УДК 617.711-089

Comparative study of fibrin glue, suturing and sutureless / glue-free limbal conjunctival autograft for primary pterygium surgery in patients attending a tertiary care hospital in Eastern India

Indrajit Sarkar [1], Dattatreya Banerjee [2], Rashmirekha Bahera [3]

[1] Department of Ophthalmology, Burdwan Medical College, Burdwan, West Bengal (India)
[2] Department of Ophthalmology, Burdwan Medical College, Burdwan, West Bengal (India)
[3] Department of Opthalmology, Gouri Devi Institute of Medical Science & Hospital, Durgapur, West Bengal (India)

Порівняльне дослідження фібринового клею, ушивання та безшовного/ безклеєвого аутотрансплантата лімбальної кон'юнктиви для первинної хірургії птеригіуму у пацієнтів, які відвідують лікарню третього рівня у Східній Індії

Індраджит Саркар [1], Даттатрея Банерджі [2], Рашміреха Бахера [3]

[1] Кафедра офтальмології, Медичний коледж м. Бурдван, Західна Бенгалія (Індія)
[2] Кафедра офтальмології, Медичний коледж м. Бурдван, Західна Бенгалія (Індія)
[3] Кафедра офтальмології, Інститут медичних наук та лікарня Гурі Деві, Дургапур, Західна Бенгалія (Індія)

Abstract

Purpose: *To compare the effectiveness, safety, and cost-effectiveness of three conjunctival autograft-fixing methods: fibrin glue, sutures, and no glue or sutures; to examine patient comfort, complications, recurrence, and postoperative outcomes; to determine whether fibrin glue or the sutureless/glue-free method is significantly better than traditional suturing in surgical efficiency, postoperative recovery, and long-term patient satisfaction.*

Methods: *A prospective comparative study was conducted on 150 patients undergoing primary pterygium excision. Participants were randomly assigned to three groups: Group I (Fibrin Glue, n = 50), Group II (Suturing, n = 50), and Group III (Sutureless/Glue-Free, n = 50). Surgical duration, postoperative complications, recurrence rates, and patient-reported comfort were assessed at one week, six weeks, and six months. Statistical analysis was performed to evaluate differences between groups.*

Results: *Surgical time was significantly shorter in the fibrin glue (24.05 ± 0.94 min) and sutureless (23.27 ± 0.87 min) groups compared with suturing (46.2 ± 1.34 min) ($p < 0.001$). Patients in the fibrin glue and sutureless groups reported greater postoperative comfort, while suturing was associated with increased pain, foreign body sensation, and tearing. Recurrence was slightly higher in the sutureless group (4 cases) compared with fibrin glue (2 cases) and suturing (2 cases), although the differences were not statistically significant.*

Conclusion: *Compared with sutures, both fibrin glue and sutureless/glue-free fixation techniques reduce operative time and improve postoperative comfort. Sutureless fixation offers a cost-effective alternative suitable for low-resource settings, although fibrin glue provides superior stability and patient experience. Long-term studies are warranted to further evaluate recurrence risk and cost-effectiveness.*

Keywords: *Pterygium; Conjunctival Autograft; Tissue Adhesives; Surgical Sutures; Ophthalmologic Surgical Procedures.*

DOI: https://doi.org/ 10.31288/Ukr.j.ophthalmol.202614045
UDC: 617.7

Corresponding author: Banerjee Dattatreya, Assistant Professor. Department of Opthalmology, Burdwan medical college, Burdwan, West Bengal, India. E-mail address - Jdinkar1978@gmail.com

Received 2025-07-20
Accepted 2025-10-17

Cite this article as: Indrajit Sarkar, Dattatreya Banerjee, Rashmirekha Bahera. Comparative study of fibrin glue, suturing and sutureless / glue-free limbal conjunctival autograft for primary pterygium surgery in patients attending a tertiary care hospital in Eastern India. Ukrainian Journal of Ophthalmology. 2026;1:.40-45.

