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Original Research Article

Sutureless and glue-free conjunctival autografting versus sutured autografting for primary pterygium: a prospective comparative study

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ABSTRACT

Background: Pterygium recurrence remains a major challenge following surgical excision. Although conjunctival autografting is the preferred treatment, suturing is associated with postoperative discomfort and suture-related complications. This study compared the outcomes of sutureless and glue-free conjunctival autografting with sutured conjunctival autografting in primary pterygium.
Methods: A prospective, observational, comparative hospital-based study was conducted at a tertiary-care centre in Madhya Pradesh, India, from February 2021 to February 2022. A total of 50 patients with primary nasal pterygium were included and divided into two groups: (i) sutureless and glue-free conjunctival autografting (n=25), and (ii) sutured conjunctival autografting (n=25). Patients were evaluated preoperatively and followed up at 2, 4, and 6 weeks postoperatively.
Results: Most patients i.e. 15 (30.0%) were aged 31-40 years. Males comprised 23 (46.0%) patients of the study population. Majority i.e. 32 (64.0%) patients resided in rural areas. Progressive pterygium was observed in 46 (92.0%) patients, with grade 2 being the most common presentation as observed in 36 (72.0%) patients. At the 6-week follow-up, visual acuity of 6/9-6/6 was achieved in 20 (80.0%) patients in the sutureless group and 17 (68.0%) patients in the sutured group. Graft oedema was observed in 2 (8.0%) and 1 (4.0%) patients, while graft displacement occurred in 2 (8.0%) and 1 (4.0%) patients in the sutureless and sutured groups, respectively. Pain was less frequent in the sutureless group at follow-up. Recurrence was observed in 2 (8.0%) patients in the sutureless group and 1 (4.0%) patients in the sutured group.
Conclusions: Sutureless and glue-free conjunctival autograft technique is easy, safe, effective.

Keywords: Conjunctival autograft, Pterygium, Sutureless glue free conjunctival autograft

INTRODUCTION

Pterygium is a common degenerative ocular surface disorder characterized by fibrovascular subconjunctival tissue extending onto the cornea.[1] It typically presents as a wing-shaped growth that may vary in thickness and occasionally shows dysplastic changes.[2] The prevalence ranges from 0.07-53% globally, with higher incidence in tropical regions due to increased exposure to ultraviolet radiation. It is also more common in warm, windy and dry climates.[3]

Several surgical techniques have been employed for the management of pterygium, including bare sclera excision, bare sclera excision with adjunctive mitomycin C application at varying doses and durations, and pterygium excision followed by conjunctival autografting or amniotic membrane transplantation.[4] However, conjunctival

autografting is considered the preferred surgical technique due to its lower recurrence rates compared to other methods.[5] The most common method of autograft fixation is suturing- however the pitfalls of this method include increased operative time, postoperative discomfort, oedema, inflammation, scarring, and granuloma formation.[6] Sutureless and glue-free conjunctival autograft is a new, easy and more cost-effective technique for the management of pterygium.[7] Against this background the current study compared the outcomes of sutureless and glue-free conjunctival autografting with sutured conjunctival autografting in the management of primary pterygium.

METHODS

Patient population and study design

A prospective, observational, comparative, hospital-based, study was conducted at a Ruxmaniben Deepchand Gardi Medical College (RDGMC), Ujjain, Madhya Pradesh, India from February 2021 to February 2022. All patients diagnosed with primary nasal pterygium regardless of age or gender were included in this study. A total of 50 patients were included: (a) group 1 comprised of 25 patients to undergo sutureless, glueless, conjunctival autografting and (b) group 2 comprised of 25 patients to undergo conjunctival autografting with sutures. Patients with: (i) temporal or recurrent pterygium, (ii) pseudopterygium, (iii) known cases of glaucoma, (iv) vitreoretinal conditions necessitating surgical interventions, (v) history of previous intraocular surgery or (vi) ocular trauma were excluded from the study. The study was conducted in accordance with the Declaration of Helsinki and Good Clinical Practices and was approved by the Institutional Ethics Committee (ECR/1030/Inst/MP/2018/RR-21).[8,9] All patients provided written informed consent for participation in the study.

Preoperative evaluation and ocular assessment protocol

All patients underwent routine laboratory investigations prior to surgery, including random blood sugar, hemoglobin, total and differential leukocyte counts, erythrocyte sedimentation rate (ESR), and ELISA testing for human immunodeficiency virus (HIV). A thorough ocular adnexal examination was performed, with particular attention to associated conditions such as dacryocystitis, ptosis, and dermoid cysts. The eyelids were carefully evaluated for abnormalities including ectropion, entropion, ptosis, lagophthalmos, and any signs of inflammation.

