Evaluation of Efficacy of Autologous Serum versus Fibrin Glue for Conjunctival Autograft Adherence in Sutureless Pterygium Surgery

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ABSTRACT

Background: Pterygium surgery aims to achieve low recurrence, minimal complications, and good cosmetic outcomes. Conjunctival autografting is widely accepted as the most effective technique to reduce recurrence. In sutureless surgery, autologous serum and fibrin glue are commonly used for graft fixation. **Objective:** To compare the efficacy of autologous serum versus fibrin glue for conjunctival autograft adherence in sutureless pterygium surgery. **Methods & Materials:** This quasi-experimental study was conducted in the Department of Ophthalmology, Dhaka Medical College Hospital, from January 2020 to July 2020. Sixty patients with primary pterygium were enrolled and divided into two groups of 30 each. Group A underwent pterygium excision with conjunctival autograft fixation using autologous serum, while Group B underwent fixation using fibrin glue. Patients were followed up on the 1st postoperative day, 7th postoperative day, 1 month, and up to 6 months to assess graft adherence, postoperative complications, surgical time, and recurrence. **Results:** The mean age was 48.23±5.36 years in Group A and 50.28±6.41 years in Group B, with no significant difference ($p>0.05$). Graft adherence was achieved in 96.7% of patients in Group A and 100% in Group B. Early postoperative complications such as subconjunctival hemorrhage, graft edema, and graft retraction were minimal and comparable between groups. No recurrence was observed during the 6-month follow-up. There was no statistically significant difference in outcomes between the two groups. **Conclusion:** Autologous serum is as effective as fibrin glue for conjunctival autograft adherence in sutureless pterygium surgery and may serve as a cost-effective alternative.

Keywords: *Pterygium; Conjunctival autograft; Autologous serum; Fibrin glue; Graft adherence.*

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INTRODUCTION

Pterygium is a common degenerative and proliferative disorder of the ocular surface characterized by a triangular fibrovascular growth of conjunctival tissue extending onto the cornea. It is strongly associated with chronic ultraviolet (UV) radiation exposure and is more prevalent in tropical and subtropical regions. The pathogenesis of pterygium involves chronic inflammation, fibroblast proliferation, angiogenesis, extracellular matrix remodeling, and limbal stem cell dysfunction. Persistent UV exposure induces actinic damage and inflammatory cell infiltration, leading to fibrovascular proliferation across the limbus [1]. Early lesions are often asymptomatic but may cause irritation, burning, foreign body sensation, tearing, and cosmetic concern. As the lesion progresses, it may induce astigmatism by altering corneal curvature and, in advanced cases, threaten the visual axis [2].

Management of pterygium depends on symptom severity and lesion progression. Conservative treatment includes lubrication and UV protection. Surgical intervention becomes necessary when there is progressive enlargement, visually significant astigmatism, restriction of ocular motility, cosmetic disfigurement, or suspicion of dysplasia [3]. Lesions larger than 3 mm may induce clinically significant astigmatism, and those exceeding 3.5 mm are frequently associated with more than 1 diopter of corneal astigmatism [4].

The principal challenge in pterygium surgery is recurrence, characterized by fibrovascular regrowth onto the cornea. Over time, several surgical techniques have been developed to reduce recurrence rates, including bare sclera excision, conjunctival autograft, limbal-conjunctival autograft, amniotic membrane transplantation, conjunctival flaps, and the use of tissue adhesives. Among these, conjunctival autografting has been widely accepted as the most effective technique for reducing recurrence by restoring limbal barrier function and covering the exposed sclera [4]. Proper inclusion of limbal tissue during graft harvesting is essential to maintain limbal stem cell integrity and prevent recurrence.

Traditionally, conjunctival autografts are secured with sutures such as nylon or vicryl. However, suturing is technically demanding, increases surgical time, and is associated with postoperative discomfort, inflammation, granuloma formation, and rarely symblepharon. Sutures may also provoke conjunctival inflammation, which has been linked to increased recurrence risk [5]. Ti et al. (2000) demonstrated that postoperative inflammation plays a significant role in recurrent pterygium formation [6].