Резюме

Мета. *Порівняти ефективність, безпеку та економічну ефективність трьох методів фіксації аутотрансплантата кон'юнктиви: фібринового клею, швів та безклейової фіксації; дослідити комфорт пацієнтів, ускладнення, рецидиви та післяопераційні результати; визначити, що є значно кращим за традиційне ушивання з точки зору хірургічної ефективності, післяопераційного відновлення та довгострокової задоволеності пацієнтів – фібриновий клей чи безклеєвий метод..*

Матеріал та методи*. Було проведено проспективне порівняльне дослідження за участю 150 пацієнтів, які перенесли первинне видалення птеригіуму. Учасників було випадковим чином розподілено на три групи: Група I (фібриновий клей, n = 50), Група II (накладання швів, n = 50) та Група III (безшовне/клеєве видалення, n = 50). Тривалість операції, післяопераційні ускладнення, частота рецидивів та комфорт, про який повідомляли пацієнти, оцінювалися через один тиждень, шість тижнів та шість місяців. Для оцінки відмінностей між групами було проведено статистичний аналіз.*

Результати. *Час операції був значно коротшим у групах з фібриновим клеєм (24,05 ± 0,94 хв) та безшовною фіксацією (23,27 ± 0,87 хв) порівняно з ушиванням (46,2 ± 1,34 хв) (p < 0,001). Пацієнти в групах з фібриновим клеєм та безшовною фіксацією повідомляли про більший післяопераційний комфорт, тоді як ушивання було пов'язане зі збільшенням болю, відчуттям стороннього тіла та розривами. Рецидиви були дещо вищими в безшовній групі (4 випадки) порівняно з фібриновим клеєм (2 випадки) та ушиванням (2 випадки), хоча відмінності не були статистично значущими.*

Висновок. *Порівняно зі шовними матеріалами, як фібриновий клей, так і безшовна/безклеєва фіксація скорочують операційний час та покращують післяопераційний комфорт. Безшовна фіксація пропонує економічно ефективну альтернативу, придатну для умов з обмеженими ресурсами, хоча фібриновий клей забезпечує кращу стабільність та покращує враження пацієнтів. Для подальшої оцінки ризику рецидиву та економічної ефективності необхідні довгострокові дослідження.*

Ключові слова: *птеригіум; кон'юнктивальний аутотрансплантат; тканинні клеї; хірургічні шви; офтальмологічні хірургічні процедури.*

Introduction

Pterygium is a common eye condition. An abnormal proliferation of blood vessels from the conjunctiva to the cornea defines it. Common symptoms include limbal stem cell degeneration due to chronic UV light, wind, dust, and dry environments [1]. UV light damage, which causes conjunctival epithelium changes, inflammation, and fibrovascular tissue proliferation, is thought to cause pterygium. Redness, irritation, foreign body sensation, tearing, and photophobia are pterygium symptoms. Advanced fibrovascular growth can encroach on the visual axis, causing astigmatism and vision loss [2]. Due to its cosmetic and functional issues, pterygium often requires surgery.

Surgical excision is the best pterygium treatment, especially for progressive growth, visual impairment, or severe discomfort. Various surgical techniques have been used to maximise healing and reduce recurrence [3]. Due to their better long-term results, conjunctival autografts have replaced bare sclera excision. This is because the former recurs frequently. Conjunctival autograft from the superior or superotemporal bulbar conjunctiva is used to create a limbal barrier to prevent recurrence. Autograft security currently relies on sutures, fibrin glue, and sutureless/glue-free methods. The traditional method used 8-0 Vicryl sutures for mechanical stability but often caused inflammation, foreign body sensation, and prolonged postoperative discomfort [4]. Fibrin glue, a biological adhesive that mimics the natural clotting mechanism, is becoming more popular because it reduces recurrence rates, surgery time, and postoperative pain. The cost and risk of viral transmission from pooled human plasma sources remain. A cheaper option for autologous blood coagulation without sutures or glue has been developed. This method fixes the graft without adhesives or sutures using the natural adhesion properties of the patient's blood, but graft stability and recurrence rates remain concerns [5].

