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Original Research Article

Autologous serum as an alternative to fibrin glue for conjunctival autograft fixation in sutureless pterygium surgery

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ABSTRACT

Background: Pterygium is a common ultraviolet (UV)-related ocular surface disorder. Although conjunctival autografting lowers recurrence, the optimal graft fixation method remains debated. Autologous serum offers a cost-effective alternative to fibrin glue in sutureless pterygium surgery. Objectives were to compare the efficacy of autologous serum and fibrin glue for conjunctival autograft fixation in sutureless pterygium surgery.
Methods: This prospective randomized comparative interventional study was conducted at the Department of Ophthalmology, Dhaka Medical College Hospital, from January to July 2020. Sixty patients with primary nasal pterygium were randomly allocated into two groups: Group A (autologous serum) and group B (fibrin glue), with 30 patients in each group. Operative time, graft adherence, postoperative symptoms, complications, and recurrence at 3 months were evaluated. Data were analyzed using SPSS version 22, and $p<0.05$ was considered statistically significant.
Results: The mean surgical time was 23.11±1.69 minutes in group A and 24.41±1.19 minutes in group B ($p=0.084$). Complete graft adherence on the first postoperative day was observed in 96.7% of group A and 100% of group B. Postoperative symptoms were present in 50.0% and 60.0% of patients, respectively ($p=0.463$). Recurrence at 3 months occurred in 3.3% of group A and none in group B ($p=1.000$). No statistically significant differences were found between groups.
Conclusions: Autologous serum is a safe, effective, and economical alternative to fibrin glue for conjunctival autograft fixation in sutureless pterygium surgery.

Keywords: Pterygium, Autologous serum, Fibrin glue, Conjunctival autograft, Recurrence

INTRODUCTION

Pterygium is a chronic, 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 prolonged exposure to UV radiation and chronic environmental irritation. The underlying pathogenesis involves inflammatory cell infiltration, fibroblast proliferation, angiogenesis, extracellular matrix remodeling, and actinic damage, leading to progressive fibrovascular

encroachment over the limbus.[1] Clinically, early lesions may remain asymptomatic; however, with progression, patients frequently complain of redness, irritation, foreign body sensation, cosmetic disfigurement, and visual disturbance due to induced astigmatism.[2]

Surgical excision remains the definitive treatment for progressive or visually significant pterygium. The major concern following surgery is recurrence, defined as fibrovascular regrowth crossing the limbus onto the cornea. Bare sclera excision alone has been associated with high recurrence rates, leading to the development of conjunctival autografting techniques, which significantly reduce recurrence by restoring the limbal barrier function. Inclusion of limbal stem cells in the graft further enhances surgical success.[3,4]

Although conjunctival autografting is widely accepted as the gold standard technique, the method of graft fixation remains a subject of debate. Traditionally, sutures such as nylon or vicryl have been used to secure the graft. However, suturing prolongs surgical time and may induce postoperative inflammation, discomfort, granuloma formation, symblepharon, and graft-related complications. Postoperative inflammation is a known contributor to recurrence, and suture-induced inflammation may further increase this risk.[5,6]

To overcome these limitations, fibrin glue was introduced as an alternative method for graft fixation. Fibrin glue provides immediate adhesion, reduces operative time, and improves postoperative comfort. Uy et al demonstrated significantly shorter operative time with fibrin glue compared to sutures.[7] Bhargava et al reported reduced postoperative pain and foreign body sensation in patients undergoing fibrin glue–assisted conjunctival autograft fixation.[8] However, despite these advantages, fibrin glue has certain drawbacks, including high cost, limited availability in resource-constrained settings, storage requirements, and a theoretical risk of transmission of blood-borne infections.