To overcome suture-related complications, fibrin glue has been introduced as a biological adhesive for graft fixation. Fibrin glue mimics the final step of the coagulation cascade, forming a fibrin clot

that secures the graft to the scleral bed. Studies comparing fibrin glue with sutures have shown significantly reduced operative time, less postoperative discomfort, and improved patient satisfaction (Uy et al., 2005)[7]. Cost analysis has also suggested that when one vial is shared among multiple patients, overall surgical cost becomes comparable to suturing techniques [3]. Additionally, reduced postoperative inflammation and faster recovery have been reported with fibrin glue [8].

More recently, autologous serum (or autologous blood coagulum) has emerged as a sutureless and glue-free alternative for graft fixation. In this technique, the patient's own blood acts as a natural adhesive, eliminating risks associated with sutures and commercial fibrin glue. Mitra (2011) reported excellent outcomes using autologous blood, with no graft loss and no recurrence during six months of follow-up [9]. Similarly, Sharma et al. (2015) reported a recurrence rate of 2.6% in 150 cases using autologous blood fixation [4]. However, some studies have noted slightly higher recurrence rates in smaller sample sizes, possibly due to inadequate graft stabilization.

Although both fibrin glue and autologous serum techniques aim to reduce surgical time, postoperative discomfort, and recurrence, there remains limited consensus regarding their comparative efficacy. Furthermore, in resource-limited settings, cost-effectiveness and availability are important considerations. Therefore, this study aims to evaluate and compare the efficacy of autologous serum versus fibrin glue for conjunctival autograft adherence in sutureless pterygium surgery, with particular emphasis on graft stability, recurrence, operative time, and postoperative comfort.

OBJECTIVES

The objective of this study was to compare the efficacy of autologous serum versus fibrin glue for conjunctival autograft adherence in suture less pterygium surgery.

METHODS & MATERIALS

The Quasi Experimental study was conducted in the Department of Ophthalmology, Dhaka Medical College Hospital, Dhaka, Bangladesh. The study was carried out over six months from January 2020 to July 2020.

Inclusion criteria

- Patients with clinically diagnosed primary pterygium
- Patients willing to participate and providing informed consent

Exclusion criteria

- Recurrent pterygium
- History of hypersensitivity to human blood products
- Patients on anticoagulant or antiplatelet therapy
- Known bleeding or coagulation disorders
- History of previous ocular trauma
- Recent ocular surgery (e.g., cataract surgery, glaucoma surgery)
- Uncontrolled diabetes mellitus or hypertension
- Unwillingness to participate in the study

Data Collection Procedure

A total of 60 patients clinically diagnosed with primary pterygium.

All enrolled patients underwent detailed history taking including demographic profile, relevant systemic illnesses, medication history, and comprehensive ophthalmic examination including visual acuity assessment and slit-lamp biomicroscopy. The patients were divided into two equal groups of 30 each. In both groups, pterygium excision with conjunctival limbal autografting was performed; however, the method of graft fixation differed. In Group A, the autograft was secured using autologous serum, while in Group B, fibrin glue was used for graft fixation.

All surgical procedures were performed under local anesthesia using peribulbar block with 2% lignocaine and 0.5% bupivacaine under strict aseptic precautions. The pterygium was excised using a crescent blade, and hemostasis was achieved by gentle pressure with cotton-tipped applicators. The size of the conjunctival defect was measured using a caliper, and a conjunctival limbal autograft of corresponding size was harvested from the superotemporal bulbar conjunctiva, ensuring inclusion of limbal tissue. The graft was carefully oriented and positioned over the bare scleral area.

In the autologous serum group, venous blood was collected from the patient and centrifuged at 2000–3000 rpm for approximately 3 minutes to obtain serum. The serum was injected into the graft-host interface, and the graft edges were gently pressed for 3–5 minutes to allow proper adhesion. In the fibrin glue group, fibrin glue (TISSEL kit, Baxter AG, Austria) was prepared according to the manufacturer's instructions. The sealer protein and thrombin components were prepared separately and applied to the scleral bed using a dual-syringe applicator. Two to three drops were placed on the scleral surface, and the graft was immediately positioned and smoothed with non-toothed forceps until secure fixation was achieved. Operative time was recorded from placement of the lid speculum to its removal.