The Indian subcontinent has a high prevalence of pterygium due to environmental and geographic factors; however, comparative data is limited despite the use of various methods. Although global research has shown the pros and cons of different fixation techniques, our own study is important because patient demographics, UV exposure, and healthcare accessibility vary by region [6]. Given India's socio-economic constraints, cost-effective alternatives, such as the glue-free technique, must be assessed. Despite improving patient comfort and reducing recurrence, fibrin glue is expensive in resource-limited settings. A systematic comparison of an Indian population can demonstrate the practicality of these methods. This information will help clinicians choose the best surgical approach using evidence [7].

Objectives

• To compare the effectiveness, safety, and cost-effectiveness of three conjunctival autograft-fixing methods: fibrin glue, sutures, and no glue or sutures.

• To examine patient comfort, complications, recurrence, and postoperative outcomes.

• To determine whether fibrin glue or the sutureless/glue-free method is significantly better than traditional suturing in surgical efficiency, postoperative recovery, and long-term patient satisfaction.

Methods

Study Design

A tertiary care hospital in Eastern India hosted this prospective comparative study. Primary pterygium surgery uses fibrin glue, sutureless/glue-free methods, and traditional sutures for conjunctival autograft fixation. This study examined and compared these three methods. This systematic review measured postoperative outcomes, surgical efficiency, and patient comfort to find the best and most practical way to operate on pterygiums in India's healthcare system. The research was ethical because all participants gave informed consent and it was institutionally approved.

Inclusion and Exclusion Criteria

The inclusion criteria were:

• Patients aged 18 years and older.

• Presence of unilateral or bilateral primary pterygium requiring surgical intervention.

Patients who met the exclusion criteria were not enrolled in the study. The exclusion criteria were:

• Presence of recurrent pterygium (cases where pterygium had previously been excised but recurred).

• Patients aged below 18 years.

• Patients unwilling to provide informed consent for participation in the study.

Sample Size and Groups

This study included 150 patients with primary pterygium. Patients were randomly assigned to one of three equal groups based on conjunctival autograft security after pterygium excision. Fifty patients in Group I (Fibrin Glue Group) had conjunctival autograft fixation with fibrin glue, a bioadhesive that speeds graft adhesion and reduces post-surgery pain. The 50 patients in Group II (Suturing Group) were secured the conjunctivalautograft with 8-0 Vicryl sutures, a method that is effective but takes longer and causes patient discomfort. In Group III, the Sutureless/Glue-Free Group, 50 patients had autologous blood coagulum-fixed conjunctival autografts. This allowed the graft to adhere naturally without adhesives or sutures. This approach reduced the risk of foreign material-related postoperative issues while being cheaper.

Surgical Procedure

Before surgery, all patients were thoroughly evaluated to determine their suitability and baseline ocular health. This evaluation included preoperative BCVA measurements. The pterygium was measured and the cornea was checked during a slit-lamp examination of the anterior segment of the eye. The patient's intraocular pressure (IOP) was measured before surgery to rule out glaucoma or hypertension. During all local anaesthesia surgeries, a peribulbar block of lignocaine and bupivacaine kept the patient comfortable and pain-free. The standard operating procedure was applied to all three groups. First, the pterygium's head was carefully dissected off the corneal surface and the fibrovascular tissue underneath was excised to remove the abnormal growth. Reducing recurrence rates required the addition of limbal stem cells to a conjunctival autograft from the same eye's superior or superotemporal bulbar conjunctiva after tissue removal.

Three groups used different graft fixation methods. Group I secured the autograft over the bare scleral bed with fibrin glue, a bioadhesive that mimics the natural clotting mechanism to speed attachment. This technique reduced surgery time and postoperative pain by replacing suturing. Group II (Suturing Group) used 8-0 Vicryl sutures to secure the autograft, which provided strong mechanical fixation but may have increased postoperative inflammation and irritation. In Group III (Sutureless/Glue-Free), the autograft was delicately placed over the exposed sclera and secured with autologous blood coagulum. This method required surgeons to gently press on the patient for a few minutes to ensure blood adhesion. Patients in all three groups received the same postoperative care. To prevent infections, all patients received Moxifloxacin eye drops for two weeks. Fluorometholone eye drops were applied four times a day for 2 weeks to reduce inflammation and speed healing. The dosage was gradually reduced over the next two weeks. Patients were assessed at 1, 6, and 24 weeks after the procedure to assess their health, potential issues, and procedure efficacy.

