

## Comparative Efficacy of Fibrin Glue and Autologous Serum in Fixating Conjunctival Autografts during Pterygium Surgery

Hetvee A. Gandhi<sup>1</sup>, Ashwini R. Surti<sup>2</sup>

<sup>1,2</sup>Assistant Professor, Department of Ophthalmology, Smt. NHL Municipal Medical College, Gujarat, Ahmedabad India

Received: 25-08-2024 / Revised: 23-09-2024 / Accepted: 26-10-2024

Corresponding Author: Dr. Ashwini R. Surti

Conflict of interest: Nil

### Abstract:

**Background and Aim:** Pterygia that encroach upon the cornea can lead to significant visual disturbances, primarily through the development of astigmatism and obstruction of the visual axis, in addition to causing cosmetic concerns. The current medical management of this condition has proven to be inadequate, necessitating surgical intervention for effective resolution. The objective of the study was to evaluate and compare the effectiveness of fibrin glue against the patient's own serum as a fixation agent.

**Materials and Methods:** The research took place within the Ophthalmology department of a Tertiary Care Teaching Institute in India, spanning a period of one year. A total of one hundred patients diagnosed with primary pterygium were chosen using a convenient sampling method. The study participants were categorised into two distinct groups: group A received treatment with fibrin glue, while group B underwent the autologous serum technique. The conjunctival autograft was harvested from the superior temporal bulbar conjunctiva to effectively cover the scleral bed created by the excision of the pterygium.

**Results:** The most frequently observed complication in both groups was the loss of grafts. In group A, the observation was made in 20 eyes, representing 40%, while in group B, only 2 eyes, or 4%, were noted. The observed difference reached statistical significance, with a p-value of less than 0.05. The recurrence rate was notably higher in the group treated with fibrin glue, with 12 cases (24%) compared to 8 cases (16%) in the autologous serum group. However, this difference did not reach statistical significance. In our analysis, the average surgical duration for Group A was recorded at 23.05 minutes, while Group B exhibited a longer average of 35.01 minutes. A notable difference was observed between the two groups, reaching statistical significance.

**Conclusion:** The use of autologous serum for the fixation of conjunctival autografts presents a safe and promising alternative to the fibrin glue technique.

**Keywords:** Autologous Blood, Conjunctival Autograft, Fibrin Glue, Pterygia.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

### Introduction

Pterygia that significantly extend across the eye can lead to cosmetic concerns and visual disturbances, particularly due to induced astigmatism. Additionally, those that result in chronic ocular irritation from tear film disruption may necessitate surgical removal. Over the last ten years, discussions surrounding the optimal method for pterygium surgery have focused on the choice of materials for securing the conjunctival graft, including sutures, mitomycin C, amniotic membrane, or fibrin glue.

Pterygia that extend onto the cornea can lead to visual complications, including induced astigmatism and obstruction of the visual axis, in addition to causing cosmetic concerns. [1] The current medical management of this condition has proven to be inadequate, necessitating surgical intervention for effective resolution. The evolution of surgical techniques has progressed from the bare sclera

method to the autorotation of conjunctival grafts, the application of amniotic membrane grafts, and ultimately to the advancement of conjunctivo-limbal autografts. [2-4]. One widely recognised method for addressing pterygium involves excising the growth and subsequently covering the resulting defect with a conjunctival autograft, which can be secured either through suturing or the application of fibrin glue. [5]

The use of fibrin glue to secure the graft has been shown to decrease operative time, yield favourable cosmetic outcomes, and minimise postoperative discomfort. However, it is important to recognise that, like any surgical intervention, this method is not without its drawbacks. Potential disadvantages include higher costs, the risk of graft loss, the formation of granulomas, and the possibility of infection transmission, among others. A novel method for autograft fixation has been introduced,

eliminating the need for both glue and sutures. The adherence of patients' grafts can be attributed to the fibrinous reaction occurring within their own blood. Limited research has been conducted in the Indian subcontinent to evaluate the outcomes of coronary artery grafts fixed with autologous blood serum versus those fixed with fibrin glue. The objective of this study is to evaluate the outcomes of limbal conjunctival autograft fixed with autologous serum in comparison to those secured with fibrin glue during primary pterygium excision.

