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Comparison of Superior and Inferior Limbal Conjunctival Autograft Transplantation in Primary Pterygium Surgery: A Retrospective Analysis

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Abstract **Original Research Article**

Introduction: Conjunctival autografting is the cornerstone of pterygium treatment. The most typical way to harvest the conjunctival graft is superior. Nonetheless, it is not always possible to harvest a graft from the superior bulbar conjunctiva, which could impact the functionality and result of a subsequent filtering procedure [1]. This study aims to compare the effectiveness of superior conjunctival autografting and inferior conjunctival autografting without using glue or sutures. ***Methods:*** This was a prospective observational study conducted in the Department of Ophthalmology, Pabna Medical College Hospital, Pabna, Bangladesh during the period from January 2019 to December 2020. In our study, we included 200 eyes of 198 patients with primary pterygium who underwent surgical procedures in Pabna Medical College Hospital. ***Results:*** A total of 200 cases were included in this case series. 100 of them underwent superior limbal conjunctival autograft transplantation (Group A) and 100 of them underwent inferior limbal conjunctival autograft transplantation (Group B). There was one eye with recurrence in both groups, which was not statistically significant; there were two eyes with graft dehiscence in group B and one eye with graft dehiscence in group A. Graft retraction was not statistically significant in 12 cases in group A and 10 cases in group B. The inferior conjunctival autografting techniques are great alternatives with similar results and no increased risk of serious problems in cases where the superior conjunctiva must be maintained. ***Conclusion:*** Our findings show that suture-less and glue-free superior or inferior limbal conjunctival autograft is safe, cost-efficient, and successful.

Keywords: Pterygium surgery, Superior conjunctival autograft, Inferior conjunctival autograft, Suture less glue-free conjunctival autograft.

INTRODUCTION

Pterygium is a disorder of the ocular surface characterized by the growth of fibrovascular tissue leading to the destruction of Bowman's membrane. Conjunctival autografting which is the mainstay in the management of pterygium, has been shown to have a lower recurrence rate when compared to other surgical options [2-8]. The conjunctival graft is most commonly harvested superiorly. However, in certain situations, such as when there is conjunctival scarring from trauma or surgery, the superior bulbar conjunctiva could not be accessible for graft harvesting. Likewise, in eyes with filtering blebs, grafting from the superior location could not be feasible, which would impact the results and functionality of a subsequent filtration procedure. Therefore, inferior bulbar conjunctival grafting, amniotic membrane grafting, bare sclera method, and conjunctival tissue grafting from the overlaying pterygium itself are possibilities that can be used in such circumstances. The most advanced method for treating pterygium nowadays involves rotating the conjunctival flap or implanting autografts with or without limbal stem cells to fully resurface the conjunctival defect [9-17]. Amniotic membrane has also been used successfully as a conjunctival substitute for covering an extensive conjunctival defect after thorough pterygium excision [18-21]. Furthermore, radiotherapy or postoperative 0.04% mitomycin C (MMC) topical administrations have been used as adjunct therapies. However, each of these was later reported to have uncommon but severe complications, including scleral ulceration, corneal ulceration, scleral thinning, glaucoma, and cataracts.[22] Therefore, the best course of treatment for pterygium would be a straightforward surgery that can lower the recurrence rate to a manageable level with few side effects and without the use of potentially harmful medications or radiation therapy. According to recent

findings, fibrin glue is preferable to sutures. Fibrin glue has been shown to increase patient comfort, shorten recovery times, and lower the risk of problems and recurrence [23-27]. Suture-related complications include infection, prolonged operation time, postoperative discomfort, suture abscesses, buttonholes, and pyogenic granuloma which usually require a second surgery for removal and chronic inflammation [28]. Plasma-derived fibrin glue has the potential risk of prion disease transmission and anaphylaxis in susceptible individuals. Sutureless grafting has been used successfully in gingival grafts [29] and represents a similar mucosal membrane tissue environment to the conjunctiva of the eye. This study aims to compare the effectiveness of superior conjunctival autografting and inferior conjunctival autografting without using glue or sutures.

