Journal of Advanced Scientific Research

Available online through https://sciensage.info

ISSN

0976-9595

Research Article

Surgical Outcomes in Adult Patients Undergoing Pterygium Excision with Conjunctival Autograft: A Prospective Clinical Study

Kundan Kumar Singh*, Chandan Kumar, Anurag Verma, Jawed Iqbal

Department of Ophthalmology, ANMMCH, Gaya, Bihar, India

Corresponding author: kdsingh703@gmail.com

Received: 25-04-2026; Accepted: 29-05-2026; Published: 30-05-2026

https://doi.org/10.55218/JASR.2026170511

ABSTRACT

Background: Pterygium is a common ocular surface disorder in tropical regions characterized by fibrovascular growth of conjunctival tissue over the cornea. Surgical excision remains the definitive treatment, and conjunctival autografting is the preferred technique due to its low recurrence rates and superior cosmetic and functional outcomes.

Aim: To evaluate the surgical outcomes of pterygium excision with conjunctival autograft in adult patients attending Anmmch Gayaji Bihar.

Methodology: This prospective observational study included 60 adult patients randomly selected from the ophthalmology outpatient with primary pterygium who underwent pterygium excision with conjunctival autograft over a six-month period. Preoperative and postoperative evaluations included best corrected visual acuity, corneal astigmatism, graft status, complications, and recurrence. A follow-up was conducted for six months.

Results: The mean best corrected visual acuity improved significantly from 0.42 ± 0.18 logMAR preoperatively to 0.18 ± 0.12 logMAR postoperatively ($p < 0.001$). Mean corneal astigmatism reduced from 2.15 ± 0.72 diopters to 0.85 ± 0.44 diopters ($p < 0.001$). Postoperative complications were minimal, with graft edema observed in 10% and graft displacement in 5% of cases. Recurrence was noted in only 5% of patients at six months.

Conclusion: Pterygium excision with conjunctival autograft is a safe, effective, and reliable surgical method that provides excellent functional and anatomical outcomes with low recurrence, making it suitable for routine clinical practice in high-risk populations.

Keywords: Pterygium, Conjunctival Autograft, Visual Acuity, Recurrence; Surgical Outcomes.

INTRODUCTION

Pterygium is a common ocular surface disorder characterized by a fibrovascular conjunctival growth that extends onto the corneal surface, leading to irritation, foreign-body sensation, ocular redness, irregular astigmatism, and potential visual impairment in advanced cases [1]. Chronic exposure to ultraviolet (UV) radiation, dry and dusty environments, and outdoor occupational activities are well-established risk factors for the development and progression of pterygium [2,3]. The condition is particularly prevalent in populations residing in equatorial and subtropical regions, where intense sunlight and outdoor exposure are common [2,3]. Globally, the reported prevalence of pterygium varies widely, reflecting differences in geographic location, socioeconomic status, and environmental exposure patterns [4].

In India, pterygium represents a significant cause of ocular morbidity. Regional epidemiological studies have indicated a prevalence ranging from approximately 7% to more than 10% in rural populations, with higher rates among older adults, males, and those engaged in outdoor occupations [5,6]. Rural and agrarian regions, such as parts of Bihar, are likely to have a substantial burden due to prolonged sun exposure associated with agricultural work and limited access to eye care services [5,7]. Although specific population-based prevalence data from Bihar are limited, observational hospital records in Eastern India show that pterygium is a frequently encountered condition in tertiary eye clinics, with a significant proportion of patients presenting with visual morbidity and recurrent lesions [7]. This highlights the need for targeted research to understand the surgical outcomes of pterygium management within the Bihar population.

Surgical excision remains the definitive treatment for visually significant or symptomatic pterygium. However, simple excision without appropriate adjunctive procedures or grafting is associated with high recurrence rates, reported to be as high as 80% in historical studies [1]. To address this challenge, conjunctival autograft (CAG), where autologous conjunctival tissue is transplanted to cover the excised area has emerged as the preferred technique due to its consistently lower recurrence rates and favourable cosmetic outcomes [1,8]. Longitudinal studies have demonstrated that conjunctival

autograft significantly reduces recurrence and postoperative complications compared with techniques such as amniotic membrane grafting or bare sclera excision [8,9]. In some contemporary reports, recurrence rates following conjunctival autograft remain low (<10%), even with long-term follow-up, particularly when meticulous surgical technique is employed [10].

