

Autograft technique for pterygium surgery with no glue and no suture -cut and paste: Our experience

Prasanna Shankar Babu TG^{1,*}, Lavanya P², Shreeraja Y.³, Praveenkumar⁴, Raviprakash D.⁵

^{1,2,3,4}Assistant Professor, ⁵Professor & HOD, Dept. of Ophthalmology, Shridevi Institute of Medical Sciences & Research Hospital, Karnataka

***Corresponding Author:**

Email: prasanna1950pa@gmail.com

Abstract

Background: Pterygium is a common disorder of the eye and surgical excision with conjunctival autografting is the treatment of choice. But recurrence is the main problem. Use of sutures and glue to secure autograft is confronted with a number of adverse effects. We present the autograft technique for pterygium surgery using autologous fibrin derived from a thin layer of blood.

Aim: To evaluate a sutureless, glue free conjunctival autograft technique for pterygium surgery.

Materials and Methods: Thirty eyes of 30 patients were included. After surgical excision of pterygium, the recipient bed was allowed to achieve natural haemostasis. A thin layer of blood was allowed to cover the recipient bed to provide a source of autologous fibrin. A thin conjunctival autograft free of Tenon's, taken at the superotemporal limbus was placed over the recipient scleral bed without sutures or fibrin glue. Patient's follow up was done for any complications.

Results: Follow up of patients was done for 6 to 15 months. The mean surgical time was 15 mins. Graft displacement was seen in 3 cases on 1st post-operative day, which was repositioned. Graft retraction was seen in 1 case at 1 month post-operative follow up. In only one case, there was conjunctival granuloma, which was excised. No recurrences were noticed during follow-up period.

Conclusions: Potential adverse reactions seen with the use of materials such as sutures or fibrin glue (foreign materials) can be prevented with the use of this simple technique for pterygium surgery.

Keywords: Autologous fibrin, Conjunctival autograft, Glue free, Pterygium, Sutureless

Introduction

Pterygium is primarily a disease of tropical and sub-tropical areas, although it has worldwide prevalence. The cause of primary pterygium is still a question. It is a fibrovascular proliferation over nasal cornea, probably a result of limbal stem cell deficiency^[1]. Though the cause is not clearly understood, long-term exposure to sunlight, especially, ultraviolet rays and chronic irritation of the eye due to dry, dusty conditions, seem to play an important role^[2]. Pterygium shows degenerative and hyperplastic changes on histopathological examination^[3,4]. The presence of active fibroblasts in the natural tissue planes surrounding Bowman's layer is seen in cap areas of several pterygium in electron microscopic examination. The hypothesis is that the fibroblasts originate in the limbal connection tissue. They advance in cornea above and below Bowman's membrane, destroying the latter and a variable amount of superficial corneal stroma^[5]. Pterygium is a slow growing non-malignant, wing shaped proliferation of fibrovascular tissue arising from subconjunctival tissue, which may extend over the cornea, thereby causing visual disturbances^[6].

India has a high prevalence of pterygium as being a tropical country, due to heat and dust. The treatment of choice is its surgical removal^[7]. Simple excision of pterygium has a high rate of recurrence ranging from 30 to 70%^[8]. In order to tackle this problem of recurrence, a variety of surgical modifications have been adopted.

The adjunctive therapies include mitomycin-C, beta irradiation, human amniotic membrane grafting and autologous conjunctival grafting^[9].

The most effective method of lowering recurrence rate (2-9%) and complications as was reported is the transplantation of conjunctival or conjunctivo-limbal autograft^[10-12]. Sutures and fibrin glue are the currently available techniques for securing the conjunctival autograft and at the same time these techniques are associated with some complications ranging from post-operative discomfort with sutures to a rare risk of viral transmission with fibrin glue^[7]. The cost of commercially available fibrin glue is also concern in developing countries.

In this study we have successfully adopted a cost effective method of achieving conjunctival autograft adherence in pterygium surgery using autologous fibrin derived from blood, without the use of commercially available fibrin glue. Some recent studies have shown^[13,14] the success of this procedure. Here we present a case series of patients who underwent pterygium excision with conjunctival autograft with this technique.

Materials and Methods

It is a prospective, interventional case series conducted at the Ophthalmology Department of Sreedevi Institute of Medical Sciences and Research Hospital, Tumkur, Karnataka, India. Thirty eyes of 30 patients with primary pterygium who presented between

21/04/2014 and 16/03/2016 were included. The study was approved by the local ethics committee.

