up. However, 9.09% of patients in Group 2 had graft retraction around 1.5–2 mm on nasal side on postoperative day 1, 4.76% had graft retraction in 1st week follow-up, and none had in further follow-ups. The patients were closely followed, and re-epithelialization of the conjunctival defect occurred within 2 weeks. Similarly, a study from Spain reported mild graft retraction, which required no intervention for a complete secondary re-epithelialization. In addition, the present study had not encountered any serious intraoperative or postoperative complications. The intraoperative complications observed in the present study were comparable with other studies.

Recurrence of pterygium after surgery is mostly seen within 6 months of surgery; however, sometimes occurs later. Therefore, a 12-month follow-up period for clinical studies is recommended. Similarly, a study by Gris et al., in seven patients with recurrent pterygium found no recurrence after a 14-month follow-up period. While, in this study, all the patients were followed-up for a minimum of 3 months. However, recurrence was not observed in both the groups throughout the follow-up period.

Besides these advantages, the study had few limitations. The limitations included smaller sample size and a shorter...
follow-up period to assess the recurrence rate of the pterygium. Hence, long-term studies are needed to determine whether the recurrence rate of pterygium is affected by autologous fibrin adhesive versus sutures.

**Conclusion**

Overall, the present study showed efficacy of autologous fibrin adhesive in conjunctival autografting among the patients undergoing pterygium removal, in terms of pain, foreign body sensation, lacrimation, and discomfort during blinking. Furthermore, it significantly reduced the surgical time with fewer postoperative complications. Although this study concluded that both the techniques of attaching the conjunctival autograft after pterygium excision are equally efficacious in terms of postoperative complications and recurrence, the decision of selecting the technique devolves with the surgeon after considering the time available and the meticulous skill required.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

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