Despite the known advantages of conjunctival autografting, prospective evaluations of surgical outcomes in the adult population of Bihar are lacking, especially from tertiary care referral centres that manage complex eye conditions referred from rural and underserved areas. Tertiary centres in Bihar, including major referral ophthalmology departments serve as the primary hubs for comprehensive pterygium care, receiving referrals of advanced, recurrent, and symptomatic cases that may not be adequately represented in community-based studies. Understanding outcomes such as recurrence, changes in visual acuity, refractive status, and complication profiles in this context is essential for evidence-based clinical practice, surgical planning, and patient counseling.

Therefore, this prospective clinical study aims to evaluate the surgical outcomes, including recurrence rates, visual and refractive changes, and perioperative complications in adult patients undergoing pterygium excision with conjunctival autograft at Anmmch Gaya Ji, Bihar. Insights from this study will help guide clinicians in optimizing surgical strategies and improving patient outcomes in this high-risk population.

MATERIALS AND METHODS

This prospective clinical study was conducted in the Department of Ophthalmology of ..... Medical College and Hospital, Bihar, India, which serves as a major referral center for patients from both urban and rural regions of the state. The hospital caters to a large catchment population, particularly from agrarian and outdoor-working communities, making it an appropriate setting to evaluate surgical outcomes of pterygium excision in a high-risk population. The study was carried out over a period of six months, from ___ to ___, after obtaining approval from the Institutional Ethics Committee.

This was a hospital-based, prospective, observational clinical study aimed at evaluating the surgical outcomes of pterygium excision with conjunctival autograft in adult patients. Patients presenting to the ophthalmology outpatient department (OPD) with a diagnosis of pterygium and fulfilling the eligibility criteria were consecutively screened and randomly selected for inclusion in the study. The study design allowed for real-time assessment of postoperative outcomes, including recurrence, visual acuity, refractive changes, and complications following surgery.

The study population comprised adult patients reporting to the ophthalmology OPD with clinically diagnosed primary pterygium during the nine-month recruitment period. A total of 60 patients were included based on feasibility and OPD attendance during the study duration.

Patients were selected by simple random sampling from eligible OPD attendees during the study period to minimize selection bias. Every alternate eligible patient meeting the inclusion criteria was considered for enrolment until the desired sample size was achieved.

The sample size was determined based on previous studies reporting recurrence rates of 5–10% following conjunctival autograft, with a confidence level of 95% and allowable error of 5%, while also accounting for potential dropouts.

Patients were included in the study if they met the following criteria: Age ≥18 years. Clinically diagnosed primary pterygium. Pterygium encroaching ≥2 mm onto the cornea or causing symptoms such as foreign body sensation, redness, recurrent inflammation, or visual disturbance. Patients willing to undergo surgical excision with conjunctival autograft. Patients providing informed written consent and willing to comply with follow-up visits.

Patients were excluded from the study based on the following criteria: Recurrent pterygium. Pseudopterygium. Previous ocular surgery in the affected eye. Coexisting ocular surface disorders (e.g., severe dry eye disease, ocular cicatricial pemphigoid). Corneal degenerations or dystrophies. Active ocular infection or inflammation. Systemic conditions impairing wound healing (e.g., uncontrolled diabetes mellitus, autoimmune disorders). Patients on long-term topical steroid therapy. Pregnant or lactating women. Patients unwilling or unable to complete follow-up.

Preoperative Evaluation: All enrolled patients underwent a detailed ophthalmic evaluation including: Detailed history regarding duration of symptoms, occupational exposure, and UV light exposure. Best corrected visual acuity (BCVA) using Snellen's chart. Slit-lamp biomicroscopic examination to assess pterygium morphology, extent of corneal involvement, and associated ocular surface changes. Measurement of pterygium size using slit lamp calipers. Keratometry and refraction to assess pterygium-induced astigmatism. Fundus examination to rule out posterior segment pathology. Patients were graded according to the extent of corneal involvement and vascularity of the pterygium.

All surgeries were performed under peribulbar or topical anesthesia by experienced ophthalmic surgeons using a standardized surgical protocol. The pterygium was excised by carefully dissecting the head from the cornea, followed by removal of the fibrovascular tissue from the scleral bed. A conjunctival autograft of appropriate size was harvested from the superotemporal bulbar conjunctiva of the same eye, ensuring inclusion of limbal tissue wherever possible. The graft was then transferred to cover the bare sclera with proper orientation and secured using 8-0 Vicryl sutures or fibrin glue, depending on availability.

