



COMPARATIVE STUDY BETWEEN PTERYGIUM EXCISION “WITHOUT GRAFT” AND PTERYGIUM EXCISION WITH “LIMBAL CONJUNCTIVAL AUTOGRAFT” TRANSPLANTATION

Ophthalmology

Dr. Mukesh Kumar*	Post Graduate Junior Resident, Government Medical College, Jalaun (Orai) Uttar Pradesh, India *Corresponding Author
Dr. (Prof.) R.N. Kushawaha	Professor and HOD, Government Medical College, Jalaun (Orai) Uttar Pradesh, India
Dr. Shaurabh Gupta	Associate Professor, Government Medical College, Jalaun (Orai) Uttar Pradesh, India
Dr. Naveen Sirohi	Assistant Professor, Government Medical College, Jalaun (Orai) Uttar Pradesh, India
Dr. Surya Prakash Shukla	Assistant Professor, Government Medical College, Jalaun (Orai) Uttar Pradesh, India

ABSTRACT

Background: Pterygium is a common ocular condition characterized by a fibrovascular growth of conjunctiva onto the cornea, often leading to visual impairment and cosmetic concerns. While pterygium excision without graft is a simpler procedure, it is associated with higher recurrence rates. Limbal conjunctival autograft (CAG) transplantation, by restoring the limbal barrier, has been shown to reduce recurrence but requires greater surgical expertise. **Objective:** To compare the outcomes of pterygium excision without graft and with limbal conjunctival autograft transplantation in terms of recurrence rates, visual acuity improvement, and postoperative complications. **Methods:** This prospective, interventional, comparative study included 100 patients diagnosed with primary or recurrent pterygium. Participants were randomized into two groups: Group A underwent excision without graft, and Group B received excision with limbal conjunctival autograft. Key outcomes, including visual acuity, recurrence, and complications, were recorded over a 12-month follow-up period. **Results:** Both techniques significantly improved visual acuity postoperatively, with 29% of patients achieving 6/6 vision. Postoperative complications, such as conjunctival scarring and discomfort, were more frequent in the CAG group. Even though the “without graft” group demonstrated fewer complications and faster recovery than CAG group, Recurrence rates were significantly lower in the CAG group (2%) compared to the group without graft (10%). **Conclusion:** Pterygium excision with limbal conjunctival autograft is superior in reducing recurrence compared to excision without graft. This technique is recommended for patients at high risk of recurrence or requiring long-term stability, despite its technical demands.

KEYWORDS

Pterygium, Limbal Conjunctival Autograft, Pterygium Excision, Recurrence, Visual Acuity

INTRODUCTION

Pterygium is a prevalent ocular surface disorder characterized by a wing-shaped fibrovascular growth of conjunctival tissue extending onto the cornea, often resulting in visual impairment and cosmetic concerns.¹ Its prevalence is notably high in tropical and subtropical regions, such as India, where increased exposure to ultraviolet (UV) radiation, primarily due to geographical and occupational factors, significantly contributes to its development.² The condition poses substantial public health challenges, adding to the global burden of ocular morbidity.

Clinically, pterygium manifests as a spectrum of symptoms ranging from mild ocular discomfort to significant visual disturbances. Symptoms include redness, irritation, dryness, and foreign body sensation, often resulting from an irregular ocular surface.³ As the lesion advances onto the cornea, it induces astigmatism by altering corneal curvature or obstructing the visual axis, leading to decreased visual acuity. Advanced cases may also cause cosmetic disfigurement or restricted ocular motility due to symblepharon formation, thereby affecting quality of life.

Management strategies for pterygium include both medical and surgical approaches. Medical management primarily addresses symptoms with lubricating eye drops and anti-inflammatory agents but does not halt progression.⁴

Surgical intervention remains the definitive treatment, especially for progressive lesions threatening the visual axis, inducing significant astigmatism, causing recurrent inflammation, or for cosmetic reasons. Among surgical techniques, the bare sclera excision method is simpler and suitable for resource-limited settings but is associated with high recurrence rates, reported between 24% and 89%.⁵ This technique restores the integrity of the limbal stem cell barrier, critical in inhibiting conjunctivalization of the cornea and preventing recurrence.⁶ Reported recurrence rates for this method range from 2% to 9%.⁷

This study aims to compare the outcomes of pterygium excision

without graft versus pterygium excision with limbal conjunctival autograft transplantation, focusing on visual acuity improvement, recurrence rates, and overall surgical success. The primary objective is to evaluate and compare the recurrence rate of pterygium between the two surgical techniques. Secondary objectives include assessing the preoperative and postoperative visual acuity outcomes and comparing the postoperative complication rates associated with each method.⁸

MATERIAL AND METHODS

This prospective interventional comparative study was conducted to evaluate the outcomes of two surgical techniques for pterygium management: pterygium excision without graft and pterygium excision with limbal conjunctival autograft transplantation. Patients attending the Ophthalmology Outpatient Department (OPD) at Government Medical College, Jalaun, were recruited based on specific eligibility criteria. Inclusion criteria included patients with primary or recurrent pterygium, aged 18 years or older, who provided informed consent. Exclusion criteria involved patients unwilling to consent, those with severe dry eye conditions, history of ocular trauma or conjunctival surgeries, presence of symblepharon, chronic conjunctival diseases, marginal corneal ulcer, peripheral ulcerative keratitis, or pregnant and lactating women.