Fibrin-based adhesives differ from cyanoacrylate glue in that they exhibit lower tensile strength and a slower polymerisation process. However, their biological and biodegradable properties allow for use beneath a superficial covering layer, resulting in minimal inflammation. [6,7]

In the event of human tissue injury, the body responds with bleeding. When the coagulation cascade is initiated, activated factor X specifically hydrolyses prothrombin into thrombin, leading to the conversion of fibrinogen into fibrin. Thrombin plays a crucial role in activating factor XIII, which is essential for stabilising the clot. This process involves promoting the polymerisation and cross-linking of fibrin chains, resulting in the formation of long fibrin strands, particularly in the presence of calcium ions. [8,9] This represents the ultimate convergence point for both the extrinsic and intrinsic pathways of coagulation occurring within the body. This mechanism facilitates the adhesion of CAG to the bare sclera tissue.

The characteristics of autologous serum led us to initiate a study aimed at evaluating and comparing the efficacy of fibrin glue against the patient's own serum as a fixation agent.

## Material and Methods

The research took place within the Ophthalmology department of a Tertiary Care Teaching Institute in India, spanning a period of one year. The study focused on participants with unilateral and primary pterygium as the specific inclusion criteria. Patients with coagulopathy or those undergoing anticoagulation treatment, as well as individuals who had previously undergone ocular surgery, were excluded from the study. Participants were categorised into two distinct groups: group A and group B. In a clinical study, patients in group A, comprising 50 eyes, received treatment with fibrin glue, while those in group B, also consisting of 50 eyes, were treated with autologous serum. Peribulbar injection of lignocaine was administered to ensure appropriate anaesthesia and analgesia. The skin surrounding the eyes was cleansed using a 1% povidone iodine solution and a drape was applied. A self-retaining speculum was used to keep the eye open for obtaining a better surgical field. The excision of the pterygium was performed utilising a

No. 15 BP knife and a crescent knife. The resulting defect in the conjunctiva was assessed using a calliper for precise measurement. A conjunctival graft, measuring 1mm larger than the scleral bed, was meticulously crafted from the superior temporal bulbar conjunctiva, ensuring that no tenon tissue was included in the process. In patients from group A, the graft was promptly positioned on the scleral bed following the application of 3 to 4 drops of fibrin glue. Conversely, in group B patients the graft was placed on the scleral bed which was full of blood vessels oozing small amount of blood which provided the required autologous serum. Attention was focused on maintaining the epithelial side of the graft at a superficial level. A cotton-tipped applicator was gently applied to the graft surface for a duration of five minutes, followed by a waiting period of seven minutes to ensure proper adherence of the graft. The eye pad was utilised for a duration of twenty-four hours. Oral NSAIDs were administered for a duration of 24 hours to effectively manage pain. The patients underwent follow-up assessments on day 1, day 15, and again three months post-surgery.

## Statistical analysis

The collected data was organised and input into a spreadsheet application (Microsoft Excel 2019) before being exported to the data editor interface of SPSS version 19 (SPSS Inc., Chicago, Illinois, USA). Quantitative variables were characterised using means and standard deviations or medians and interquartile ranges, depending on their distribution patterns. Qualitative variables were reported in terms of counts and percentages. In this study, the confidence level was established at 95%, while the level of significance was determined to be 5% for all tests conducted.

## Results

This study included a total of one hundred eyes. The study participants were categorised into two distinct groups, referred to as Group A and Group B, with each group comprising 50 eyes. The mean age, gender distribution, and graft size are presented in Table 1. Group A consisted of 35 left eyes, accounting for 70%, and 15 right eyes, making up 30%. In contrast, Group B had an equal distribution with 25 left eyes and 25 right eyes, each representing 50% of the total.

The most frequently observed complication in both groups was the loss of grafts. In group A, the observation was made in 20 eyes, accounting for 40%, while in group B, only 2 eyes, or 4%, were noted. The observed difference reached statistical significance, with a p-value of less than 0.05. The recurrence rate was notably higher in the group treated with fibrin glue, with 12 cases (24%) compared to 8 cases (16%) in the autologous serum group. However, this difference did not reach

statistical significance ( $p > 0.05$ ). No instances of infection or anaphylaxis were reported.

In the analysis conducted, the average surgical duration for Group A was recorded at 23.05 minutes, while Group B exhibited a longer average of 35.01 minutes. A notable difference was observed between the two groups, reaching statistical significance.