Outcome Measures

This study compared three surgical techniques using primary and secondary outcome measures. Recurrence rate, the frequency of fibrovascular regrowth beyond 1 mm from the corneal limbus, was the main outcome measure. Recurrence is crucial to pterygium surgery's long-term success because it can impair vision and require additional surgery. Secondary outcomes included surgical efficacy, graft stability, and postoperative complications. Postoperative discomfort included pain, foreign body sensation, excessive tearing (lacrimation), and eye redness (hyperaemia) assessed using a standardised symptom scale. The length of surgery was another important secondary outcome when comparing the three methods. Faster surgeries reduce infection risks and improve patient comfort. Finally, graft stability was assessed by monitoring displacement, dehiscence, and shrinkage. These factors may affect surgery success and patient satisfaction after recovery.

Statistical Analysis

The study data was analysed using standard statistical methods. The t-test compared continuous variables such as surgical time, while the chi-square test compared categorical variables. Statistical significance was defined as $p < 0.05$. For accurate data analysis and interpretation, statistical software was used.

Ethics

The study protocol was approved by the Institutional Ethics Committee (Protocol No. IEC/2023/OPH-017).

Results

Demographic Characteristics

The study included 150 patients (163 eyes) with a mean age of 50.93 years. Males comprised 82.66% (124/150) of the study population, likely due to higher environmen-

Table 1. Demographic Characteristics

Characteristic	Group I (Fibrin Glue)	Group II (Suturing)	Group III (Sutureless/Glue-Free)	Total (%)
Mean Age (years)	50.93	50.93	50.93	50.93
Male	38 (76%)	45 (90%)	41 (82%)	124 (82.66%)
Female	12 (24%)	5 (10%)	9 (18%)	26 (17.33%)

tal exposure to dust and ultraviolet rays, whereas females comprised 17.33% (26/150). The distribution across groups is shown in Table 1.

Surgical Time

Suturing (Group II) required significantly longer operative time (46.2 ± 1.34 min) compared with fibrin glue (24.05 ± 0.94 min) and sutureless fixation (23.27 ± 0.87 min), nearly doubling the operative duration. Shorter fixation procedures in Groups I and III likely contributed to improved surgical efficiency (Table 2).

Postoperative Complications

The postoperative complications varied among the groups (Table 3). Pain, foreign body sensation, and lacrimation were highest in the suturing group (Group II), whereas fibrin glue (Group I) and sutureless (Group III) groups reported faster symptom resolution. However, minor complications such as hemorrhage, graft shrinkage, graft dehiscence, and pyogenic granuloma were slightly higher in the sutureless group. Recurrence occurred in 2 cases in Group III, compared with 1 case each in Groups I and II.

Symptoms generally resolved within 2–4 weeks, with Group II experiencing the longest discomfort period (mean 4 weeks) versus 2 weeks for Groups I and III (Table 4).

Pterygium Characteristics

Most eyes had nasal pterygium (99.38%), with temporal pterygium being rare (0.62%). Pterygium sizes ranged from 2.0 to 4.9 mm, with a mean of 2.887 ± 0.77 mm. Progressive pterygium was observed in 43.56% of eyes, while 56.44% were atrophic/degenerative. Spherical equivalent improved significantly in eyes with pterygium ≥ 3.5 mm, independent of fixation method.

Table 2. Mean Surgical Time (minutes)

Group	Mean ± SD
Group I (Fibrin Glue)	24.05 ± 0.94
Group II (Suturing)	46.2 ± 1.34
Group III (Sutureless/Glue-Free)	23.27 ± 0.87

Table 3. Postoperative Complications by Group

Complication	Group I	Group II	Group III
Pain	26	49	42
Foreign Body Sensation	14	48	9
Lacrimation	29	38	20
Hemorrhage	11	13	17
Graft Shrinkage	1	2	4
Graft Dehiscence	1	2	2
Pyogenic Granuloma	0	0	2
Recurrence	1	1	2

Table 4. Duration of Postoperative Symptoms

Group	Mean Duration of Symptoms (weeks)
Group I (Fibrin Glue)	2
Group II (Suturing)	4
Group III (Sutureless/Glue-Free)	2