Aims & Objectives

The availability of superior bulbar conjunctiva for graft harvesting may not always be possible, which could impact the results and functionality of a subsequent filtration procedure. Ocular surface surgery with foreign materials may result in local consequences like infection, scarring, or pain. Fibrin glue and other plasma-derived products run the risk of causing hypersensitivity reactions, although there is still a chance of viral transmission. To minimize the possible difficulties that come with using fibrin glue or sutures, we outline a straightforward technique for producing conjunctival autografts from superior and inferior conjunctiva during pterygium surgery.

METHODOLOGY & MATERIALS

This was a prospective observational study conducted in the Department of Ophthalmology, Pabna Medical College Hospital, Pabna, Bangladesh during the period from January 2019 to December 2020. In our study, we included 200 eyes of 198 patients with primary pterygium who underwent surgical procedures in Pabna Medical College Hospital. Patients were numbered serially; an odd number of patients were enrolled in group A and autografts taken from superior conjunctiva on the other hand even number of patients were enrolled in group B and autografts taken from inferior conjunctiva.

These are the following criteria to be eligible for enrollment as our study participants:

Inclusion Criteria:

1. Patients of all ages and either sex presenting with primary pterygium.
2. Patients who were willing to participate in the study.

Exclusion Criteria:

1. Patients suffering from other intraocular or ocular surface disease.
2. Patients with both nasal and temporal pterygium.
3. Patients non-compliant to follow-up
4. Patients enrolled in other study groups

Ethical Approval: Ethical clearance was obtained from the Institutional Review Board of Pabna Medical College. All clinical information was noted on structured proforma and consent was obtained from all patients.

Preoperative Ophthalmic Evaluation: Uncorrected and best-corrected visual acuity, digital anterior segment photography, slit-lamp examination, fundoscopy, and measurement of intraocular pressure. The Goals of pterygium surgery were to remove the pterygium, restore the conjunctival anatomy, leave the cornea as smooth and clear as possible, preserve superior conjunctiva for future surgery, if necessary, prevent recurrence and cosmesis.

Surgical Technique: Preoperative peribulbar anesthesia was administered using a 2% lignocaine to 0.5% bupivacaine in l:l ratio. A spring scissor was used to cut a line 1 mm medial to the limbus over the pterygium, removing only the conjunctiva. The body was then dissected using blunt and sharp tools to remove the overlying conjunctiva as smoothly and clearly as possible. The pterygium's body was cut 4 mm from the limbus to the exposed sclera. The sclera was left bare. After the thicker portion of the conjunctiva and surrounding Tenons capsule, as well as the subconjunctival pterygium tissue were removed. Avulsion was used to remove the pterygium from the cornea. Calipers were used to measure the bare sclera's size, which was recorded in millimeters squared (mm^2). Group A received graft from the superior conjunctiva, while Group B received autograft from the inferior quadrant of the bulbar conjunctiva. The tips of the calipers were used to designate the four corners to harvest the conjunctival autograft. Using Wescotl tenotomy scissors, two tiny incisions were made at the limbal site, and the entire graft was carefully bluntly dissected until it was free of tenons that reached the limbus, including limbal stem cells that serve as a barrier to the conjunctival cells moving onto the corneal surface.

The edges of the graft were then cut with Vannas scissors. Forceps were utilized to gently transfer the graft to the recipient bed, maintaining the epithelial side up and the limbal edge towards the limbus. When taking a transplant from the superior conjunctiva, the globe must spin downwards, although this was not required when taking a graft from the inferior conjunctiva. Hemostasis was allowed to develop spontaneously with little cautery to provide autologous fibrin to naturally glue the conjunctival autograft in place without strain, and the scleral bed was observed via the

transparent conjunctiva to ensure that residual bleeding did not raise the graft.