In recent years, autologous serum (autologous blood) has emerged as a promising alternative to fibrin glue for conjunctival autograft fixation in sutureless pterygium surgery. This technique utilizes the patient's own blood oozing from the scleral bed to secure the graft through natural fibrin clot formation. It eliminates suture-related inflammation and avoids the additional cost and potential risks associated with commercially prepared fibrin glue. Thatte (2011) reported favorable outcomes in a prospective case series where graft fixation was achieved using autologous blood, with no graft loss and no recurrence during six months of follow-up.[9] Sharma et al observed a recurrence rate of 2.6% in 150 cases using autologous serum fixation, suggesting comparable efficacy to fibrin glue.[4]

Recent comparative studies up to 2020 have also indicated that autologous serum fixation provides similar recurrence rates and postoperative comfort compared to fibrin glue, while being more cost-effective and freer from risks related to exogenous biological adhesives.[10] These findings are particularly relevant in developing countries, where reducing surgical cost without compromising efficacy is essential. Therefore, the present study aims to evaluate autologous serum as an alternative to fibrin glue for conjunctival autograft fixation in sutureless pterygium surgery, focusing on recurrence rate, operative time, postoperative pain, foreign body sensation, and overall surgical outcomes.

Objectives

The main objective was to compare the efficacy of autologous serum and fibrin glue for conjunctival autograft fixation in sutureless pterygium surgery.

METHODS

The prospective randomized comparative interventional 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.

A total of 60 patients clinically diagnosed with primary nasal pterygium were enrolled after fulfilling the inclusion and exclusion criteria and providing informed written consent. Patients were recruited using purposive sampling technique and were randomly allocated into two equal groups of 30 patients each using simple randomization method. Group A underwent conjunctival autograft fixation using autologous serum, and Group B underwent conjunctival autograft fixation using fibrin glue. Patients aged 18 years and above with primary pterygium requiring surgical excision were included in the study. Patients with recurrent pterygium, history suggestive of hypersensitivity to human blood products, those receiving anticoagulant or antiplatelet therapy, known bleeding or coagulation disorders, history of ocular trauma, recent ocular surgery (such as cataract or glaucoma surgery), uncontrolled diabetes mellitus or hypertension, and those unwilling to participate were excluded. All patients underwent detailed history taking, biophysical assessment, and comprehensive ophthalmic examination prior to surgery. All procedures were performed under aseptic precautions using peribulbar anesthesia with 2% lignocaine and 0.5% bupivacaine. After placement of lid speculum, the pterygium was excised using a crescent blade. Hemostasis was achieved with gentle pressure using cotton buds. The conjunctival defect was measured with a caliper, and a conjunctival limbal autograft of identical size was harvested from the superotemporal bulbar conjunctiva, ensuring proper limbal orientation before placement over the bare sclera. In Group A, autologous serum was prepared from the patient's own venous blood by centrifugation at 2000–3000 rpm for 3 minutes. After controlling active bleeding, the serum was applied to the graft–host interface, and the graft was held in position with

non-toothed forceps for approximately 3-5 minutes to ensure adequate adhesion. In group B, commercially available fibrin glue (TISSEL kit, Baxter AG, Austria) was prepared according to the manufacturer's instructions and applied to the scleral bed. The conjunctival autograft was then positioned and gently smoothed until proper adhesion occurred. Operative time was recorded from placement to removal of the lid speculum. Postoperatively, all patients received topical moxifloxacin and difluprednate four times daily for one week, which was gradually tapered over the following two weeks. Artificial tear drops were prescribed for four weeks. Follow-up examinations were conducted on postoperative day 1, day 3, day 7, day 14, 1 month, and 3 months. During each visit, patients were evaluated for postoperative pain, foreign body sensation, lacrimation, graft adherence, graft retraction or gapping, graft edema, subconjunctival hemorrhage, and other complications. Recurrence was assessed at 3 months and defined as fibrovascular growth crossing the limbus onto the cornea.

Statistical analysis

Data were entered and analyzed using SPSS version 22. Quantitative data were expressed as mean ± standard deviation, and qualitative data were expressed as frequency and percentage. Comparisons between groups were performed using Chi-square (χ^2) test and unpaired t-test where appropriate. Odds ratios were calculated to determine risk factors. A $p<0.05$ was considered statistically significant, $p<0.001$ highly significant, and $p>0.05$ non-significant.