Postoperatively, all patients received topical moxifloxacin and difluprednate eye drops four times daily for one week, which were gradually tapered over the following two weeks. Artificial tear drops were prescribed for four weeks. Patients were followed up on postoperative day 1, day 3, day 7, day 14, at 1 month, and at 3 months. At each visit, evaluation was done for postoperative pain, foreign body sensation, lacrimation, graft adherence, graft retraction or gapping, graft edema, subconjunctival hemorrhage, and any other complications. Recurrence was assessed at 3 months and was defined as fibrovascular growth crossing the limbus onto the cornea.

Ethical Considerations

Ethical approval was obtained from the Ethical Review Committee of Dhaka Medical College Hospital. Informed consent was taken from patients or their legal guardians before enrollment. Confidentiality of patient information was strictly maintained and data were used solely for research purposes.

Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics for Windows, version 22. Quantitative variables were expressed as mean ± standard deviation, and qualitative variables were expressed as frequency and percentage. Comparisons between the two groups were performed using the unpaired t-test for continuous variables and Chi-square (χ^2) test for categorical variables. Odds ratios were calculated where applicable to assess risk associations. A p-value of less than 0.05 was considered statistically significant, $p < 0.001$ highly significant, and $p > 0.05$ was considered non-significant.

RESULTS

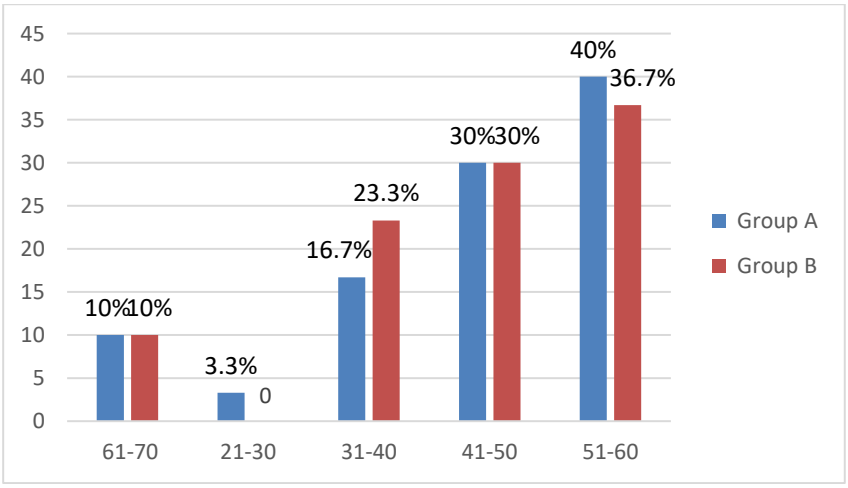

Figure 1 Distribution of the study population according to Age groups (*n*=60).

Figure 1 illustrates the age distribution of the study population in both groups. Most patients were in the 51–60 years age group (40% in Group A and 36.7% in Group B), followed by 41–50 years (30% in both groups). The lowest proportion was observed in the 21–30 years group. The mean age of Group A was 48.23±5.36 years and 50.28±6.41 of Group B.