The graft was held in place for 1 minute, after which its stability was examined with a Merocel spear centrally and on each free edge to confirm tight adherence to the sclera. The eye was bandaged for twenty-four hours. Following surgery, a pressure eye patch was applied. Analgesia was administered twice daily. Tab was added in the post-operative medication list. Ciprofloxacin 500 mg bid for 5 days, dexamethasone with Tobramycin eye ointment three times daily for one-week, gradual tapering for three weeks, and liberal use of topical lubricating eye drops four times daily for four weeks.

The patients were told not to rub their eyes and to stay out of the sun, heat, and dust. To lessen their exposure to UV rays, the patients were additionally advised to wear sunglasses.

After twenty-four hours, one week, one month, three months, and six months, all patients were monitored. Each follow-up appointment, particularly the first three, involved patients filling out a questionnaire that graded discomfort, foreign body (F.B.) feeling, photophobia, hyperemia, and chemosis into four intensity-based categories. From 0 to 3, the scale was as follows: 0 for nothing, 1 for mild, 2 for moderate, and 3 for severe. The information was gathered as mean scores and documented. Graft dehiscence, graft retraction, recurrence rate (defined as fibrovascular growth invading the cornea more than 1 mm at the site of previously removed pterygium), and gain in uncorrected visual acuity (UCVA) were the primary postoperative outcomes observed.

The secondary outcomes were postoperative pain, foreign body sensation, photophobia, hyperemia, chemosis, and overall satisfaction, with complications including persistent epithelial defect, dellen, inclusion cyst, pyogenic granuloma, conjunctival oedema, scleral necrosis, infective scleritis, keratitis, endophthalmitis, and symblepharon formation.

Statistical analysis: Data were expressed as mean ± SD. Statistical analysis was performed using SPSS 16 for Windows (IBM Corp., New York, NY, USA).

RESULTS

Case series was carried out in 200 eyes of 198 patients (2 patients have bilateral pterygium 1 in each group) with primary pterygium.

Table 1: Demographic Profile of the Study Population

Parameter	Group A Superior conjunctival autografting	Group B Inferior conjunctival autografting
Total number of eyes	100	100
Mean age in years	50.08±11.76	48.08±12.76
Male: Female	38: 62	36: 64
Right eye: Left eye: Both eye	56: 42: 1	58: 40: 1
Nasal: Temporal	96: 4	95: 5
Size of pterygium in mm length mean & SD	4.398± 1.453	4.378± 1.534

The demographic data is elaborated in Table 1. The mean age of the patients in Group A and Group B was 50.08±11.76 years and 48.08±12.76 years and the male: female ratio was 38: 62 and 36: 64 respectively. The number of eyes with nasal vs temporal pterygium was 96: 4 in Group A and 95: 5 in Group B. The size of pterygium in mm length mean & SD was 4.398± 1.453 and 4.378± 1.534 respectively.

Table 2: Showing postoperative main and secondary outcomes

Outcome	Group A Superior conjunctival autografting	Group B Inferior conjunctival autografting
Recurrence rate	1(1%)	1(1%)
Graft dehiscence	1(1%)	2(2%)
Early graft retraction	12(12%)	10(10%)
Medial side	10(10%)	8(8%)
Upper side	2(2%)	2(2%)
Early Graft oedema	14(14%)	12(12%)
SCH On 1st Follow up	20(20%)	18(18%)
SCH On 2nd Follow up	4(4%)	8(8%)
SCH On 3rd Follow up	0(0%)	0(0%)
Gain in UCVA	13(13%)	10(10%)

Outcome	**Group A** **Superior conjunctival autografting**	**Group B** **Inferior conjunctival autografting**
Conjunctival oedema	6(6%)	7(7%)
Conjunctival granuloma	0(0%)	0(0%)
Corneal scar (faint nebula)	8(8%)	6(6%)
Dellen	0(0%)	0(0%)
Symblepharon	0(0%)	0(0%)
Scleral necrosis	0(0%)	0(0%)
Scleral thinning	0(0%)	0(0%)

SHC=Sub Conjunctival Haemorrhage

Table 2 shows that recurrence was the primary complication compared between the two groups. It was seen in 1 eye in each group, which was not statistically significant. Other complications are listed in Table 2. Graft dehiscence in Group A was in 1 eye & 2 in Group B, which was not statistically significant. Graft retraction in Group A was in 10 eyes & 12 in Group B, which was not statistically significant. Other findings are almost similar in both groups.