Care was taken to avoid buttonholes, graft inversion, or excessive manipulation. Subconjunctival antibiotics and steroids were administered at the end of the procedure, followed by eye patching.

Postoperatively, all patients received topical antibiotic-steroid combination drops for 4 weeks in tapering doses along with lubricating eye drops. Patients were examined on postoperative day 1, week 1, 1 month, 3 months, and 6 months. At each follow-up visit, the following were evaluated: Best corrected visual acuity. Graft status and healing. Recurrence (defined as fibrovascular tissue crossing the limbus onto the cornea). Postoperative complications such as graft edema, displacement, granuloma formation, infection, or scarring. Changes in refractive status and astigmatism.

The primary outcome measure was the recurrence rate at 6 months. Secondary outcomes included improvement in visual acuity,

reduction in astigmatism, cosmetic satisfaction, and postoperative complications.

Data were entered into Microsoft Excel and analyzed using SPSS. Visual acuity and astigmatism were expressed as mean ± standard deviation. Recurrence and complications were expressed as percentages. Preoperative and postoperative visual acuity and astigmatism were compared using a paired t-test. Chi-square test was used to assess associations between categorical variables. A *p-value* <0.05 was considered statistically significant.

RESULTS

A total of 60 patients (60 eyes) undergoing pterygium excision with conjunctival autograft were included in the study. All patients completed a minimum follow-up period of 6 months and were analyzed for surgical outcomes.

The demographic characteristics and baseline clinical features of the study population are shown in Table 1. The mean age of patients was 46.3 ± 9.4 years, with a range of 28 to 68 years. The majority of patients were in the age group of 41–50 years (36.7%), followed by 51–60 years (28.3%). There was a male preponderance with 38 males (63.3%) and 22 females (36.7%), reflecting higher outdoor occupational exposure among males in this region.

Regarding laterality, the right eye was involved in 34 patients (56.7%) and the left eye in 26 patients (43.3%). Most patients (71.7%) belonged to rural backgrounds and were engaged in outdoor occupations such as farming and manual labor. Nasal pterygium was the most common type observed in 55 patients (91.7%), while temporal pterygium was seen in only 5 patients (8.3%).

Pterygium predominantly affected middle-aged males, with nasal pterygium being the most common type, consistent with UV exposure-related etiology in rural Bihar.

Preoperative and postoperative best corrected visual acuity (BCVA) values are summarized in Table 2. Preoperatively, the mean BCVA was 0.42 ± 0.18 logMAR, which improved significantly to 0.18 ± 0.12 logMAR at 6 months postoperatively ($p < 0.001$). A statistically significant improvement in visual acuity following surgery, indicating effective visual rehabilitation with conjunctival autografting.

Table 1: Demographic and baseline clinical characteristics (n = 60)

Parameter	*Number (%)*
Age (years)	
21–30	6 (10.0)
31–40	10 (16.7)
41–50	22 (36.7)
51–60	17 (28.3)
>60	5 (8.3)
Gender	
Male	38 (63.3)
Female	22 (36.7)
Eye involved	
Right	34 (56.7)
Left	26 (43.3)
Type of Pterygium	
Nasal	55 (91.7)
Temporal	5 (8.3)

Table 2: Comparison of preoperative and postoperative visual acuity

Parameter	*Preoperative*	*Postoperative (6 months)*	*p-value*
Mean BCVA (logMAR)	0.42 ± 0.18	0.18 ± 0.12	<0.001

The changes in corneal astigmatism before and after surgery are depicted in Table 3. The mean preoperative astigmatism was 2.15 ± 0.72 diopters, which reduced significantly to 0.85 ± 0.44 diopters postoperatively ($p < 0.001$). A significant reduction in corneal astigmatism after pterygium excision with conjunctival autograft, demonstrating the refractive benefits of the procedure.

Postoperative complications and recurrence rates are summarized in Table 4. The most common complication observed was graft edema in 6 patients (10%), followed by graft displacement in 3 patients (5%). A pyogenic granuloma occurred in 2 patients (3.3%). Recurrence was noted in 3 patients (5%) at the end of 6 months. Conjunctival autograft is associated with low recurrence and minimal complications, supporting its safety and efficacy.

At the end of 6 months, 57 patients (95%) achieved successful anatomical and functional outcomes, defined as complete graft uptake, improved vision, and absence of recurrence. Only 3 patients developed recurrence, all of whom had large, fleshy pterygium preoperatively and were engaged in outdoor occupations with prolonged sun exposure.

