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Original Research Article

Use of Autologous Blood as Tissue Glue for Conjunctival Grafting during Pterygium Excision Surgery

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Abstract

Background: Pterygium is a triangular growth of connective tissue enveloped by conjunctival epithelium, extending beyond the cornea. The primary treatment is surgical excision.

Objectives: To demonstrate a simple technique for improving attachment of conjunctival autografts in pterygium surgery and assess the efficacy of using a patient's own blood for securing the graft.

Materials and Methods: This was a prospective interventional study that was carried out in the department of Ophthalmology of a multispecialty tertiary health care hospital and research centre in central India. Following the excision of pterygium, conjunctival autograft was applied onto the scleral surface after achieving hemostasis. The evaluation of graft adherence was conducted within a time frame of 15 minutes after surgery.

Results: Out of 220 cases with nasal Pterygium who had excision & conjunctival autograft using autologous blood, 200 cases (200 eyes) completed the study. Among 200 cases, 90 were females & 110 were males. 130 patients had progressive pterygium while 70 had non-progressive pterygium. In post-operative complications, a ganuloma was seen in 8 patients (4% of subjects) and 22 patients had conjunctival hemorrhages (11%). 10 patients had graft dehiscence and retraction (5%), 8 had graft oedema (4%), and 4 had a pterygium recurrence within 3 months (2%). 20 patients improved their visual acuity. Level of cosmesis achieved was satisfactory.

Conclusion: Using autologous blood as tissue glue is a useful and cost-effective alternative for graft fixation, resulting in less discomfort and improved patient satisfaction. Also, the complications linked with the use of fibrin glue and suturing are circumvented.

Keywords: Pterygium, Autograft, Autologous Blood, Graft Adherence, Tissue Glue.

Introduction

The condition known as Pterygium includes a triangular arrangement of fibrovascular connective tissue that's encompassed in conjunctival epithelium and transgresses over the limbus to corneal region [1]. The term 'pterygium' is of Greek beginning and is determined from the word 'pterygos', which deciphers to 'wing' in English [2,3].

Pterygium is a degenerative condition that affects the subconjunctival tissue and is

characterized by the proliferation of vascularized granulation tissue. This tissue invades the cornea, resulting in the destruction of the superficial layers of the stroma and Bowman's membrane, and is covered by the conjunctival epithelium. It takes the form of a triangular encroachment of the conjunctiva onto the corneal region. The incidence of pterygium is notably elevated within the tropical zone of the world, with particular emphasis on the territory of India, where the warm, arid, and dusty climatic conditions present an optimal environment for the proliferation of this ocular malady [3,4]., UV rays being the foremost risk factor [5,6].

A small pterygium commonly presents with no clinical manifestations. However, an enlarged pterygium may necessitate pterygium excision, in light of the compromised visual acuity arising from involvement of the visual axis, irregular astigmatism, tear film break-up. Additionally, patients may experience ocular irritation and discomfort, hindered ability to wear contact lenses, difficulties with refractive surgery, and concerns regarding cosmetic appearance. These considerations are supported by previous research [7].

The primary treatment modality for this condition continues to be surgical extirpation, with the fundamental approach being comprehensive resection, resulting in an exposed region of the sclera. The rate of recurrence associated with the conventional bare sclera technique has been reported to range from 24% to 89% [8]. Hence, adjunctive therapy remains the only viable option for addressing this issue. There exists a range of therapeutic techniques currently employed, including beta irradiation, the intraoperative implementation of mitomycin-c, conjunctival auto grafts, and amniotic membrane grafts. The use of conjunctival autografting has been recognized as an effective strategy in mitigating the incidence of pterygium recurrence [9].

Materials and Methods

220 patients with primary nasal pterygium, who met the predetermined inclusion and exclusion criteria, were chosen for this study from among the patients visiting the outpatient department of Ophthalmology at a multi speciality tertiary care hospital and research center of central India. It was a prospective interventional study completed over duration of 12 months. The present study employed a set of inclusion criteria which involves visual impairment resulting from astigmatism or pupillary area encroachment, as well as the presence of nasal pterygium, while enrolling patients of both genders within a specific age range of 20-60 years. The exclusion criteria for this study comprised of presence of recurrent, temporal, or atrophic pterygium, patients who are receiving anticoagulants, and those with documented cases of blepharitis or dry eyes. Additionally, individuals with a history of prior ocular surgery or trauma, pterygium exhibiting cystic degeneration, or pseudopterygium were also excluded from participation.