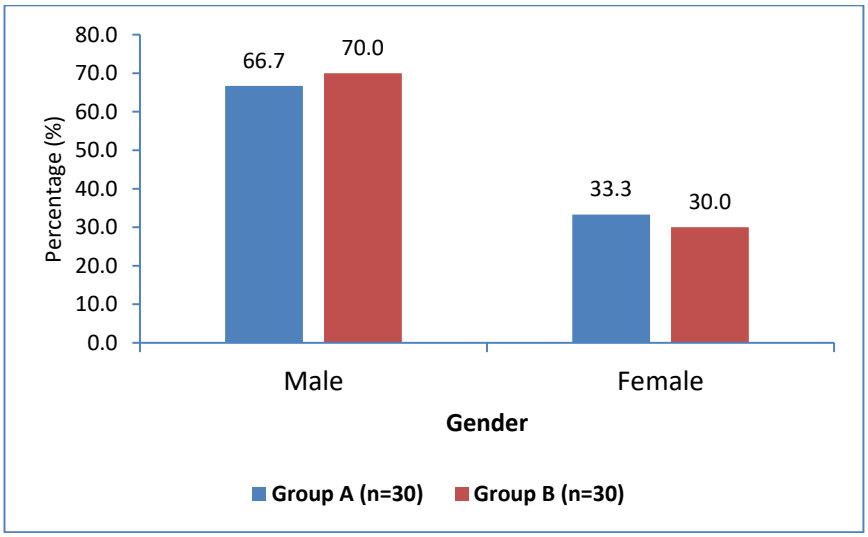

Figure 2 Gender distribution of the study population.

Figure 2 shows the gender distribution of the study. There were 20(66.7%) males and 10(33.3%) females in Group A. 21(70.0%) male and 9(30.0%) females in Group B.

Table I shows the surgical time between two groups. The mean surgical time (hours) 23.11±1.69 hours and 24.41±1.187 hours in Group A and Group B respectively. There was no statistically difference in surgical time between groups (P > 0.05).

Table I
Comparison of surgical time between two groups (*n*=60).

Variable	Group A (n=30) Mean±SD	Group B (n=30) Mean±SD	P-value
Surgical time (hours)	23.11±1.69	24.41±1.187	0.084

Figures in the parentheses indicate corresponding percentage; Unpaired student t-test was performed to compare between two groups
Group A Autologous serum; Group B: Fibrin glue

Table II shows the comparison of postoperative outcomes and complications between the two groups. On the 1st postoperative day, graft adherence was 96.7% in Group A and 100% in Group B, with some early complications such as subconjunctival hemorrhage, graft edema, and postoperative symptoms observed in both groups, though without significant difference. By the 7th postoperative day, graft adherence remained high and the frequency of complications had decreased in both groups. At 1 month follow-up, graft adherence was maintained in almost all patients, and most complications had completely resolved. Overall, there was no statistically significant difference between the two groups at any follow-up period.

Table II
Outcome and complications between two groups (*n*=60).

	Outcome	Group A (n=30) No. (%)	Group B (n=30) No. (%)	P-value
1st POD	Graft adherence to host tissue	29(96.7%)	30(100.0%)	1.000
	Subconjunctival hemorrhage	5(16.7%)	3(10.0%)	1.000
	Graft retraction	1(3.3%)	1(3.3%)	1.000
	Graft edema	1(3.3%)	5(16.7%)	0.197
	Postoperative symptoms (pain, lacrimation, foreign body sensation)	15(50.0%)	18(60.0%)	0.463
7th POD	Graft adherence to host tissue	29(96.7%)	30(100.0%)	1.000
	Subconjunctival hemorrhage	3(10.0%)	1(3.3%)	0.604
	Graft retraction	1(3.3%)	1(3.3%)	1.000
	Graft edema	0(0.0%)	4(13.3%)	0.153
	Postoperative symptoms (pain, lacrimation, foreign body sensation)	1(3.3%)	4(13.3%)	0.350
1st month	Graft adherence to host tissue	29(96.7.0%)	30(100.0%)	1.000
	Subconjunctival hemorrhage	0(0.0%)	0(0.0%)	-
	Graft retraction	1(3.3%)	1(3.3%)	1.000
	Graft edema	0(0.0%)	0(0.0%)	-
	Postoperative symptoms (pain, lacrimation, foreign body sensation)	0(0.0%)	0(0.0%)	-

Figures in the parentheses indicate corresponding percentage; Unpaired student t-test was performed to compare between two groups
Group A Autologous serum; Group B: Fibrin glue

