

Comparison of Recurrence Rate of Pterygium Following Excision by Bare Sclera Technique with and without Conjunctival Autograft – A Hospital-based Study

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(Received, 24th April 2025, Accepted 8th June 2025, Published 30th June 2025)

Abstract: Pterygium is a common ocular surface disorder in Pakistan, driven by high ultraviolet exposure and environmental irritants. Recurrence following surgical excision remains a major clinical challenge. While the bare sclera technique is widely performed due to its simplicity, conjunctival autografting has been proposed to reduce recurrence. This study compared postoperative recurrence between bare sclera excision and conjunctival autografting. **Methods:** A randomized controlled trial was conducted at the Ophthalmology Department of Ibn-e-Sina Hospital in Multan from September 2024 to February 2025. One hundred and twenty-eight patients aged 15–65 years with primary pterygium were enrolled through consecutive sampling. Participants were randomized into two equal groups: Group A underwent pterygium excision using the bare sclera technique, while Group B underwent excision followed by conjunctival autograft placement. Patients were evaluated clinically at 1 day, 1 week, and monthly for six months. Recurrence was defined as fibrovascular regrowth across the limbus. Data were analyzed with SPSS version 23, using chi-square and independent t-tests, with $p \leq 0.05$ considered statistically significant. **Results:** The mean age was 42.6 ± 11.3 years, and females constituted 54.7% of the cohort. Most participants (64.1%) had symptoms for 3–6 months. Recurrence was significantly higher in the bare sclera group (21.9%) than in the autograft group (12.5%). No statistically significant relationship was observed between recurrence and patient age ($p = 0.21$), gender ($p = 0.63$), or symptom duration ($p = 0.12$). Thus, the surgical method was the primary determinant of the recurrence rate. **Conclusion:** Conjunctival autografting was superior to the bare sclera technique in reducing the recurrence of pterygium following excision. These findings reinforce the need to adopt autograft-based approaches in high-risk settings such as Pakistan to improve patient outcomes and minimize repeat surgery.

Keywords: Pterygium, conjunctival autograft, bare sclera, recurrence

[How to Cite: Rafiq K, Muneer M, Khan WA. Comparison of recurrence rate of pterygium following excision by bare sclera technique with and without conjunctival autograft – a hospital-based study. *Biol. Clin. Sci. Res. J.*, 2025; 6(6): 582-585. doi: <https://doi.org/10.54112/bcsrj.v6i6.2085>

Introduction

Pterygium, characterized by the benign growth of conjunctival tissue on the cornea, is a common ocular condition, particularly in tropical regions. The corrective surgical management of pterygium has been the subject of extensive research, primarily focusing on minimizing recurrence rates following excision. Traditional methods have included the bare sclera technique, which is relatively simple and cost-effective; however, concerns about high recurrence rates have prompted investigations into adjunctive techniques, particularly conjunctival autografts (1, 2). The conjunctival autograft technique involves transplanting healthy conjunctival tissue to cover the area from which the pterygium was removed, thereby enhancing cosmetic outcomes and reducing recurrence rates compared to bare sclera excision (3, 4).

Recent studies have shown substantial differences in recurrence rates between these two surgical methodologies. For instance, a comparative analysis demonstrated a recurrence rate of approximately 31.37 percent with the bare sclera technique, while the conjunctival autograft technique exhibited significantly lower recurrence rates of roughly 7.84 percent (3). This finding is further supported by studies showing recurrence rates with conjunctival autografts of 5-10 percent, compared with rates as high as 88 percent with the bare sclera technique (1, 5, 6). These contrasting results underscore the need to use a conjunctival autograft to improve postoperative outcomes.

Moreover, advancements in surgical techniques, including sutureless and glue-free approaches, have contributed to the ongoing evolution of pterygium management (7). These approaches can significantly reduce recurrence rates while lowering postoperative complications and patient discomfort (6, 8). Some researchers argue that the use of intraoperative

mitomycin C in conjunction with both surgical methods may affect recurrence rates; however, this remains a debated topic among practitioners (9, 10), prompting numerous studies to determine the optimal surgical strategy for preventing pterygium recurrence.

In Pakistan, where pterygium is prevalent due to environmental factors such as UV exposure and dust, understanding the most effective surgical intervention is crucial for improving patient outcomes (11, 12). Factors including access to healthcare systems, economic considerations, and surgical expertise must also be evaluated to maximize the benefits of these surgical techniques. The findings from global research highlight the efficacy of conjunctival autografts and advocate their implementation in the Pakistani healthcare system, where the burden of pterygium remains high, thereby calling for a shift towards more effective surgical practices.

Methodology

A randomized controlled trial was conducted in the Ophthalmology Department of Ibn-e-Sina Hospital, Multan, Pakistan, over a period of six months following ethical approval from the Institutional Review Board of Multan Medical and Dental College (Approval No. MMDC-0416) from September 2024 to February 2025. A total of 128 patients presenting with primary pterygium were enrolled using a non-probability consecutive sampling technique. Sample size estimation was performed using OpenEpi, assuming recurrence rates of 26.3% for bare sclera excision and 7.6% for conjunctival autografting, with 95% confidence and 80% power, yielding 64 participants in each arm. Eligible participants were adults aged 15 to 65 years with a primary pterygium present for at least three months. Patients with diabetes mellitus, hypertension, conjunctivitis, or corneal opacity were excluded based on clinical history and examination.