All the surgical procedures were conducted by the same surgeon subsequent to conducting all routine investigations. The present study utilized peribulbar anesthesia administration through a 2% xylocaine injection for the performance of the surgeries. The pterygium was dissected from the limbus, with a distance of 4mm, extending to the bare sclera. Blunt and sharp dissection via the utilization of Westcott scissors was carried out for the purpose of isolating fibrovascular tissue from the adjoining conjunctiva. The excision of the pterygium from the cornea was performed through a superficial keratectomy technique using a crescent knife. The excision solely targeted the hypertrophied areas of the conjunctiva

and the contiguous zones of the tenon's capsule that exhibit convoluted vasculature [Table 1]. The recipient bed was measured utilizing Castroviejo calipers, with the intention of achieving a graft size that was at least 1mm larger. In all observed cases, the mean measurement of graft size was recorded to be within the range of 5-6mm. A conjunctival autograft was meticulously dissected from the superotemporal region, wherein it was carefully freed from surrounding tenon's tissues in a manner that prevented any occurrence of buttonholing. In order to maintain the orientation of the epithelial side, the graft was carefully pulled onto the cornea, with precautions taken to avoid rolling it over.

Following the excision of the pterygium, a brief period of 1-2 minutes was allowed for the accumulation of blood within the uncovered recipient scleral bed. The free Conjunctival autograft was administered onto the exposed recipient bed and subsequently diffused and sustained in the area for a period of 5 minutes. The autologous fibrin then typically underwent a significant level of solidification, contributing to the effective adhesion of the graft. During the waiting period for adhesion, measures were employed to prevent the displacement of the graft from the bed due to excessive and prolonged bleeding. Additionally, any residual active haemorrhage beneath the graft, if present, was controlled by direct compression using a blunt instrument. At the culmination of the procedure, graft adherence was assured, followed by the application of antibiotic eye ointment. Subsequently, a pressure bandage remained in place for duration of 24 hours.

The standard postoperative treatment regimen included administration of 0.5% moxifloxacin eye drops every 6 hours for a duration of 6 weeks, followed by 1% prednisolone acetate eye drops at a frequency of every 4 hours for a week, which were subsequently tapered over a period of one month. Additionally, lubricant eye drops were administered every 4 hours for a period of one month. The patients were subjected to a post-operative follow-up regimen which included assessments on day 1, week 1, month 1, as well as after three and six months following the surgical procedure. During each clinical encounter, a comprehensive slit lamp examination was conducted in order to evaluate the integrity of the graft by assessing parameters such as adherence, displacement, and retraction. Additionally, the presence of any recurrences as well as any adverse outcomes were closely monitored and documented.

Results

Out of 220 cases with nasal Pterygium who had excision & conjunctival autograft using autologous blood, 200 cases (200 eyes) completed the study. [Table1]. There were 90 females & 110 males. Majority of patients were from rural area and married. Most of males were farmer by occupation, while females were housewife. Positive family history was present in 25% of male patients and 16% of female patients [Table 2]. 130 patients had progressive pterygium while 70 had non-progressive pterygium. Majority of the patients presented with unilateral, progressive, nasal pterygium in the right eye. Most common severity of pterygium presentation was grade 2. [Table 3]

No intra-operative complications were seen. However, some patients had post-operative complications. A granuloma was seen in 8 patients (4% of subjects) and 22 patients had conjunctival hemorrhages (11%). 10 patients had graft dehiscence and retraction (5%), 8 had graft oedema (4%), and 4 had a pterygium recurrence within 3 months (2%) [Table 4]. 20 patients improved their visual acuity. Level of cosmesis achieved was satisfactory.