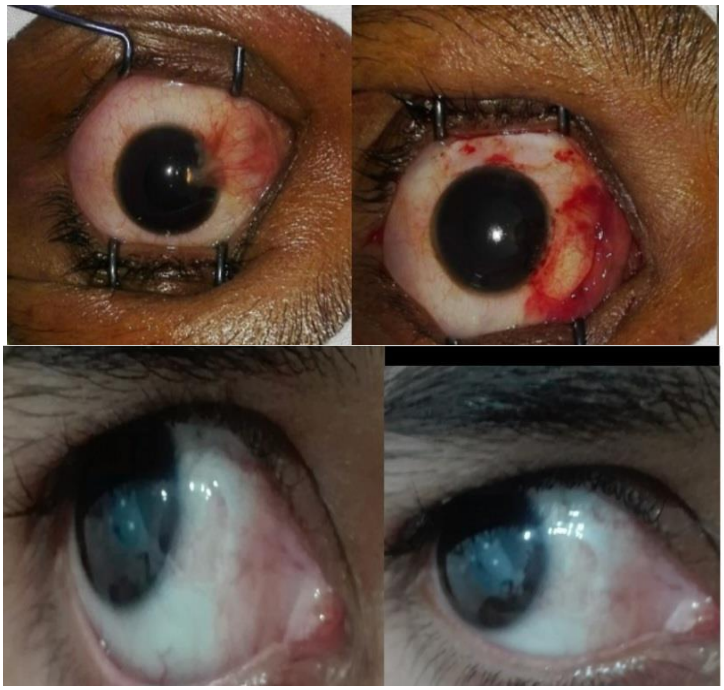
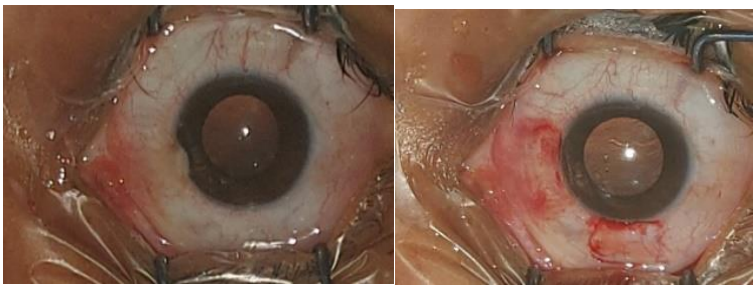


Figure l: Nasal pterygium before & after surgery, after 1 month & after six months (Graft taken from superior conjunctiva)



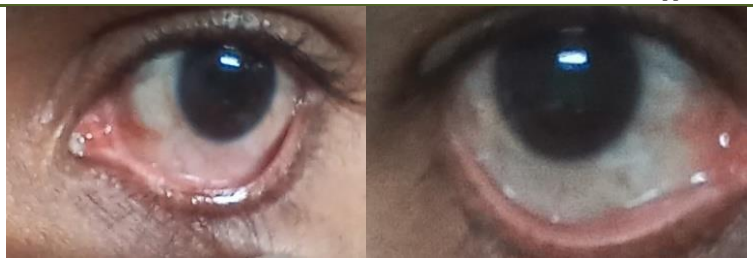


Figure 2: Nasal pterygium before & after surgery, after 1 month & after six months (Graft taken from inferior conjunctiva)

DISCUSSION

When doing surgery, the surgeon should consider the potential for more aggressive recurrent pterygium and choose an operating approach that will reduce recurrence. Thus, the goal of pterygium surgery should be to avoid recurrence in addition to removing the pterygium. Recurrences of pterygium usually happen within the first six months following surgery [30]. Autologous limbal conjunctival grafting is one such technique to stop recurrence. Limbal conjunctival autologous transplantation considerably reduces the recurrence rate by restoring the limbus barrier function.