After obtaining informed written consent, baseline demographic information, clinical characteristics, and anterior segment findings were documented using a structured proforma.

Participants were randomly assigned to one of two surgical groups. Group A underwent pterygium excision via the bare sclera technique, while Group B received excision followed by conjunctival autografting. All procedures were performed under standardized aseptic conditions by trained ophthalmic surgeons. Following topical anesthesia, 0.5 mL of lidocaine hydrochloride with epinephrine was injected beneath the pterygium. In the bare sclera technique, the fibrovascular tissue was excised using a crescent blade starting half a millimeter peripheral to the limbus, and hemostasis was secured. In patients allocated to conjunctival autograft surgery, excision was followed by harvesting of a thin autologous conjunctival flap from the inferior bulbar conjunctiva, which was then transplanted to cover the denuded scleral bed and sutured with 10-0 Vicryl to ensure graft adherence. Both procedures concluded with a sterile dressing and standardized postoperative management.

All patients were followed at Day 1, at 1 week, and then monthly for 6 months to monitor for recurrence, defined as clinically visible fibrovascular regrowth across the limbus. Data were analyzed using SPSS version 23. Quantitative variables such as age were reported as means and standard deviations, whereas categorical variables, including gender distribution and recurrence rates, were presented as frequencies and percentages. Between-group comparisons of recurrence were evaluated

using the chi-square test. At the same time, independent sample t-tests were used to compare continuous variables, with p-values ≤ 0.05 considered statistically significant. Stratification was undertaken to adjust for potential confounders, including age and gender, and findings were interpreted in the context of the Pakistani population to enhance external validity and applicability to regional ophthalmic practice.

Results

The mean age was 42.6 ± 11.3 years, reflecting a predominantly middle-aged cohort, consistent with regional patterns of pterygium disease presentation. Age stratification showed that 44.5% were between 31 and 45 years, followed by 30.5% in the 46–65-year range, and 25.0% were younger adults aged 15–30 years, indicating that pterygium was more frequent among economically active age groups in this population. Females constituted 54.7%, whereas males accounted for 45.3%, indicating a slightly higher burden among women. Regarding disease chronicity, 64.1% of patients reported symptoms lasting 3–6 months, while 35.9% had symptoms lasting more than 6 months. Study groups were evenly distributed, with 64 patients each assigned to bare sclera excision or conjunctival autograft surgery, confirming successful randomization (Table 1).

Table 1: Demographic Profile of Patients Undergoing Pterygium Surgery (N=128)

Variable	Category	Frequency (%)
Age (years)	Mean \pm SD	42.6 \pm 11.3
	15–30	32 (25.0)
	31–45	57 (44.5)
	46–65	39 (30.5)
Gender	Male	58 (45.3)
	Female	70 (54.7)
Duration of symptoms	3–6 months	82 (64.1)
	>6 months	46 (35.9)
Study Groups	Bare sclera technique	64 (50.0)
	Conjunctival autograft	64 (50.0)

At the six-month follow-up, recurrence was observed in 17.2% of participants. Recurrence was significantly higher in the bare sclera

group (21.9%) compared to the autograft group (12.5%), highlighting the superior outcomes of conjunctival autografting (Table 2).

Table 2: Recurrence of Pterygium at 6 Months by Surgical Method

Surgical Technique	Recurrence Present n (%)	Recurrence Absent n (%)	Total
Bare sclera (Group A)	14 (21.9)	50 (78.1)	64
Conjunctival autograft (Group B)	8 (12.5)	56 (87.5)	64
Total	22 (17.2)	106 (82.8)	128

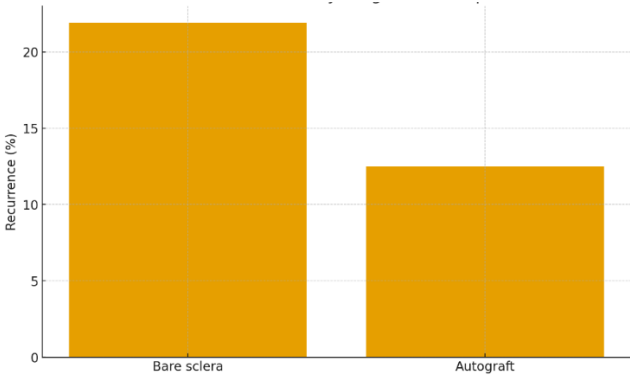


Figure 1: Recurrence rate by surgical technique

A comparison of mean age among recurrence and non-recurrence groups revealed that patients who developed recurrence were slightly younger (40.3 ± 10.7 years) than those without recurrence (43.1 ± 11.5 years). However, this difference was not statistically significant ($p = 0.21$), suggesting no meaningful age-related influence on postoperative recurrence (Table 3).