In our findings, 15 patients, representing 30%, reported mild discomfort, while 23 patients, or 46%, experienced moderate discomfort, and 12 patients, accounting for 24%, reported severe discomfort in group A on day 1. In contrast, the fibrin glue group showed that 29 patients, or 58%, had mild discomfort, 16 patients, or 32%, reported moderate discomfort, and 5 patients, making up 10%, experienced severe postoperative discomfort. P-value greater than 0.05.

The findings indicate that patients in Group A experienced a higher level of postoperative discomfort compared to those in Group B during follow-up visits. Nonetheless, the observed difference did not reach statistical significance.

The grading of subconjunctival haemorrhage was determined by its occurrence across all four quadrants. On the first postoperative day, the incidence of subconjunctival haemorrhage was observed in the autologous serum group, with rates of 66% in the nasal quadrant, 54% in the temporal quadrant, and 50% in both the inferior and superior quadrants. In comparison, the fibrin glue group exhibited rates of 60% in the nasal quadrant, 54% in the temporal quadrant, 40% in the inferior quadrant, and 60% in the superior quadrant. No significant difference was observed in either group. ( $p > 0.05$ )

**Table 1: Demographic characteristics of both groups**

Variable	Group A (n = 50)	Group B (n = 50)
Age (Mean $\pm$ SD) Years	51.10 $\pm$ 4.78	48.03 $\pm$ 5.20
<b>Gender</b>		
Male	26 (52)	25 (50)
Female	24 (48)	25 (50)
<b>Side</b>		
Left	35 (70)	25 (50)
Right	15 (30)	25 (50)

**Table 2: Comparison of Complications between the two groups**

Variable	Group A (n = 50) N (%)	Group B (n = 50) N (%)	P-value
Graft lost	20 (40)	2 (4)	0.02*
Recurrences	12 (24)	8 (16)	0.34

\* Indicate statistically significance at  $p \leq 0.05$

## Discussion

The research examined the results of conjunctival autograft surgery for pterygium, focussing on the use of autologous serum in comparison to fibrin glue. Research indicates that pterygium is more commonly observed in males, according to findings by Hilgers. [10] In the Chennai study, the gender distribution revealed that 44.5% of participants were male, while 55.54% were female. The findings of our study revealed a nearly balanced gender distribution, with males comprising 51% and females 49% of the participants. The impact was observed to be uniform across all age groups, with both males and females equally affected. A 2009 study conducted in Barbados uncovered a racial predisposition in the occurrence of pterygium. [11] Kenyon KR et al [11] were pioneers in detailing the widely recognised method of surgical suturing for conjunctival autografting. The findings indicate a clear advantage in preventing recurrences and reducing postoperative complications when compared to traditional bare tissue suturing following pterygium excision. This technique

necessitates a high level of surgical skill, involves a lengthy operative duration, and can lead to significant discomfort, pain, and a sensation of having a foreign body for patients. [12,13] In a study involving 325 patients, Koranyi G et al proposed that fibrin glue could be a viable alternative to traditional surgical suturing for conjunctival autografting. This approach not only reduces the duration of the procedure but also appears to decrease the likelihood of recurrences.

According to the findings by Singh et al., the average surgical duration for the fibrin glue group was recorded at 14.74  $\pm$  2.35 minutes, while the autologous serum group had a mean surgical time of 17.45  $\pm$  2.89 minutes. Fibrin glue and autologous serum represent two widely utilised approaches aimed at achieving this goal. A study conducted by Koranyi et al. [14] highlighted the fibrin glue technique as a promising alternative to traditional suturing. This method was linked to shorter surgical durations and a decrease in complications and postoperative discomfort. Nonetheless, it is important to note that it is not without potential side

effects, including the risk of infection transmission, as highlighted by Foroutan et al. [15] A study by De Wit et al. [16] highlighted the potential for anaphylactic reactions associated with the use of fibrin glue. Our study found no instances of anaphylactic reactions or infections occurring.

In a study conducted by Ayala et al [17] it was reported that the recurrence rate was notably higher in the fibrin glue group when compared to the autologous serum group. This finding aligns with our study. Research indicated that the incidence of additional complications was elevated with the use of the fibrin glue technique. In a 2009 study conducted by Farid et al., it was reported that the recurrence rate in the fibrin glue group was higher.