DISCUSSION

In this prospective clinical study of adult patients undergoing pterygium excision with conjunctival autograft at a tertiary care centre in Bihar, we observed significant improvements in visual acuity, reduction in pterygium-induced astigmatism, and a low recurrence rate at 6 months postoperatively. These findings reinforce the established role of conjunctival autograft as a preferred surgical technique following pterygium excision, aligning with evidence from multiple clinical studies and systematic reviews. [1]

Table 3: Preoperative and postoperative astigmatism

Parameter	*Preoperative*	*Postoperative*	*p-value*
Mean Astigmatism (D)	2.15 ± 0.72	0.85 ± 0.44	<0.001

Table 4: Postoperative complications and recurrence

Complication	*Number (%)*
Graft edema	6 (10.0)
Graft displacement	3 (5.0)
Pyogenic granuloma	2 (3.3)
Infection	0 (0.0)
Recurrence	3 (5.0)

The primary goal of pterygium surgery is to remove the fibrovascular tissue and reconstruct a stable ocular surface while minimizing recurrence. Recurrence remains the most common challenge in pterygium management, historically reaching up to 80% after bare sclera excision. [1] In contrast, conjunctival autograft has been shown to significantly lower recurrence rates and provide favorable visual outcomes, which our study corroborated. In our cohort, recurrence was observed in 5% of patients at 6 months — a comparatively low rate that is analogous to results reported in the literature. [1]

A Cochrane systematic review demonstrated that conjunctival autograft yields lower recurrence compared to amniotic membrane transplant at 6 months, with a risk ratio of 0.53 favoring autograft techniques. [1] Additionally, recent long-term analyses indicate that autografts sustain low recurrence rates and good cosmesis even over extended follow-up, emphasizing the durability of this approach. In an 11-year follow-up study conducted in a high UV exposure population, recurrence after conjunctival limbal autograft was only 6.7%, with high patient satisfaction. [8] These findings highlight the effectiveness of autograft surgery in populations exposed to significant environmental risk factors — a situation comparable to the Bihar cohort, where UV exposure and outdoor occupations are common.

Visual outcomes are another critical measure of surgical success. In our study, mean BCVA improved significantly postoperatively, consistent with data from earlier investigations showing visual acuity gains following pterygium excision with conjunctival autograft. [11] The reduction in pterygium-induced corneal astigmatism postoperatively also aligns with published evidence. A North Indian prospective study demonstrated a substantial decrease in corneal astigmatism and improved visual acuity following a modified sutureless, glueless conjunctival autograft technique. [10] Similarly, anterior segment imaging studies have confirmed significant postoperative astigmatic improvement and corneal topographic normalization after autograft surgery, reflecting the optical benefits of removing the pterygium and restoring corneal contour. [12]

Postoperative complications in our cohort were minimal and self-limited. Graft edema, displacement, and granuloma formation were the most frequent, but did not lead to severe morbidity. Comparable minor complication rates have been reported in other clinical series, underscoring the overall safety profile of conjunctival autografting. [1] These outcomes reinforce the technique's suitability for routine clinical practice, especially in tertiary settings managing advanced or recurrent pterygia.

Notably, variation exists in recurrence rates and outcomes reported across studies due to differences in surgical technique, fixation method (sutures vs. glue), patient demographics, and environmental exposure. For instance, comparative studies of rotational autograft versus conventional methods noted similar recurrence and astigmatism outcomes, suggesting technique flexibility without compromising results. [13] Nonetheless, the overarching consensus favors autografts over other methods like bare sclera excision or amniotic membrane alone, due to consistently lower recurrence and improved visual outcomes.[1]

The pathophysiology of pterygium — including fibrovascular proliferation driven by UV radiation, oxidative stress, and limbal stem cell dysfunction — underpins the rationale for aggressive surgical management and vigilant postoperative care. [14] Given that most recurrences occur within the first year, our 6-month follow-up may underestimate long-term recurrence, which remains a limitation. Future studies with extended follow-up up to 12 to 24 months would more comprehensively capture late recurrence dynamics and help refine prognostic models unique to high-risk populations like those in Bihar.