RESULTS

Table 1 shows the baseline characteristics of the study population. Both groups were comparable at baseline. The mean age was 48.23±5.36 years in group A and 50.28±6.41 years in group B (p=0.186). Male patients constituted 66.7% in group A and 70.0% in group B (p=0.781). There was no statistically significant difference between the groups.

Table 1: Baseline characteristics of the study population, (n=60).

Variables	Group A, (Autologous serum), n=30	Group B, (Fibrin glue), n=30	P value
Age (in years), mean±SD	48.23±5.36	50.28±6.41	0.186
Male	20 (66.7%)	21 (70.0%)	0.781
Female	10 (33.3%)	9 (30.0%)	

Figures in the parentheses indicate corresponding percentage; unpaired student t test was performed to compare between two groups, group A autologous serum and group B: Fibrin glue.

Table 2 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 2: Comparison of surgical time between two groups, (n=60).

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

Table 3: Graft status on 1st postoperative day, (n=60).

Graft status	Group A, (n=30)	Group B, (n=30)	P value
Complete adherence	29 (96.7%)	30 (100%)	1
Graft retraction	1 (3.3%)	1 (3.3%)	1
Graft edema	1 (3.3%)	5 (16.7%)	0.197

*Fisher's exact test used.

Table 3 demonstrates the graft status on the first postoperative day. Complete graft adherence was observed in 96.7% of patients in group A and 100% in group B. Graft retraction occurred in 3.3% of patients in both groups. Graft edema was noted in 3.3% of patients in group A and 16.7% in group B. No statistically significant difference was found between the groups (p>0.05).

Table 4: Early postoperative symptoms on 1st POD.

Symptoms	Group A, (n=30)	Group B, (n=30)	P value
Present (pain, foreign body sensation, lacrimation)	15 (50.0%)	18 (60.0%)	0.463
Absent	15 (50.0%)	18 (60.0%)	

Table 4 shows the early postoperative symptoms on the first postoperative day. Postoperative symptoms (pain, foreign body sensation, lacrimation) were present in 50.0% of patients in group A and 60.0% in group B. The difference was not statistically significant (p=0.463).

Table 5: Postoperative complications (1st POD findings).

Complication	Group A, (n=30)	Group B, (n=30)	P value
Subconjunctival hemorrhage	5 (16.7%)	3 (10.0%)	0.448
Graft edema	1 (3.3%)	5 (16.7%)	0.197
Graft retraction	1 (3.3%)	1 (3.3%)	1

Table 5 illustrates the early postoperative complications on the first postoperative day. Subconjunctival hemorrhage occurred in 16.7% of patients in group A and 10.0% in group B. Graft edema and graft retraction were observed in small proportions in both groups. There was no statistically significant difference between the groups (p>0.05).

Table 6: Recurrence at 3 months.

Recurrence	Group A, (n=30)	Group B, (n=30)	P value
Present	1 (3.3%)	0 (0%)	1
Absent	29 (96.7%)	30 (100%)	

Table 6 shows recurrence rates at 3 months follow-up. Recurrence was observed in 3.3% of patients in group A and none in group B. The difference was not statistically significant (p=1.000).