Table 1: Procedure of pterygium excision and conjunctival grafting

Surgical step sequence	Description
1	Local anesthesia (2% xylocaine)
2	A small incision was made in the conjunctiva over the pterygium.
3	The pterygium was carefully excised.
4	A conjunctival autograft was taken from a healthy area of the conjunctiva.
5	The autograft was placed over the bare sclera and secured in place with autologous blood.

Table 2: Sociodemographic profile of patients

	Male (110)	Female (90)	p Value (Unpaired students' t test)
Age in years (Mean ± SD)	51.23 ± 8.36	53.74± 10.59	0.06
Height in cm (Mean ± SD)	162.82±5.32	161.26 ± 6.32	0.06
Weight in Kg (Mean ± SD)	68.11 ± 6.59	66.48 ± 5.56	0.06
Body Mass Index (Kg/m^2)	25.73 ± 7.82	25.43 ± 6.37	0.78
			p Value (Chi Square test)
Residence:			
Rural [N (%)]	70 (63.64)	58 (64.44)	0.90
Urban [N (%)]	40 (36.36)	32 (35.56)	
Marital status:			
Married [N (%)]	101 (91.82)	83 (92.22)	0.92
Unmarried [N (%)]	9 (8.18)	7 (7.78)	
Occupation:			
Farmer	73 (66.36)	07 (7.77)	<0.05*
Service	11 (10)	02 (2.22)	
Business	24 (21.82)	04 (5.55)	
Housewife	00 (00)	76 (84.45)	
Other	02 (1.82)	01 (1.11)	
Positive Family History:			
Present [N (%)]	28 (25.45)	15 (16.67)	0.13
Absent [N (%)]	82 (74.55)	75 (8.33)	

Table 3: Clinical profile of patients

	Male (110)	Female (90)	P Value (Chi Square test)
Unilateral Pterygium [N (%)]	69 (62.72)	58 (64.44)	0.80
Bilateral Pterygium [N (%)]	41 (37.28)	32 (35.56)	
Right Eye, Nasal Pterygium [N (%)]	67 (60.90)	57 (63.30)	0.73
Left Eye, Nasal Pterygium [N (%)]	43 (39.10)	33 (36.70)	
Grade of Pterygium:			
One [N (%)]	11 (10)	08 (10)	<0.05*
Two [N (%)]	73 (66.36)	76 (84.44)	
Three [N (%)]	26 (23.64)	06 (6.66)	
Progressive Pterygium [N (%)]	78 (70.90)	52 (57.78)	0.053
Non-progressive Pterygium [N (%)]	32 (29.10)	38 (42.22)	

Table 4: Post-operative complications

	N (%)
Granuloma	8 (4%)
Conjunctival haemorrhage	22 (11%)
Graft retraction	10 (5%)
Graft oedema	8 (4%)
Recurrence (within 3 months)	4 (2%)

Discussion

Pterygium is a frequently encountered ocular disorder in regions of tropical climate such as India. It has been determined that surgical intervention is the sole efficacious remedy for pterygium. The surgical strategies utilized in the treatment of pterygium display a range of diversity; however, the recurrence rate following effective excision continues to pose a significant challenge [10]. The primary objective of pterygium surgery is to surgically remove the pterygium and subsequently deter its recurrence.

Nonetheless, limited clinical regulations exist regarding therapeutic approaches that effectively reduce the incidence of relapse and minimize the frequency of negative outcomes. A plethora of techniques exist in the field of ocular surface reconstruction, varying in their complexity and scope. Their range spans from the rudimentary bare sclera procedure to more intricate modalities, such as amniotic membrane transplantation, featuring techniques such as conjunctival autograft, limbal conjunctival transplant, conjunctival flap, conjunctival rotation autograft surgery, and cultivated transplant. Specifically, the latter approach, which involves the ex-vivo expansion of conjunctival epithelial sheets onto an amniotic membrane substrate, has demonstrated considerable success in achieving prompt epithelialisation of the ocular surface, diminished post-operative inflammatory response, and an expedited recovery process. The aforementioned process proves to be highly beneficial in the closure of sizable surgical gaps consequent to the removal of pterygium. A range of methods, including sutures and fibrin glue, have been developed for the purpose of securing the conjunctival autograft subsequent to excision of a pterygium [11]. The administration of adjunctive therapies comprising Beta irradiation, 5-fluorouracil, daunorubicin, and mitomycin C is a widely accepted approach to enhance the efficacy of primary treatments [7]