A total of 100 patients were enrolled, and sample size calculation ensured adequate statistical power ($\alpha = 0.05$, $\beta = 0.20$). Patients were randomly assigned to two groups: Group A underwent pterygium excision without graft, and Group B underwent excision with limbal conjunctival autograft transplantation. The surgical methods included simple excision of pterygium leaving a bare sclera in Group A, and in Group B, excision followed by transplantation of autologous conjunctival tissue, including limbal stem cells, to the bare scleral area.

The study was approved by the Institutional Ethics Committee of Government Medical College, Jalaun, and adhered to the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants. Data collection involved the use of a structured proforma capturing demographic details, clinical presentation, and

surgical outcomes. Preoperative and postoperative evaluations were conducted at 1 week, 1 month, 3 months, 6 months, and 12 months. Parameters recorded included recurrence rates, visual acuity outcomes, complication rates, surgical duration, and patient satisfaction.

Statistical analysis was conducted using SPSS software version 21.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. The chi-square test and independent t-test were used to assess intergroup differences, with a p-value of <0.05 considered statistically significant. Standardized preoperative and postoperative protocols ensured the study's validity and reliability, with data verification by a second investigator and consistent application of surgical and follow-up procedures across all participants.

RESULTS

The age distribution revealed that the majority (25%) were in the 50–59 years age group, followed by 24% in the 40–49 years group. The occupational distribution of participants showed that most were housewives (45%), followed by labour workers (29%) and farmers (15%). Students constituted 10% of the sample, while only 1% of the participants were involved in sales work. The grading system categorized the majority of patients (40%) as T2 (moderate severity), followed by T3 (31%, advanced), and T1 (29%, early-stage) (Fig. 1).

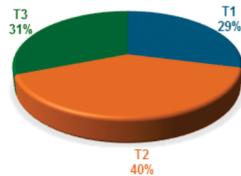


Figure 1: Pie Chart Showing Grading Of Pterygium Amongst The Patients (n=100)

Preoperative visual acuity showed a wide range of impairments, with 6/24 (19%) and 6/36 (18%) being the most common. A minority (17%) had a visual acuity of 6/6 (Table 1). Postoperative assessments revealed significant improvement in visual acuity, with 29% achieving 6/6 and 23% achieving 6/9, reflecting a statistically significant enhancement (p < 0.001).

Table 1: Preoperative And Postoperative Visual Acuity (With And Without Graft Combined)

Visual Acuity	Preoperative (%) n=100	Postoperative(%) n=100	p value
6/6	17	29	< 0.001
6/9	14	23	
6/12	6	7	
6/18	12	19	
6/24	19	9	
6/36	18	13	
6/60	14	0	

The comparison of surgical techniques indicated that both "With Graft" and "Without Graft" methods significantly improved visual acuity postoperatively (p < 0.001), but no statistically significant difference was observed between the two groups (p = 0.443) (Table 2). Similarly, improvement in astigmatism was comparable between the techniques (p = 0.541) (Table 3).

Table 2: Table Showing Comparative Evaluation Of “with And Without Graft Techniques” On Visual Acuity As Outcome Of Surgical Techniques

Surgical Technique	Test Performed	p-value	Interpretation
Without Graft	Wilcoxon Signed-Rank Test	< 0.001	Significant improvement in postoperative visual acuity
With Graft	Wilcoxon Signed-Rank Test	< 0.001	Significant improvement in postoperative visual acuity
Comparison Between Techniques	Mann-Whitney U Test	0.443	No significant difference between the two techniques

Table 3: Table Showing Post Operative Outcome Of Astigmatism Present Preoperatively (n=56)

Type of Surgery	Astigmatism Improved	Astigmatism Not Improved	df	Chi square value	p-value
With Graft	24	3	1	0.373	0.541
Without Graft	23	6			

The "Without Graft" technique resulted in fewer immediate postoperative complications and also showed quicker healing over time, but recurrence rate was significantly less (p=0.32) in "with graft group" than "without graft group (1 Vs 5)". Recurrence rates were lower in the "With Graft" group (1%) compared to the "Without Graft" group (5%), with a statistically significant difference (p = 0.032) (Table 4).