DISCUSSION

Pterygium surgery should ideally achieve low recurrence, minimal postoperative complications, and satisfactory cosmetic outcomes. The present quasi-experimental study was conducted to compare the efficacy of autologous serum and fibrin glue for conjunctival autograft adherence in sutureless pterygium surgery. A total of 60 patients were included and equally divided into two groups: autologous serum (Group A) and fibrin glue (Group B). In the present study, males (68.3%) were more commonly affected than females (31.7%), which is consistent with previous studies by Malik et al. (2012), Rangu et al. (2014), and Bhargava et al. (2015) [10-12]. This male predominance may be attributed to increased outdoor exposure and ultraviolet radiation. The age of patients ranged from 21 to 68 years, with the majority belonging to the 41–60 years age group in both groups. The mean age was 48.23±5.36 years in the autologous serum group and 50.28±6.41 years in the fibrin glue group, with no statistically significant difference between groups (p>0.05). Similar findings were reported by Sharma et al. (2020) and Singh et al. (2020), where most patients were in the middle-aged group and the baseline demographic characteristics were comparable between groups [13,14]. The mean surgical time was 23.11±1.69 minutes in the autologous serum group and 24.41±1.19 minutes in the fibrin glue group, showing no statistically significant difference (p>0.05). Singh et al. (2013) reported shorter operative times in both groups, while Shrivastava et al. (2017) observed comparable operative durations between autologous serum and fibrin glue techniques, consistent with our findings [14,15]. Although some studies have reported reduced operative time with fibrin glue [16], the difference in our study was not significant, possibly due to surgical expertise and standardized technique. Graft adherence, which was the primary outcome of this study, was excellent in both groups. On the 1st postoperative day, 96.7% of patients in Group A and 100% in Group B achieved successful graft adherence, and this stability was maintained at the 7th postoperative day and at 1 month follow-up. There was no statistically significant difference between the two groups. These findings suggest that autologous serum is comparable to fibrin glue in achieving adequate graft fixation. Regarding postoperative complications, subconjunctival hemorrhage was observed in 16.7% of patients in Group A and 10% in Group B on the 1st postoperative day, which decreased over time and resolved completely by one month. Elwan (2014) similarly reported complete resolution of subconjunctival hemorrhage during follow-up [16]. Graft retraction occurred in one patient (3.3%) in each group, which is lower than rates reported by Boucher et al. (2015) and comparable to Sharma (2015). Graft edema was slightly higher in the fibrin glue group during early follow-up but resolved in all patients by one month [4,17]. Variations in graft edema may be related to intraoperative manipulation and small sample size, as suggested in previous studies. Importantly, no recurrence was observed in either group during the 6-month follow-up period. This finding aligns with studies by Hemalatha et al. (2016), who reported no recurrence in both groups during follow-up [18]. Although some studies such as Sharma (2015) reported low recurrence rates after 3 months, our results fall within the acceptable criteria described by Massaoutis et al. (2006), who defined successful pterygium surgery as having a recurrence rate below 10% [19]. Compared to broader recurrence ranges reported by Ang et al. (2007), the absence of recurrence in our study suggests satisfactory surgical outcomes [20]. Conjunctival limbal autografting remains the most effective method for reducing recurrence by restoring limbal barrier function. While fibrin glue offers advantages such as ease of use and reduced manipulation, it is associated with higher cost and theoretical risk of transmission of blood-borne diseases. In resource-limited settings like Bangladesh, autologous serum presents a cost-effective and biologically safe alternative without compromising efficacy. Overall, the findings of this study demonstrate that autologous serum is comparable to fibrin glue in terms of graft adherence, postoperative complications, and recurrence rate. Therefore, autologous serum may serve as an effective, economical, and safe alternative to fibrin glue for conjunctival autograft fixation in sutureless pterygium surgery.

CONCLUSION

The present study demonstrates that autologous serum is comparable to fibrin glue for conjunctival autograft adherence in sutureless pterygium surgery. There was no graft loss in either group, and postoperative complications such as subconjunctival hemorrhage, graft retraction, and graft edema were minimal and comparable between the two techniques. Graft adherence was excellent in both groups, and no statistically significant difference was observed in outcomes during the follow-up period.
Therefore, pterygium excision with conjunctival autograft fixation using autologous serum can be considered as effective as fibrin glue in sutureless pterygium surgery. Given its cost-effectiveness, biological safety, and availability, autologous serum may serve as a suitable alternative to fibrin glue, particularly in resource-limited settings.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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