The clinical use of bare sclera excision (BSE) has been deemed obsolete owing to the markedly high incidence of recurrence (ranging between 40 to 60 percent) [12]. The utilization of BSE (bleomycin sulfate and electromagnetic therapy) combined with Perioperative MMC (mitomycin C), preoperative subconjunctival injection, intraoperative application, and postoperative drops have demonstrated improved outcomes. However, the associated risk of complications has resulted in a decrease in the procedure's acceptance among practitioners. The application of BSE in conjunction with beta irradiation has yielded promising results, with a recurrence rate of 13% [13]. Nevertheless, this therapeutic modality is not without significant and deleterious adverse effects.

The predominant approach for autograft fixation involves the utilization of suturing, which is associated with several limitations, including extended surgical duration, post-operative discomfort, the development of suture abscesses, formation of granulomas, and recurrence resulting from suture

irritation. The presence of sutures has been identified as a contributing factor to the extended duration of wound healing and the onset of fibrosis. Fibrin sealant has been employed as a substitute for conventional sutures in the fixation of conjunctival grafts. According to a recent study, the recurrence rate among patients who were treated with glue was found to be 5.3%, compared to 13.5% among those who underwent suture procedures [14].

The study posited that this disparity could be attributed to the immediate graft adherence and a reduced post-operative inflammatory response, which may hinder fibroblast in growth and consequently inhibit the recurrence rate. The primary concern with the application of commercial fibrin glue pertains to the potential transmission of infectious agents, including parvovirus B19 (HPV19) [13] and prions, notwithstanding the utilization of viral inactivation measures. Additionally, occurrences of anaphylactic reactions have been documented subsequent to the application of fibrin sealant (TISSEEL), attributed to the presence of bovine protein aprotinin [16].

The employment of patients' autologous blood is hinged on the physiochemical process of blood coagulation and must be administered prior to fibrinolysis, as the natural formation of blood clots has been subjected to rigorous refinement, thereby eliminating all potential flaws.

Many studies have attempted to compare different treatment modalities for pterygium [17-23]. The present study yields the conclusion that incorporating autologous blood as a tissue adhesive in graft fixation is a viable and valuable alternative, as reported in prior research [24]. The aforementioned procedure exhibits superior results as it is characterized by a high degree of safety, efficacy, economic feasibility, reduced patient discomfort, and elevated levels of patient satisfaction [25].

The utilization of this technique effectively circumvents the potential hazards linked with fibrin glue and complications arising from sutures. The aforementioned investigation conducted by Boucher and colleagues elucidated a greater propensity for relapse when utilizing autologous blood [26].

Conclusions

Using autologus blood as tissue glue is a useful and cost-effective alternative for graft fixation, resulting in less discomfort and improved patient satisfaction. Also, the complications linked with the use of fibrin glue and suturing are circumvented.

References

1. Hirst LW, Sebban A, Chant D. Pterygium Recurrence time. Ophthalmology 1994; 101: 755–8.
2. Steven G Kramer, MD editor diagnostic and surgical techniques survey of ophthalmology volume 33. July-August 1988; pg: 41.
3. Duke-Elder WS. System of ophthalmology. London: Henry Kimpton, 1965;8: Part-1: 573–83.
4. Sandford-Smith J. Eye diseases in hot climates. Bristol: ELBS/Wright, 1987; 104–5.
5. Timothy J. Threlfal, MBBS, MPH, And Dallas R. English, PhD sun exposure and pterygium of the eye: a dose responsive curve American Journal of ophthalmology. September, 1999; 280.
6. Moran DJ, Hollows FC. Pterygium and ultraviolet radiation: A positive correlation. BRR J Ophthalmology. 1984; 68: 343.
7. Hirst LW. The treatment of pterygium. Surv Ophthalmol 2003; 48(2): 145–180.
8. D'Ombrain A. The surgical treatment of pterygium. Br J Ophthalmology. 1948; 32: 65–70.