Discussion

Fibrin glue secures conjunctival autografts during pterygium surgeries, as shown by Elzlitni et al., 2018 [8]. Fibrin glue reduces surgical time and postoperative pain better than traditional suturing, according to research. This study's finding that the fibrin glue group had surgery in 24.05±0.94 min compared to the suturing group (46.2±1.34 min) supports previous research that removing sutures speeds up the procedure and reduces operative trauma. Patients with fibrin glue had less pain, foreign body sensation, and lacrimation after surgery. Shaaban et al., 2014 [9]. Recently developed sutureless/glue-free methods are viable alternatives. This method secures the graft using autologous blood coagulum without sutures or glue. The sutureless method can achieve haemostasis in a fraction of the time it takes with fibrin glue, but the current study found that this is not always true. Sutureless grafts were slightly more likely to shrink and shift, emphasising the need for precise surgery to ensure graft adhesion. Despite being as comfortable as fibrin glue, sutureless techniques require more surgical skill to avoid graft displacement and recurrence, according to Kavita Malli Karjun Salagar 2013 [10].

Fibrin glue reduces surgical time, postoperative inflammation, and recurrence, making it a clinically effective and patient-friendly option. However, Ashok Sharma et al., 2015 [11] its high cost makes it harder to implement in resource-poor areas. Although commercial preparations are rigorously screened, fibrin glue may cause viral transmission from pooled human plasma sources. Sutureless/glue-free methods eliminate the

need for expensive adhesives and sutures, making them cheaper. To prevent graft displacement, it requires surgical skill and careful intraoperative haemostasis. Sutureless pterygium surgery may work where fibrin glue is unavailable or too expensive. Despite its limitations, this study offers valuable insights. Due to the short follow-up period, long-term recurrence rates could not be assessed. The sutureless group had two recurrences at six months, compared to one for the fibrin glue and suturing groups. Longer follow-up is needed to determine if these trends persist. Due to time constraints, the study did not evaluate other complications such as persistent pain or delayed healing. Future research should use larger samples and longer follow-ups to understand each method's long-term effects. This study found that fibrin glue is the best way to fix conjunctival autografts because it shortens the surgery, reduces complications, and prevents recurrence. In low-resource settings, sutureless/glue-free surgery can be cost-effective if graft stability is ensured. Further long-term studies are needed to determine the best surgical method for pterygium management and assess recurrence risks.

While suturing resulted in greater pain and a longer surgical time, these findings reflect postoperative discomfort rather than true surgical complications. The incidence of actual complications such as graft dehiscence or granuloma did not differ significantly between the techniques, and was more often related to the size and grade of the pterygium.

To conclude, fibrin glue secures conjunctival autografts better than suturing in pterygium surgery, reducing surgical time, postoperative pain, and recurrence. The sutureless/glue-free method is less expensive but has a higher recurrence rate and requires careful haemostasis to ensure graft stability. Suturing remains an effective and reliable method for conjunctival autograft fixation, although it requires a longer operative time and is associated with greater postoperative discomfort compared to other techniques. However, these factors represent increased surgical duration and pain rather than true complications, which were not significantly higher in the suturing group. Actual postoperative complications were more frequently associated with higher-grade (Grade 3) pterygium rather than the fixation method itself. In settings with limited resources and experienced surgeons, sutureless surgery may be considered, but fibrin glue is better when money is not an issue. Longer follow-up studies are needed to assess long-term recurrence rates and improve surgical techniques for the best patient outcomes. Based on statistical analysis ($p<0.05$ for surgical time and postoperative discomfort), fibrin glue demonstrated significantly shorter operative time and lower early postoperative discomfort compared to suturing. The sutureless/autologous blood technique showed comparable comfort to fibrin glue but a slightly higher, though not statistically significant, recurrence rate. Suturing remained effective but was associated with longer operative times and more complications. In resource-limited settings, the sutureless technique may be a practical alternative if performed with meticulous haemostasis, whereas fibrin glue remains the preferred choice when resources allow.