Patients were also assessed for dry eye, and the Schirmer test was conducted in all cases. Detailed slit-lamp examination of the conjunctiva was carried out to confirm the presence of pterygium and to classify it as progressive or atrophic. Grading of the pterygium (grade 1, 2, or 3) was documented, and the presence or absence of Stocker's line was noted. The limbal area was examined for scars, nodules, retained sutures, or foreign body granulomas, while the sclera was evaluated to rule out scleritis, episcleritis, or staphyloma.

A comprehensive ocular examination was completed, including assessment of the cornea, uvea, and lens, pupillary reactions, intraocular pressure measurement, and fundus evaluation using an ophthalmoscope. All surgical procedures were performed by the consultant in charge of the department of ophthalmology, while the principal investigator assisted, observed, and recorded relevant parameters using a pre-tested proforma.

Procedure

After obtaining informed consent, all patients underwent the procedure under peribulbar anesthesia using a 1:1 mixture of 2% lignocaine and 0.5% bupivacaine administered preoperatively. The body of the pterygium was dissected approximately 4 mm from the limbus up to the exposed sclera, followed by avulsion of the pterygium from the corneal surface.

In the sutureless group, controlled bleeding from the episcleral vessels at the excision site was encouraged to form a thin coagulum; excessive blood, if present, was gently removed to achieve an optimal layer for adhesion. A conjunctival autograft of appropriate size was harvested and immediately placed over the recipient bed with careful attention to correct orientation. Gentle, uniform pressure was applied using McPherson forceps for approximately 2 minutes to facilitate adherence of the graft to the underlying sclera via the blood coagulum. Graft stability was assessed intraoperatively by asking the patient to move the eye (adduction and abduction), followed by removal of the speculum and reassessment during blinking.

In the suture group, a conjunctival autograft was dissected from the superotemporal bulbar conjunctiva adjacent to the limbus. The graft was positioned over the recipient site and secured with interrupted 10-0 nylon sutures using episcleral bites at the corners to maintain proper alignment and stability.

Postoperatively, the eye was bandaged for 24 hours in both groups. Patients were prescribed topical lubricants along with antibiotic-steroid eye drops. Sutures in group 2 were removed at 2 weeks. Follow-up examinations were scheduled at 2, 4, and 6 weeks. At each visit, best-corrected visual acuity and intraocular pressure were recorded, and careful evaluation for recurrence of pterygium was performed, which constituted the primary outcome of the study. Additionally, complications such as graft edema, graft displacement, suture granuloma, pain, foreign body sensation, epithelial cyst formation, and graft necrosis were meticulously documented to enable comparison between the glueless and sutured conjunctival autograft techniques.

Data collection

Preliminary data such as age, gender, and occupation were recorded. All patients provided a detailed history of past and current systemic illnesses such as tuberculosis, hypertension, diabetes mellitus, leprosy, acquired immunodeficiency syndrome, any prior ocular surgery and other conditions. Patients were questioned regarding any associated predisposing factors such as history of exposure to sunlight and period of exposure to sunlight. Patient were also enquired for any history of immuno-compromised state, use of any drugs and exposure to smoke, dust.

All the patients underwent general and systemic examination. Ocular examination was done of both the eyes respectively. Anterior segment examination was done with the help of torch light and slit lamp examination. All patients underwent visual acuity recording full efforts were made to properly record best corrected visual acuity of both the eyes.

Statistical analysis

Categorical data are expressed as frequencies and percentages, whereas continuous variables are expressed as mean ± standard deviation. Chi-square test was used to analyse differences between groups. A p value of <0.05 was considered statistically significant.

RESULTS

Baseline characteristics of study patients

Among the 50 patients included in the study, most i.e. 15 (30.0%) patients were aged 31-40 years, 13 (26.0%) patients were aged >50 years, 12 (24.0%) patients were aged 41-50 years and 10 (20.0%) patients were aged ≤30 years. Males constituted 23 (46.0%) patients of the study population. Most i.e. 30 (60.0%) patients belonged to the low socioeconomic class, while the remaining 20 (40.0%) patients belonged to the middle socioeconomic class, with none from the high socioeconomic class. Majority i.e. 32 (64.0%) patients were from rural areas. 32 (64.0%) patients were labourers, 11 (22.0%) patients were field workers (22.0%), and 7 (14.0%) patients had office jobs. The baseline characteristics of the study patients is given in Table 1.