Table 4: Contingency Table Showing Recurrence Between The Two Surgical Groups

Surgical Technique	No Recurrence	Recurrence	p value
With Graft	51	1	0.032
Without Graft	43	5	

Postoperative complications differed between the groups. Pain was more common in the "With Graft" group (26%) compared to the "Without Graft" group (15%) at 48 hours, but it resolved in both groups by one month. Subconjunctival haemorrhage was more frequent in the "With Graft" group (34% at 48 hours) but resolved by the first month. Congestion was initially higher in the "With Graft" group but resolved entirely by one month. Granuloma formation was observed only in the "Without Graft" group at first week (4%). Healing outcomes showed that the "Without Graft" group demonstrated faster progress, with 45% achieving a healthy eye by the first month compared to 0% in the "With Graft" group. Healthy graft outcomes in the "With Graft" group improved steadily, reaching 50% by the first month (Table 5).

These findings underscore the trade-offs between the two surgical methods in terms of complications, recurrence, and healing dynamics.

Table 5: Heat Map Of Complaints/ Status Of Eye Or Graft Over The Time Postoperative

Complaint / graft or eye condition	Type Of Surgery	48 Hrs	First Week	First Month
Pain	Without Graft	15	0	0
	With Graft	26	7	0
Sub conjunctival haemorrhage	Without Graft	7	3	0
	With Graft	34	11	0
Congestion	Without Graft	15	3	0
	With Graft	25	12	0
Granuloma	Without Graft	0	4	0
	With Graft	0	0	0
Foreign body sensation	Without Graft	0	0	3
	With Graft	0	0	0
Healthy graft	Without Graft	0	0	0
	With Graft	22	28	50
Healthy eye	Without Graft	0	28	45
	With Graft	0	0	0

DISCUSSION

This study compared the outcomes of pterygium excision with and without limbal conjunctival autograft (CAG) in terms of visual acuity improvement, recurrence rates, and postoperative complications. Both surgical techniques led to significant improvements in visual acuity.

The recurrence of pterygium is a pivotal determinant of surgical success, and this study underscores the superior efficacy of limbal conjunctival autograft (CAG) in minimizing recurrence. The recurrence rate was significantly lower at 2% in the CAG group compared to 10% in the group without graft, reflecting the trend favouring autografts. This aligns with established literature, where studies documented a recurrence rate of 6.5% with CAG, far below the 32.5% observed in bare sclera excision.⁸ Similarly, Patel et al.⁹ reported a 2.7% recurrence rate with CAG, emphasizing its efficacy, particularly in high-risk populations.

The protective role of limbal stem cells in re-establishing the limbal barrier is well-supported by studies from Gris et al.¹⁰ and Kheirkhah et al.¹¹, demonstrating recurrence rates below 10% when using CAG with proper technique and care.

In this study, both pterygium excision with limbal conjunctival autograft (CAG) and excision without graft demonstrated significant improvements in visual acuity. Statistical analysis (Mann-Whitney U test, $p = 0.443$) revealed no significant difference between the two groups in short-term outcomes. This aligns with Allan et al.⁸, who reported significant visual improvements with CAG but noted no substantial differences across surgical methods apart from recurrence rates.

Overall, this study corroborates the consensus that while both techniques are safe, CAG offers superior outcomes by reducing both the severity and frequency of complications. This supports its preference for minimizing long-term ocular surface damage and improving patient comfort post-surgery.

Limitations of the Study

This study's findings are valuable but must be interpreted considering its limitations. The small sample size, while sufficient for observing significant differences, limits detection of smaller clinical differences, particularly in recurrence rates. Larger, multi-center studies, like those by Kheirkhah et al.¹¹ and Allan et al.⁸, would offer more robust evidence. The relatively short follow-up of one year may not capture late recurrences, which often occur beyond this period, as highlighted by Promesberger et al.¹² Longer follow-ups are crucial to fully assess the durability of surgical outcomes.

The absence of adjunctive therapies, such as mitomycin C, may have influenced outcomes, particularly in the excision without graft group. Additionally, variability in postoperative care and compliance introduces potential biases. Factors like adherence to follow-up schedules and use of eye drops, as noted by Allan et al.⁸ significantly influence outcomes. Lastly, the single-center design limits generalizability, as geographic and environmental factors, like UV exposure, can affect recurrence rates, as shown by Gris et al.¹⁰

CONCLUSION

This study compared the outcomes of pterygium excision with and without limbal conjunctival autograft (CAG). Both techniques significantly improved visual acuity, with 29% of patients achieving 6/6 vision postoperatively. The CAG group demonstrated a markedly lower recurrence rate (2%) compared to the excision without graft group (10%), alongside fewer and milder postoperative complications.

CAG's ability to restore the limbal barrier provides long-term benefits by reducing recurrence and promoting smoother healing. These findings establish CAG as the preferred technique for pterygium management, particularly in high-risk or recurrent cases. However, its technical demands and longer operative time necessitate skilled surgical expertise, which may limit its use in resource-constrained settings.

While excision without graft remains a viable option, particularly when combined with adjunctive therapies, the superior outcomes associated with CAG shows its advantages in maintaining corneal integrity over time and improving patient recovery without recurrence.

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