Preserving the superior conjunctiva is the goal of harvesting grafts from the inferior conjunctiva. Since inferior conjunctival autografting has the same recurrence rate as superior conjunctival grafts, no extra adjunctive medications, such as mitomycin C, are needed for this treatment. The likelihood of symblepharon development and technical difficulties in achieving a big, thin graft are the method's disadvantages [31]. According to a study by Shrestha A *et al.*, [32], which had 50 eyes undergoing the same procedure with a follow-up of six months, 4% of the eyes experienced a recurrence, and 8% of the eyes developed conjunctival scarring. The findings were similar to our current investigation, and neither study found any symblepharon development.

The recurrence rate in both groups in this study was 1%. According to Massaoutis *et al.*, [33], the provision of white cosmetic conjunctiva with no lingering symptoms and a low recurrence rate (less than 10%) is the definition of surgical success in pterygium surgery. Our study's recurrence rate meets Massaoutis *et al.*,'s standards. Malik *et al.*, [34], who used a suture-less and glue-free graft from a superior conjunctival autograft and reported a recurrence rate of 2.5%, also had a comparable recurrence rate.

Graft dehiscence is a known side effect of glue-based procedures [35]. When utilizing autologous fibrin, Foroutan *et al.*, [36] reported a 13.33% rate of graft dehiscence. They ascribed this to the autologous glue's low thrombin and fibrinogen concentration in comparison to a commercial formulation. In our investigation, two eyes in group B and one eye in group A experienced graft dehiscence. Therefore, during the first week following surgery, we advise patients to wear protective glasses and refrain from rubbing their eyes. Furthermore, for graft uptake to be successful, a thin donor limbal conjunctival autograft free of Tenon's capsule must be carefully dissected.

Graft retraction was reported by Tan [37]. who advocated sub-conjunctival fibrosis and recommended meticulous dissection of sub-epithelial graft tissue. Foroutan *et al.*, [36] reported 20% of cases with graft retraction, in our study graft retraction occurred in 12 eyes out of 100 eyes in group A & 10 eyes in group B. All the cases of graft retraction were resolved with conservative treatment.

Wit *et al.*, [38] also proposed that the apposition of the eyelids to the bulbar conjunctiva provides a natural biological dressing, compression, and a smooth frictionless surface.

Pyogenic granuloma and dellen did not occur in any group. Conjunctival oedema occurred in our study in group A 6 eyes & 7 eyes in group B. All cases resolved spontaneously with conservative treatment. Symblepharon does not occur in any patient in both groups. To avoid Symblepharon we use dexamethasone with tobramycin eye ointment three times a day for 1 month.

None of our patients developed serious complications such as scleral necrosis, scleral thinning, graft necrosis, excessive bleeding, medial rectus muscle injury, or globe perforation.

Limitations of the study

Our study was a single-center study. We took a small sample size due to our short study period. After evaluating those patients, we did not follow up with them for the long term and did not know other possible interference that may happen in the long term with these patients.

CONCLUSION AND RECOMMENDATIONS

Suture-less and glue-free superior or inferior limbal conjunctival autograft is safe, cost-efficient, and

successful. After primary pterygium surgery, surgical results are similar to those of other operations. A great alternative approach with comparable results and no increased risk of serious problems is inferior conjunctival autografting, which is required in instances where the superior conjunctiva must be spared or for those who may require future glaucoma filtration surgery.

So further study with a prospective and longitudinal study design including a larger sample size needs to be done to validate the findings of our study.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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