Clinical and ocular characteristics of study patients

Of the 50 patients, 31 (62.0%) had exposure to smoke dust and 10 (20.0%) had an underlying systemic illness, whilst 9 (18.0%) had no such predisposing factors. Pterygium was observed in the right eye in 23 (46.0%) patients and in the left eye in 27 (54.0%) patients. All patients had perception of light. Majority i.e. 38 (76.0%) patients had visual acuity between 6/9-6/6, 6 (12.0%) patients had visual acuity between 6/36-6/24, and 4 (8.0%) had visual acuity between 1/60-3/60. Schirmer's test revealed 40 (80.0%) patients had values >15 mm, while the remaining 10 (20.0%) patients had values between 9-14 mm. The type of pterygium was progressive in 46 (92.0%) patients. Grade of pterygium was 1, 2, and 3 in 8 (16.0%), 36 (72.0%), and 6 (12.0%) patients, respectively. The clinical and ocular characteristics of the study patients is detailed in Table 2.

Table 1: Demographics of study patients.

Variables	Patients (n=50) (%)
Age in years	
≤30	10 (20.0)
31-40	15 (30.0)
41-50	12 (24.0)
>50	13 (26.0)
Males	23 (46.0)
Socioeconomic status	
Low	30 (60.0)
Middle	20 (40.0)
High	0 (0)
Area of residence	
Rural	32 (64.0)
Urban	18 (36.0)
Occupation	
Labourer	32 (64.0)
Field worker	11 (22.0)
Office job	7 (14.0)

Table 2: Clinical and ocular characteristics of study patients.

Variables	Patients (n=50) (%)
Predisposing factors	
Exposure to smoke dust	31 (62.0)
Any systemic illness	10 (20.0)
No predisposition	9 (18.0)
Eye taken	
Right	23 (46.0)
Left	27 (54.0)
Best corrected visual acuity	
No perception of light	0 (0)
Positive perception of light and negative hand movement	0 (0)
1/60-3/60	4 (8.0)
4/60-6/60	2 (4.0)
6/36-6/24	6 (12.0)
6/18-6/12	0 (0)
6/9-6/6	38 (76.0)
Schirmer's test	
>15 mm	40 (80.0)
9-14 mm	10 (20.0)
Type of pterygium	
Progressive	46 (92.0)
Atrophic	4 (8.0)
Grade of pterygium	
1	8 (16.0)
2	36 (72.0)
3	6 (12.0)

Clinical and ocular characteristics of study patients undergoing sutureless and suture technique

Exposure of sunlight was observed in 14 (56.0%) and 21 (84.0%) patients in the sutureless and suture group, respectively. Visual acuity was mostly 6/9-6/6 (sutureless: 20 (80.0%) patients and suture: 18 (72.0%) patients), followed by 6/36-6/24 (sutureless: 3 (12.0%) patients and suture: 3 (12.0%) patients). Schirmer's test revealed majority of patients had values >15 mm (sutureless: 21 (84.0%) patients and suture: 19 (76.0%) patients) while the remaining patients had values between 9–14 mm. Grade of pterygium was grade 1 in 5 (20.0%) and 3 (12.0%) patients, grade 2 in 18 (72.0%) and 18 (72.0%) patients and grade 3 in 2 (8.0%) and 4 (16.0%) patients in the sutureless and suture groups, respectively. The clinical and ocular characteristics of study patients according to technique is elaborated in Table 3.

Table 3: Clinical and ocular characteristics of study patients undergoing sutureless and suture technique.

Variables	Sutureless (n=25) (%)	Suture (n=25) (%)
Exposure to sunlight	14 (56.0)	21 (84.0)
Best corrected visual acuity		
No perception of light	0 (0)	0 (0)
Positive perception of light and negative hand movements near face	0 (0)	0 (0)
1/60-3/60	1 (4.0)	3 (12.0)
4/60-6/60	1 (4.0)	1 (4.0)
6/36-6/24	3 (12.0)	3 (12.0)
6/18-6/12	0 (0)	0 (0)
6/9-6/6	20 (80.0)	18 (72.0)
Schirmer's test		
>15 mm	21 (84.0)	19 (76.0)
9-14 mm	4 (16.0)	6 (24.0)
Grade of pterygium		
1	5 (20.0)	3 (12.0)
2	18 (72.0)	18 (72.0)
3	2 (8.0)	4 (16.0)