9. Kiran Beesam, Krishna N. Autologous blood as tissue adhesive for conjunctival autograft in primary nasal pterygium surgery. J Pre Clin Clin Res. 2018; 12(2):51–53.
10. Ghiasian L, Samavat B, Hadi Y, Arbab M, Abolfathzadeh N. Recurrent Pterygium: A Review. J Curr Ophthalmol. 2022 Jan 6;33(4):367-378.
11. Romano V, Cruciani M, Conti L, Fontana L. Fibrin glue versus sutures for conjunctival autografting in primary pterygium surgery. Cochrane Database Syst Rev. 2016 Dec 2;12(12):CD011308.
12. Ozer A, Yildirim N, Erol N, Yurdakul S. Long-term results of bare sclera, limbal-conjunctival autograft and amniotic membrane graft techniques in primary pterygium excisions. Ophthalmologica. 2009; 223(4):269-73.
13. Alsmman AH, Radwan G, Abozaid MA, Mohammed UA, Abd Elhaleim NG. Preoperative subconjunctival combined injection of bevacizumab and mitomycin C before the surgical excision of primary pterygium: clinical and histological results. Clin Ophthalmol. 2017 Mar 10; 11:493-501.
14. Elwan SA. Comparison between sutureless and glue free versus sutured limbal conjunctival autograft in primary pterygium surgery. Saudi J Ophthalmol. 2014 Oct;28(4):292-8.
15. Hino M, Ishiko O, Honda KI, Yamane T, Ohta K, Takubo T, Tatsumi N. Transmission of symptomatic parvovirus B19 infection by fibrin sealant used during surgery. Br J Haematol. 2000 Jan; 108(1):194-5.
16. Orihara, M., Takazawa, T., Horiuchi, T. *et al*. Intraoperative anaphylaxis due to aprotinin after local application of fibrin sealant diagnosed by skin tests and basophil activation tests: a case report. JA Clin Rep 7, 68 (2021).
17. Zeng W, Dai H, Luo H. Evaluation of Autologous Blood in Pterygium Surgery with Conjunctival Autograft. Cornea. 2019 Feb; 38(2):210-216.
18. 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 Jan;124(1):61-65.
19. Yan B, Peng L, Peng H, Zhou S, Chen B. Modified Sutureless and Glue-Free Method Versus Conventional Sutures for Conjunctival Autograft Fixation in Primary Pterygium Surgery: A Randomized Controlled Trial. Cornea. 2019 Nov;38(11):1351-1357.
20. Clearfield E, Muthappan V, Wang X, Kuo IC. Conjunctival autograft for pterygium. Cochrane Database Syst Rev. 2016 Feb 11;2(2):CD011349.
21. Palewski M, Budnik A, Konopińska J. Evaluating the Efficacy and Safety of Different Pterygium Surgeries: A Review of the Literature. Int J Environ Res Public Health. 2022 Sep 9;19(18):11357.
22. Kothari EA, Tenewitz JE, Jayman JR, Cartwright MJ. Pilot study of a glue-less, suture-less amniotic membrane for pterygium excision. Int Ophthalmol. 2022 Sep;42(9):2933-2938.
23. Yin CJ, Bao YL, Zhang QC, Kang SF, Chen GL. Comparison of postoperative recovery of primary pterygium excision combined with either limbal stem cell transplantation or amniotic membrane transplantation: a randomized controlled trial-based meta-analysis. Am J Transl Res. 2023 Feb 15;15(2):641-652.
24. Singh, Punith K. MS, Singh, Subadra MS, Vyas, Chandrashekar MS, Singh, Manju MS; Conjunctival Autografting without fibrin glue or sutures for pterygium surgery; Cornea; 2013;32(1): 104–107.

25. D de Wit, Athanasiadis, A Sharma and J Moore: Sutureless and glue free conjunctival autograft in pterygium surgery: a case series. Eye. 2010;24: 1474–1477.

26. Boucher S, Conlon R, Teja S, Teichman JC, yeung S,Ziai S; Fibrin glue versus autologous blood for conjunctival autograft fixation in pterygium surgery. Can J Ophthalmol. 2015 AUG; 50(4): 269–272.