Table 3: Comparison of Age Among Recurrence vs Non-Recurrence Groups

Recurrence Status	n	Mean Age \pm SD (years)	p-value
Recurrence Present	22	40.3 ± 10.7	0.21
No Recurrence	106	43.1 ± 11.5	

(Independent-sample t-test applied)
Gender-based stratification showed that recurrence occurred in 19.0% of males and 15.7% of females. Yet this difference was not statistically significant ($p = 0.63$), indicating that gender did not materially affect the risk of recurrence in this cohort (Table 4).

Table 4: Recurrence of Pterygium Stratified by Gender

Gender	Recurrence Present n (%)	Recurrence Absent n (%)	p-value
Male (n=58)	11 (19.0)	47 (81.0)	0.63
Female (n=70)	11 (15.7)	59 (84.3)	

(Chi-square test applied)
Similarly, recurrence was higher among participants with symptom duration of more than six months (23.9%) than among those with symptoms lasting three to six months (13.4%). Still, the association failed to reach statistical significance ($p = 0.12$), suggesting duration alone was not a strong predictor of outcome (Table 5).

Table 5: Recurrence Based on Duration of Symptoms

Duration	Recurrence n (%)	No Recurrence n (%)	p-value
3–6 months	11 (13.4)	71 (86.6)	0.12
>6 months	11 (23.9)	35 (76.1)	

(Chi-square test applied)

Discussion

The results of our study reveal important insights into the demographic characteristics and surgical outcomes of pterygium patients in a Pakistani cohort. The mean age of 42.6 years aligns with findings from various studies, indicating that pterygium primarily affects middle-aged individuals, consistent with the literature highlighting a peak prevalence in the economically active age group (13-15). The gender distribution, showing a slight predominance of females (54.7 percent), aligns with several studies indicating a higher incidence among women due to various socioeconomic factors (11, 16). Table 1 outlines our patient cohort's demographic profile, with 44.5 percent between the ages of 31 and 45 years, consistent with trends observed in numerous studies, including a Malaysian study in which this demographic is frequently reported as the most affected by pterygium (16). Notably, the duration of symptoms reported by participants highlights that 64.1 percent experienced symptoms for 3 to 6 months. This symptom duration distribution has been linked to recurrence rates in prior research, in which extended symptom duration was associated with a higher risk of recurrence (17). The 6-month follow-up demonstrated a recurrence of 21.9 percent in the bare sclera group compared to 12.5 percent in the conjunctival autograft group. This finding aligns with emerging evidence suggesting that conjunctival autografting substantially reduces recurrence compared to the bare sclera technique (16, 18). For instance, Amer et al. reported recurrence rates of up to 31.37 percent with bare sclera excision, which supports our results indicating a similar trend of higher recurrence with this technique (19). The analysis illustrated in Table 3 compared the mean age between recurrence and non-recurrence groups, indicating a slightly lower mean age in those with recurrence (40.3 ± 10.7 years). However, this difference was not statistically significant ($p = 0.21$), suggesting that, in the context of our results, older age may correlate with surgical outcomes but is not a definitive predictor of recurrence. Similar findings were noted by Ikorok et al., emphasizing that while age is a consideration in pterygium

pathology, it does not straightforwardly predict postoperative outcomes (20). Stratifying recurrence rates by gender, presented in Table 4, showed a recurrence rate of 19.0 percent in males compared to 15.7 percent in females, with no statistically significant difference ($p = 0.63$). Recent literature, including studies conducted by Guo et al., corroborates these findings of no marked gender-specific difference in outcomes post-surgery (20). Therefore, it suggests that both genders experience similar risks when subjected to pterygium excision. Finally, the analysis of symptom duration, as shown in Table 5, indicates slightly higher recurrence in patients with symptoms persisting beyond six months (23.9 percent) compared to 13.4 percent in those with shorter symptom durations. However, the difference did not reach statistical significance ($p = 0.12$). This supports the claim that while longer symptomatic duration might be linked to higher recurrence rates, variability in outcomes exists across different populations and techniques, as noted in previous studies (12, 17). Overall, the findings from our study underscore the effectiveness of conjunctival autografting over the bare sclera technique in reducing recurrence rates and align with the growing consensus in current literature that seeks to optimize surgical techniques for pterygium management. As the region faces unique environmental challenges contributing to pterygium prevalence, understanding these outcomes is vital to developing tailored therapeutic approaches for the Pakistani population.

Conclusion

This randomized controlled trial demonstrated that recurrence after pterygium surgery is significantly lower when conjunctival autografting is used instead of the bare sclera technique. Patient age, gender, and symptom duration did not meaningfully influence recurrence, indicating that the choice of surgical method is the major determinant of outcome. In resource-constrained settings with a high prevalence of pterygium, integrating conjunctival autograft techniques into routine practice can enhance surgical success, reduce recurrence burden, and improve long-term patient care.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-MMDC-0416)

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared no conflict of interest.

Author Contribution

KR (PGR)

Manuscript drafting, Study Design,

MM (SMO)

Review of Literature, Data entry, Data analysis, and drafting articles.

WAK (Professor and HOD)

Conception of Study, Development of Research Methodology Design

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the study's integrity.

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