Best corrected visual acuity and postoperative complications of patients undergoing sutureless and suture technique at 2-week follow-up

At the 2-week follow-up, majority i.e. patients had visual acuity between 6/9-6/6 (sutureless: 20 (80.0%) patients and suture: 17 (68.0%) patients) followed by visual acuity between 6/36-6/24 (sutureless: 3 (12.0%) patients and suture: 3 (12.0%) patients). Complications observed included graft oedema in 6 (24.0%) patients in the sutureless group and 3 (12.0%) patients in the suture group and pain in 3 (12.0%) patients in the sutureless group and 3 (12.0%) patients in the suture group. Graft displacement occurred in 2 (8.0%) patients in the sutureless group. The best corrected visual acuity and postoperative complications of patients undergoing sutureless and suture technique at 2-week follow-up is demonstrated in Table 4. The association of complications and age at 2-week follow-up is displayed in Figure 1.

Table 4: Best corrected visual acuity and postoperative complications of patients undergoing sutureless and suture technique at 2-week follow-up.

Variables	Sutureless (n=25) (%)	Suture (n=25) (%)
Best corrected visual acuity		
No perception	0 (0)	0 (0)
Positive perception of light and negative hand movements near face	0 (0)	0 (0)
1/60-3/60	1 (4.0)	3 (12.0)
4/60-6/60	1 (4.0)	1 (4.0)
6/36-6/24	3 (12.0)	3 (12.0)
6/18-6/12	0 (0)	1 (4.0)
6/9-6/6	20 (80.0)	17 (68.0)
Complications		
Graft displacement	2 (8.0)	0 (0)
Graft oedema	6 (24.0)	3 (12.0)
Pain	3 (12.0)	10 (40.0)
Epithelial cyst	0 (0)	1 (4.0)
Suture granuloma	0 (0)	1 (4.0)

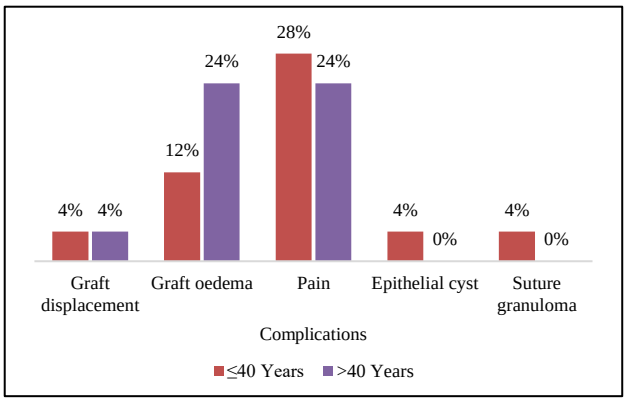

Figure 1: Association of complications and age at 2-week follow-up.

Best corrected visual acuity and postoperative complications of patients undergoing sutureless and suture technique at 4-week follow-up

At the 4-week follow-up, majority i.e. patients had visual acuity between 6/9-6/6 (sutureless: 20 (80.0%) patients and suture: 17 (68.0%) patients) followed by visual acuity between 6/36-6/24 (sutureless: 3 (12.0%) patients and suture: 3 (12.0%) patients) as observed at the 2-week follow-up. Complications such as graft oedema decreased from the 2-week follow-up and were observed in 4 (16.0%) patients in the sutureless group and 2 (8.0%) patients in the suture group. Pain decreased in the sutureless group and was observed in 1 (4.0%) patient but increased in suture group and was observed in 5 (20.0%)

patients in the suture group. Graft displacement was still observed in 2 (8.0%) patients in the sutureless group, however in 1 (4.0%) patient, a new case was observed in the suture group. The best corrected visual acuity and postoperative complications of patients undergoing sutureless and suture technique at 4-week follow-up is given in Table 5. The association of complications and age at 4-week follow-up is depicted in Figure 2.

Table 5: Best corrected visual acuity and postoperative complications of patients undergoing sutureless and suture technique at 4-week follow-up.