DISCUSSION

An ideal pterygium surgery should ensure low recurrence, minimal postoperative complications, reduced patient discomfort, and satisfactory cosmetic outcomes. The present study was conducted to compare the efficacy of autologous serum versus fibrin glue for conjunctival autograft fixation in sutureless pterygium surgery. A total of 60 patients were included and equally divided into two groups. Group A underwent conjunctival autograft fixation using autologous serum, while group B received fibrin glue fixation. In the present study, males (68.3%) were more commonly affected than females (31.7%), which is consistent with previous reports by Malik et al, Rangu et al and Bhargava et al where higher male predominance was attributed to greater outdoor exposure and UV radiation.[8,11,12] The mean age in the autologous serum group was 48.23±5.36 years and 50.28±6.41 years in the fibrin glue group, with no statistically significant difference between the groups. Similar age distribution has been reported by Singh et al and Sharma et al where the majority of patients belonged to the middle-aged group and no baseline demographic differences were observed between comparative groups.[13,14] Comparable demographic patterns were also reported by Kurian et al who found no significant baseline differences between autologous blood and fibrin glue groups.[15] The mean surgical time in our study 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 reported shorter operative time in the fibrin glue group compared to autologous serum, while Shrivastava et al observed comparable operative durations between the two techniques.[13,16] Although fibrin glue is generally associated with reduced operative time and improved intraoperative handling (Elwan), our findings suggest that autologous serum fixation does not significantly prolong the procedure when performed by experienced surgeons.[17] Similarly, Rafe et al demonstrated comparable operative times between autologous serum and fibrin glue fixation methods.[20] Regarding graft stability, complete graft adherence was achieved in 96.7% of patients in the autologous serum group and 100% in the fibrin glue group on the first postoperative day. Graft retraction occurred in only one patient in each group. These findings are comparable to those reported by Boucher et al and Sharma who demonstrated similar graft stability with both techniques.[14,19] However, Boucher et al observed slightly lower early graft stability in the autologous blood group compared to fibrin glue.[19] Likewise, Nadarajah et al reported that autologous blood fixation showed marginally reduced graft stability compared to fibrin glue, though long-term recurrence was not significantly different.[20] Subconjunctival hemorrhage and graft edema were observed in small proportions in both groups, resolving during follow-up without significant intergroup differences. Early graft edema was slightly higher in the fibrin glue group, but this difference was not statistically significant. Previous studies by Bhargava et al and Rangu et al have also reported low rates of postoperative edema and hemorrhage, supporting the safety profile of both techniques.[8,12] A systematic review by Zein et al concluded that autologous blood fixation may have slightly higher early graft-related events, but overall complication and recurrence rates were comparable to fibrin glue.[21] Postoperative symptoms such as pain, foreign body sensation, and lacrimation were observed in 50% of patients in the autologous serum group and 60% in the fibrin glue group on the first postoperative day, without significant difference. These findings indicate comparable patient comfort between the two techniques. Earlier studies have suggested that fibrin glue may reduce postoperative discomfort compared to sutures; however, when both techniques are sutureless, symptom profiles appear similar. Kurian et al also reported no significant difference in early postoperative discomfort between autologous blood and fibrin glue groups.[15] Recurrence remains the most critical parameter in evaluating the success of pterygium surgery. In our study, recurrence was observed in 3.3% of patients in the autologous serum group and none in the fibrin glue group at 3 months follow-up, without statistical significance. Similar low recurrence rates have been reported by Sharma.[4] Elwan reported recurrence rates of 6-8% with comparable outcomes between fixation techniques. Massaoutis et al defined surgical success as a recurrence rate below 10%, a criterion met by our study.[22] Although long-term follow-up is ideal for recurrence assessment, the low recurrence observed in our study supports the effectiveness of both methods. Recent literature continues to demonstrate acceptable recurrence rates with both techniques. Rafe et al reported comparable recurrence rates between autologous serum and fibrin glue groups, while Kurian et al found no significant difference in recurrence between the two fixation methods.[20] Fibrin glue offers advantages such as ease of graft fixation and shorter operative time; however, its higher cost and potential risk of transmissible infections from plasma-derived products may limit its use, particularly in developing countries. Autologous serum,

being derived from the patient's own blood, eliminates the risk of disease transmission and significantly reduces cost. Given the comparable outcomes observed in this study and supported by contemporary literature, autologous serum appears to be a safe, effective, and economical alternative to fibrin glue for conjunctival autograft fixation in sutureless pterygium surgery. Overall, the findings of this study support the use of autologous serum as a viable alternative to fibrin glue, especially in resource-limited settings where cost-effectiveness is an important consideration.

Limitations

The study had a small sample size and short follow-up period, which may underestimate late recurrence. It was conducted at a single center, limiting generalizability. Larger multicenter studies with longer follow-up are needed.

CONCLUSION

Both autologous serum and fibrin glue are effective methods for conjunctival autograft fixation in sutureless pterygium surgery. The two techniques showed comparable graft stability, postoperative complications, patient comfort, and recurrence rates. Given its low cost, safety, and absence of risk of disease transmission, autologous serum can be considered a safe and economical alternative to fibrin glue, particularly in resource-limited settings.

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