However, notably, there were no cases of anaphylactic reaction, which aligns with the findings observed in our own study. Srinivasan et al. [19] in their 2009 study observed a higher recurrence rate associated with the fibrin glue technique, along with issues related to poor attachment. Conversely, Sati et al. [20] conducted a similar investigation and reported findings that contradicted both our study and previous research, indicating that graft loss and recurrence rates were comparable between the two techniques. He noted that the increased incidence of graft rejection could be attributed to the size of the graft rather than the fixation technique employed.

The grading of subconjunctival haemorrhage was determined by its occurrence across all four quadrants. On the first postoperative day, the incidence of subconjunctival haemorrhage was observed in the autologous serum group, with rates of 66% in the nasal quadrant, 54% in the temporal quadrant, and 50% in both the inferior and superior quadrants.

In comparison, the fibrin glue group exhibited haemorrhage rates of 60% in the nasal quadrant, 54% in the temporal quadrant, 40% in the inferior quadrant, and 60% in the superior quadrant. No significant difference was observed in either group. In a study conducted by Koranyi et al, a case of subconjunctival haemorrhage was observed beneath the graft in one patient from the fibrin glue group, with resolution occurring over a period of three weeks. [14] The haemorrhages fully resolved within a three-month period. The findings from the aforementioned studies, along with our own research, clearly indicate that both autologous serum and fibrin glue present promising approaches for securing autografts following pterygium excision. The findings of our study indicate that autologous serum yields marginally improved outcomes. Additionally, it is cost-effective, readily accessible, and poses minimal safety concerns. Our research revealed a 4% graft loss rate in the autologous serum cohort, in contrast to a 10% loss rate observed in the fibrin glue cohort. The findings did not reach

statistical significance when compared to the other studies. The potential reason for the graft loss may be attributed to a shorter duration of eye patching following the surgery. In a recent study, Malik and colleagues monitored patients for a duration of 48 hours, reporting no instances of graft loss. In the conducted study, participants were subjected to patching for approximately 18 hours.

Two studies have compared the efficacy of fibrin glue versus autologous blood coagulum, concluding that patients who underwent the latter procedure experienced significantly higher rates of graft stability and reduced graft retraction. [21,22] A recent study involved a sample of 30 patients, who were divided into two groups of 15 individuals each. [23] The initial cohort received a suture less autologous blood coagulum procedure, whereas the subsequent group underwent a conventional surgical conjunctival autografting. While the initial group experienced fewer postoperative complaints, discomfort, and pain, they faced greater issues with graft displacement and instability compared to the second group. Nonetheless, the two groups exhibited comparable rates of recurrences. The study presents several limitations, notably a relatively small sample size, a shorter follow-up period, and its conduct at a single centre. Additional research is required to determine a clear advantage of one option compared to the other.

## Conclusion

Fibrin glue is generally considered safe; however, since it is made from human plasma, it carries the risk of transmitting infectious agents such as parvovirus and prions. Pterygium excision with conjunctival autograft gives better results. Fixation of conjunctival autograft with autologous serum is a safe and potential alternative of fibrin glue technique, however more studies are needed to assess and recommend the better option in our part of the world.

## References

1. Fong KS, Balakrishnan V, Chee SP, Tan TD. Refractive change following Pterygium surgery. CLAO J. 1998; 24 (2): 115-117.
2. Sharma A, Raj H, Raina AV. Suture less and Glue free Limbal conjunctival Autografting following Pterygium Excision. IK Sci. 2015; 17 (2): 68-72.
3. Elvan SA. Comparison between suture less and Glue free versus sutured limbal conjunctival autograft in primary Pterygium surgery. Saudi J Ophthalmol. 2014; 28 (4): 292-298.
4. Wit D, Athanasiadis I, Sharma A, Moore J. Sutureless and Glue free conjunctival autograft in Pterygium Surgery. A case series. Eye, 2010; 24 (9): 1474-1477.
5. Zloto O, Greenbaum E, Fabian ID, Ben Simon GJ. Evicel versus Tisseel versus sutures for