Variables	Sutureless (n=25) (%)	Suture (n=25) (%)
Best corrected visual acuity		
No perception	0 (0)	0 (0)
Positive perception of light and negative hand movements near face	0 (0)	0 (0)
1/60-3/60	1 (4.0)	3 (12.0)
4/60-6/60	1 (4.0)	1 (4.0)
6/36-6/24	3 (12.0)	3 (12.0)
6/18-6/12	0 (0)	1 (4.0)
6/9-6/6	20 (80.0)	17 (68.0)
Complications		
Graft displacement	2 (8.0)	1 (4.0)
Graft oedema	4 (16.0)	2 (8.0)
Pain	1 (4.0)	5 (20.0)
Epithelial cyst	0 (0)	1 (4.0)
Suture granuloma	0 (0)	1 (4.0)

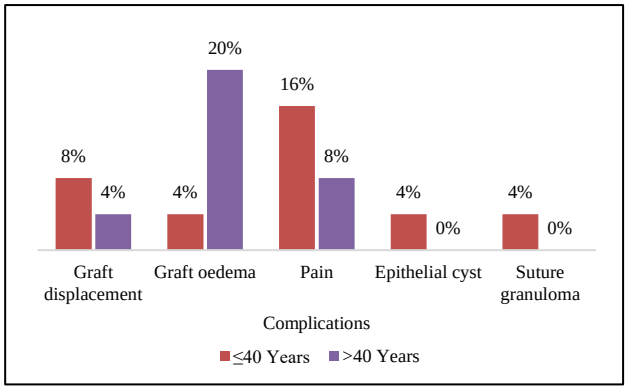

Figure 2: Association of complications and age at 4-week follow-up.

Best corrected visual acuity and postoperative complications of patients undergoing sutureless and suture technique at 6-week follow-up

At the 6-week follow-up, majority i.e. patients had visual acuity between 6/9-6/6 (sutureless: 20 (80.0%) patients and suture: 17 (68.0%) patients) followed by visual acuity between 6/36-6/24 (sutureless: 3 (12.0%) patients and suture: 3 (12.0%) patients) as observed at the 2 and 4-week follow-ups. Intraocular pressure was <10 mmHg in 4 (16.0%) patients, 10-20 mmHg in 20 (80.0%) patients and >20 mmHg in 1 (4.0%) patients in both the sutureless and suture groups, respectively. Complications such as graft oedema decreased and were observed in 2 (8.0%) patients in the sutureless group and 1 (8.0%) patient in the suture group. Pain decreased and was observed in 0 patients in the sutureless groups and in 1 (4.0%) patients in the suture group. Graft displacement was still observed in 2 (8.0%) patients in the sutureless group and in 1 (4.0%) patient in the suture group. The best corrected visual acuity and postoperative complications of patients undergoing sutureless and suture technique at 4-week follow-up is provided in Table 6. The association of complications and age at 2-week follow-up is shown in Figure 3.

Table 6: Best corrected visual acuity and postoperative complications of patients undergoing sutureless and suture technique at 6-week follow-up.

Variables	Group 1 (n=25) (%)	Group 2 (n=25) (%)
Best corrected visual acuity		
No perception	0 (0)	0 (0)
Positive perception of light and negative hand movements near face	0 (0)	0 (0)
1/60-3/60	1 (4.0)	3 (12.0)
4/60-6/60	1 (4.0)	1 (4.0)
6/36-6/24	3 (12.0)	3 (12.0)
6/18-6/12	0 (0)	1 (4.0)
6/9-6/6	20 (80.0)	17 (68.0)
Intraocular pressure		
<10	4 (16.0)	4 (16.0)
10-20	20 (80.0)	20 (80.0)
>20	1 (4.0)	1 (4.0)
Complications		
Graft displacement	2 (8.0)	1 (4.0)
Graft edema	2 (8.0)	1 (4.0)
Pain	0 (0)	1 (4.0)
Epithelial cyst	0 (0)	1 (4.0)
Suture granuloma	0 (0)	1 (4.0)

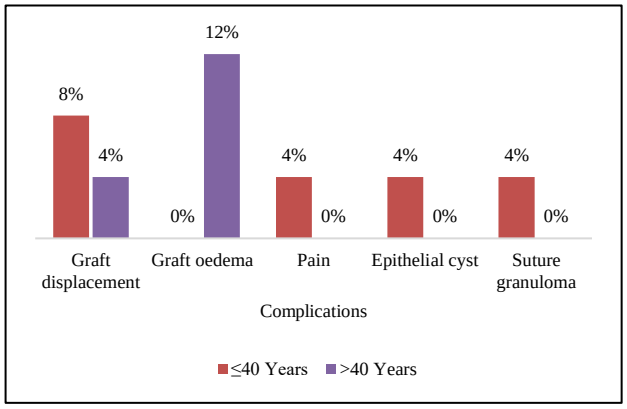

Figure 3: Association of complications and age at 6-week follow-up.