Author Contributions

Indrajit Sarkar – Conceptualization, study design, data collection, surgical procedures, manuscript drafting; Dattatreya Banerjee – Supervision, Statistical analysis, literature review, interpretation of data, manuscript writing, revision of the manuscript, and approval of the final version; Rashirekha Bahera – Patient follow-up, data verification, preparation of figures and tables. All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work.

Acknowledgements

The authors thank the Department of Ophthalmology and the operating theatre staff of Burdwan Medical College for their assistance and patient care during the study.

Disclaimers

The views expressed in this article are solely those of the authors and do not necessarily represent the official position of their affiliated institution or any funding source.

Funding

This Study did not receive any funding or grant.

Conflict of Interest

The authors declare that they have no conflicts of interest related to this work.

Ethical approval

Subjects of the study. This study involved human participants undergoing primary pterygium surgery.

Ethics approval for research involving humans. The study protocol was reviewed and approved by the Institutional Ethics Committee under Protocol No. IEC/2023/OPH-017. All procedures followed were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments.

Informed consent

Written informed consent was obtained from all participants prior to inclusion in the study for participation and publication of anonymized data.

Data Availability Statement

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request. Due to institutional policy and patient confidentiality, raw data are not publicly available.

Abbreviations

UV – Ultra violet, IOP – Intraocular Pressure.

References

1. Singh PK, Singh S, Vyas C, Singh M. Conjunctivalautografting without fibrin glue or sutures for pterygium surgery. Cornea. 2012 Jun;32(1):104–7. doi:10.1097/ICO.0b013e31824bd1fb

2. Muhammad S, Ali F, Malik IQ. Frequency of pterygium recurrence with limbal stem cell autograft. Pak J Ophthalmol. 2016 Oct–Dec;32(4):211–4. doi:10.36351/pjo.v32i4.90
3. Huerva V, Marcé A, Martínez-Alonso M, Muniesa MJ, Sánchez C. Pterygium surgery by means of conjunctivalautograft: long-term follow-up. Arq Bras Oftalmol. 2012;75(4):251–5. doi:10.1590/S0004-27492012000400003
4. Wadgaonkar SP, Tiwari RR, Patil PA, Kamble BS. Fibrin glue versus suture technique for pterygium excision: a prospective study in tertiary-based rural hospital. J ClinOphthalmol Res. 2017;5(1):23–7. doi:10.4103/2320-3897.195305
5. Goswami S, Chatterjee SS, Goswami S, Bhaduri G. A comparative study of use of fibrin glue and vicryl suture in conjunctivalautograft transplantation following pterygium excision. Indian J Basic Appl Med Res. 2014;4(1):169–75.
6. Wang X, Zhang Y, Zhou L, Wei R, Dong L. Comparison of fibrin glue and Vicryl sutures in conjunctivalautografting for pterygium surgery. Mol Vis. 2017;23:275–8.
7. Karandikar S, Shanbhag N, Bhatt N, Chen L. Comparison of three different techniques for fixation of conjunctivalautograft in pterygium surgery. Indian J ClinExpOphthalmol. 2016;2(4):350–5. doi:10.5958/2395-1451.2016.00079.5
8. Elzlitni NM, Eldressi SS, Bukhatwa SA. Sutureless and glue-free conjunctivalautograft for pterygium surgery: a preliminary report about Libyan experience. Libyan Int Med Univ J. 2018;3(1):16–9. doi:10.21502/limuj.009.03.2018
9. Elwan SAM. Comparison between sutureless and glue-free versus sutured limbalconjunctivalautograft in primary pterygium surgery. Saudi J Ophthalmol. 2014;28(4):292–8. doi:10.1016/j.sjopt.2014.03.012
10. Salagar KM, Biradar KG. Conjunctivalautograft in primary and recurrent pterygium: a study. J ClinDiagn Res. 2013 Dec;7(12):2825–7. doi:10.7860/JCDR/2013/6355.3775
11. Sharma A, Raj H, Gupta A, Raina AV. Sutureless and glue-free versus sutures for limbalconjunctivalautografting in primary pterygium surgery: a prospective comparative study. J ClinDiagn Res. 2015 Nov;9(11):NC06–NC09. doi:10.7860/JCDR/2015/15689.6789.