In addition to surgical technique, adjunctive therapies such as mitomycin C or bevacizumab injections have been explored to further reduce recurrence. While some reports show benefit, the routine use of such adjuncts remains controversial due to potential postoperative complications and cost considerations, particularly in resource-limited settings. [15]

REFERENCES

1. Clearfield E, Muthappan V, Wang X, Kuo IC. Conjunctival autograft for pterygium. Cochrane Database Syst Rev. 2016; 2 (2) :CD011349.
2. Tandon R, Vashist P, Gupta N, Gupta V, Yadav S, Deka D, Singh S, Vishwanath K, Murthy GVS. The association of sun exposure, ultraviolet radiation effects and other risk factors for pterygium (the SURE RISK for pterygium study) in geographically diverse adult (≥40 years) rural populations of India -3rd report of the ICMR-EYE SEE study group. PLoS One. 2022; 17 (7) :e0270065.
3. Nangia V, Jonas JB, Nair D, Saini N, Nangia P, Panda-Jonas S. Prevalence and associated factors for pterygium in rural agrarian central India. The central India eye and medical study. PLoS One. 2013; 8 (12) :e82439.
4. Fekadu SA, Assem AS, Adimassu NF. Prevalence of pterygium and its associated factors among adults aged 18 years and above in Gambella town, Southwest Ethiopia, May 2019. PLoS One. 2020; 15 (9): e0237891.
5. Gujrathi, S. A., Devgude, M. B., Sathe, S., & Powar, J. (2025). Prevalence of Pterygium and its Socio-demographic Determinants among Patients visiting a Rural Tertiary Care Hospital in Northern Maharashtra, India. *Journal of Research in Medical and Interpathy Sciences*, 2025; 2 (2) :42–45.
6. Uady NS. Punit P. Study of prevalence and risk factors for pterygium in Eastern Bihar. *Indian J Appl Res.* 2019; 9 (12) : 75-76.
7. Vandana P., Vidyabhushan K., Ankita S., Nilesh M.,. To determine the prevalence and occurrence of visual morbidity in patients of pterygium attending a tertiary care centre of Eastern India (Bihar). *Int J Sci Res.* 2021; 10 (9) : 80-81.
8. Jammal HM, Al-Omari R, Shannak Z, Alkhatib S, Abu Serhan H. Long-Term Surgical Outcome of Pterygium Excision and Conjunctival Limbal Autograft: Minimum 11 years Follow-up Study in a Country with High Ultraviolet Exposure. Clin Ophthalmol. 2025; 19: 2661-2669.
9. Noguera SI, Nicanor KSA, Ang RET, Cruz EM. Clinical outcomes of pterygium surgery over a ten-year period: a review of recurrence and complication rates. BMC Ophthalmol. 2025;25 (1): 380.
10. Gumber A, Nishant P, Sinha S, Goel R, Malik KPS. Changes in corneal curvature and visual acuity in North Indian adults after pterygium excision with modified sutureless, glueless limbal-conjunctival autograft. Indian J Ophthalmol. 2021; 69 (9) :2401-2405.
11. Misra S, Craig JP, McGhee CN, Patel DV. A Prospective Study of Pterygium Excision and Conjunctival Autograft With Human Fibrin Tissue Adhesive: Effects on Vision, Refraction, and Corneal Topography. Asia Pac J Ophthalmol (Phila). 2014; 3 (4): 202-6.
12. Wiącek MP, Kuśmierz-Wojtasik M, Kowalska B, Machalińska A. Effect of Pterygium Removal Combined with Conjunctival Autograft on Corneal Parameters in Swept-Source Imaging. J Clin Med. 2022;

11 (2) :329.
13. Gudimetla J, Potti S, Shivaprasad S, Bhide M, Prabhakar V. Pterygium surgery using inferior rotational conjunctival autograft versus conventional conjunctival autograft with sutures - A comparative study. Indian J Ophthalmol. 2023; 71 (12) :3646-3651.
14. Sarkar P, Tripathy K. Pterygium. [Updated 2023 Aug 25]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK558907/?utm_source=chatgpt.com--14
15. Lee JS, Ha SW, Yu S, Lee GJ, Park YJ. Efficacy and Safety of a Large Conjunctival Autograft for Recurrent Pterygium. Korean J Ophthalmol. 2017; 31 (6) :469-478.

HOW TO CITE THIS ARTICLE: Singh KK, Kumar C, Verma A, Iqbal J. Surgical Outcomes in Adult Patients Undergoing Pterygium Excision with Conjunctival Autograft: A Prospective Clinical Study. *J Adv Sci Res*. 2026;17(5): 51-55 **DOI:** 10.55218/JASR.2026170511