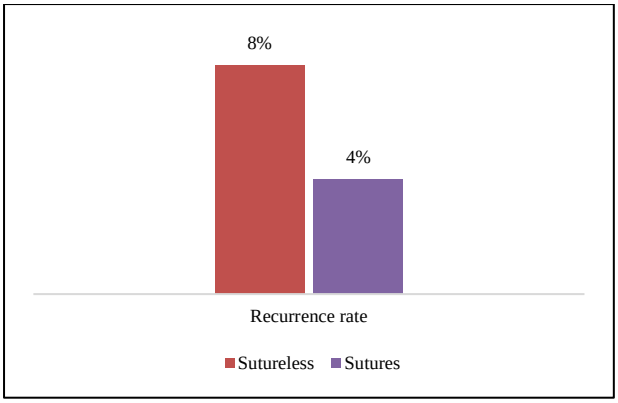

Figure 4: Recurrence rates at 6-month follow-up.

Recurrence rates at 6-month follow-up

Recurrence was observed in 2 (8.0%) patients in the sutureless and glue-free group and 1 (4.0%) patient in the sutured group at the 6-week follow-up.

DISCUSSION

Pterygium recurrence most commonly occurs within the first 6 months following surgery; therefore, the primary objective of pterygium management should be not only complete excision but also effective prevention of recurrence. Several studies have demonstrated favourable recurrence rates with the sutureless and glue-free conjunctival autograft technique. Elwan et al reported recurrence in 3 (6.0%) patients in the sutureless and glue-free group compared with 4 (8.0%) patients in the sutured group at 6 months of follow-up, with recurrences occurring after 3 months in the former and after 6 months in the latter.[10] Sethi et al also noted lower recurrence in the sutureless and glue-free group, reporting 2 cases compared to 3 cases in the sutured group.[11] Latif-Ul-Hasan et al reported recurrence in 4 (8.0%) patients in the sutureless and glue-free group, occurring between the fourth and sixth postoperative months.[12] Sharma et al documented no recurrence in the sutureless and glue-free group, whereas 1 (4.0%) patient in the sutured group developed recurrence.[4] Malik et al reported recurrence in only 1 (2.5%) patient treated with the sutureless and glue-free technique.[13] Furthermore, de Wit et al reported no recurrence in 15 eyes over a 9-month follow-up period.[14] de Wit et al attributed these favorable outcomes to the natural apposition of the eyelids to the bulbar conjunctiva, which acts as a biological dressing and promotes an optimal wound-healing environment. Additionally, the absence of sutures provides uniform tension across the graft interface and minimizes direct traction on graft edges, thereby reducing subconjunctival scarring and the stimulus for recurrence. In the current study, recurrence was observed in 2 (8.0%) patients in the sutureless and glue-free group and 1 (4.0%) patient in the sutured group at the 6-week follow-up. Although the recurrence rate in the sutureless and glue-free group was slightly higher in our study, the short follow-up duration may have influenced these findings, as most recurrences are typically reported after 3-6 months postoperatively. Overall, the available literature suggests that the sutureless and glue-free conjunctival autograft technique provides recurrence rates comparable to or lower than those associated with sutured grafts, while also offering advantages in wound healing and postoperative comfort.

The present study has several limitations that may affect the generalizability of its findings. The relatively small sample size and short follow-up duration limit assessment of long-term outcomes, particularly as most pterygium recurrences and complications are reported between 3 and 6 months postoperatively. A follow-up period of one year or longer would better evaluate graft stability and recurrence patterns. Additionally, the study was not randomized, and patient allocation was influenced by surgeon experience, which may have introduced selection bias. Future studies with larger sample sizes, randomized designs, and longer follow-up provide further insight into optimal pterygium management.

CONCLUSION

Sutureless and glue-free conjunctival autografting is a simple, safe, and effective alternative to conventional sutured autografting for primary pterygium surgery. The technique provides comparable graft stability, visual outcomes, and recurrence rates while offering the added advantages of reduced postoperative discomfort and avoidance of suture-related complications. Its ease of application, cost-effectiveness, and favorable postoperative profile make it a valuable option for routine pterygium management. However, larger randomized studies with longer follow-up are required to further validate its long-term efficacy and recurrence outcomes.

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