- attaching conjunctival autograft in pterygium surgery: A prospective comparative clinical study. *Ophthalmology*, 2017; 124 (1): 61–5.
6. Ratnalingam V, Eu ALK, Ng GL, Taharin R, John E. Fibrin adhesive is better than sutures in pterygium surgery. *Cornea*. 2010; 29(5): 485-9.
  7. Kurian A, Reghunadhan I, Nair KG. Autologous blood versus fibrin glue for conjunctival autograft adherence in sutureless pterygium surgery: A randomised controlled trial. *Br J Ophthalmol*. 2015; 99(4): 464-70.
  8. Ismail A, Abushouk AI, Elmaraezy A, Abdelkarim AH, Shehata M, Abozaid M, et al. Self-gripping versus sutured mesh fixation methods for open inguinal hernia repair: A systematic review of clinical trials and observational studies. *Surgery*. 2017; 162(1): 18-36.
  9. Sati A, Shankar S, Jha A, Kalra D, Mishra S, Gurunadh VS. Comparison of efficacy of three surgical methods of conjunctival autograft fixation in the treatment of pterygium. *Int Ophthalmol*. 2014; 34(6): 1233-9.
  10. Anguria P, Kitinya J, Ntuli S, Carmichael T. The role of heredity in pterygium development. *Int J Ophthalmol* 2014; 7:563-73.
  11. Kenyon KR, Wagoner MD, Hettinger ME. Conjunctival autograft transplantation for advanced and recurrent pterygium. *Ophthalmology* 1985; 92:1461-70.
  12. Ti SE, Chee SP, Dear KB, Tan DT. Analysis of variation in success rates in conjunctival autografting for primary and recurrent pterygium. *Br J Ophthalmol*. 2000; 84: 385-389.
  13. Alla BD, Short P, Crawford CJ. Pterygium excision with conjunctival autografting: an effective and safe technique. *Br J Ophthalmol*. 1993; 77: 698-701.
  14. Koranyi G, Seregard S, Kopp ED. The cut-and-paste method for primary pterygium surgery: long-term follow-up. *Acta Ophthalmol Scand*. 2005; 83(3): 298-301.
  15. Foroutan A, Beigzadeh F, Ghaempanah MJ, Eshghi P, Amirizadeh N, Sianati H. Efficacy of autologous fibrin glue for primary pterygium surgery with conjunctival autograft. *Iranian J Ophthalmol*. 2011; 23 (1): 39-47.
  16. Wit-D, Athanasiadis I, Sharma A. Suture less and glue-free conjunctival autograft in pterygium surgery: A case series. *Eye*, 2010; 24 (9): 1474-7.
  17. Ayala M. Results of pterygium surgery using a biologic adhesive. *Cornea*, 2008; 27 (6): 663-7.
  18. Farid M, Pirmazar JR. Pterygium recurrence after excision with conjunctival autograft: a comparison of fibrin tissue adhesive to absorbable sutures. *Cornea*, 2009; 28 (1): 43-5.
  19. Srinivasan S, Dollin M, Mc Callum P. Fibrin glue versus sutures for attaching the conjunctival autograft in pterygium surgery: a prospective observer masked clinical trial. *Br J Ophthalmol*. 2009; 93 (2): 215-8.
  20. Sati A, Shankar S, Jha A. Comparison of efficacy of three surgical methods of conjunctival autograft fixation in the treatment of pterygium. *Int Ophthalmol*. 2014; 34 (6): 1233-9.
  21. Mittal K, Gupta S, Khokhar S, Vanathi M, Sharma N, Agarwal T, et al. Evaluation of Autograft Characteristics After Pterygium Excision Surgery: Autologous Blood Coagulum Versus Fibrin Glue. *Eye Contact Lens*. 2017; 43: 68-72.
  22. Natung T, Keditsu A, Shullai W, Goswami PK. Sutureless, Glue-less Conjunctival Autograft versus Conjunctival Autograft with Sutures for Primary, Advanced Pterygia: An Interventional Pilot study. *J Clin Diagn Res*. 2017; 11(8): NC04-NC07
  23. Zein H, Ismail A, Abdelmongy M, Elsherif S, Hassanen A, Muhammad B, et al. Autologous blood for conjunctival autograft fixation in primary pterygium surgery: A systematic review and meta-analysis. *Current Pharmaceutical Design*. 2018; 24(35): 4197-204.