Inclusion and Exclusion Criteria

The patients included in the study are aged between 30 and 65 years with growing primary pterygium. This age group was selected as these patients were more likely to comply with instructions and observe precautions. Patients with recurrent pterygium, ocular surface pathology or infectious and major systemic illnesses like collagen vascular disorder, uncontrolled diabetes mellitus were excluded. The reason behind excluding recurrent pterygium is that, it is difficult to achieve a smooth scleral bed for autograft because of dense fibrous adhesions in these cases. Written informed consent was obtained from all the patients.

Surgical Technique

Peribulbar anaesthesia with a Von Lint Block.

Surgical Steps

Step 1: Graft preparation: The autograft was prepared before the excision of pterygium so that the graft can be quickly placed over a fresh layer of blood. Graft size was decided depending on the grade of pterygium assuming that the gap between the graft-host junctions would be epithelialized in a few days. Grading is shown in Table 1.

Tryptan Blue, which is easily available is used to stain the epithelial surface for easy identification of the graft-side and for the visibility of the incisions precisely.

A Castroviejo caliper was used to measure the size and the extent of the autograft. It was also used to mark 4 points over to stained conjunctiva, two at the posterior limbus and two corresponding points behind the limbus at pre-calculated distances based on the grade of the Pterygium, by giving firm pressure with the tip of the instrument over these points. The graft taken was of the size of about 5mm X 7mm and rectangular in shape. Limbal based conjunctival autograft free of Tenon's was prepared and the graft was hinged at the Limbus.

Step 2: Excision of the pterygium: The head of the pterygium was excised using the avulsion technique with a Colibri forceps and any remnant pterygium tissue over the cornea was removed with a Tooke Knife. The body of the pterygium and the sub conjunctival tissue was excised with corneal scissors leaving behind a bare sclera.

Step 3: Providing the source of autologous fibrin: To provide for autologous fibrin, a thin layer of fresh blood is required over the bare sclera. If no blood was evident at the recipient bed, small perforating veins or capillaries were deliberately ruptured with the Hoskin's forceps and any excess bleeding was cauterized.

Step 4: Graft sliding to the recipient site: The graft is separated from the limbus and spread evenly over the bare scleral bed with the help of the closed smooth Jaws of McPherson forceps without any folds. The smooth jaws of the forceps helps in stretching the graft without any damage. It was ensured that any residual bleeding did not lift the graft. Any excess bleeding was controlled within direct compression wick-cel sponge and McPherson forceps. At the end of surgery, a drop of povidoneiodine was instilled and the speculum was gently removed. Eye lids were closed while taking care not to dislodge the graft. An eye pad was placed (overnight).

Post-Operative Period: Antibiotic- steroid combination in the form of drops were prescribed 6 times/day for a week and then the steroid were decreased in tapering doses over next 3 to 4 weeks. Dexamethasone was preferred as it does not form precipitates. Patients were instructed not to rub the eyes and report to the hospital staff in case of pain, watering or irritation at the earliest so that any loss or dislocation of the graft can be examined.

Follow-up: Patients were followed up at 1 day, 1 week, 1 month and then at 2, 3, 6, 9, 12, 15 months after surgery. The primary outcome measured included recurrences and graft dislocation and the secondary outcome measures being patient's comfort and surgical time. About 35% of the patient did not turn-up for follow up after 6 months as the majority of them had no further complaints to visit the doctor. About 3 last cases could be followed up only for 3 to 6 months

Table I (Grading of Pterygium)

Grade I - Pterygium extends < 2 mm over the cornea. Graft area approximately 30-35mm²
 Grade II - Pterygium extends 2-4 mm over the cornea. Graft area-approximately 35-40 mm².
 Grade III - Pterygium extends > 4 mm over the cornea. Graft area approximately 40-50 mm².

Results

The surgeries were performed by two experienced surgeons. During the study 24 females and 6 males underwent suturesless, glue-free conjunctival autograft for pterygium. Surgeries were done on grade II and grade III pterygium (Table 1). Mean age was 54.7 +/- standard deviation 8.67. Mean surgical timing was 15 mins. Graft displacement was seen in 3 (10%) cases on the first post-operative day, the graft was repositioned with a Hoskin forceps under topical anaesthesia using slit lamp bi-microscope. There were no graft displacement subsequently after repositioning. In about 5 cases, there were graft retraction on the 1st post-operative day (16.6%). In only one case, (3.3%) there was graft retraction at 1 month follow up, which suggested that the exposed area epithelialised adequately

on follow up in most cases, without compromising the surgical or cosmetic results. There were no recurrences in any of the cases till the last follow up.

All cases were cosmetically very good. There were no other significant post-operative complications which required further treatment.

Table 1

Mean Age	54.1 years
Male : Female	6:24
Laterality	20:10
Grade of pterygium	Grade I 15 Grade II 10 Grade III 5
Mean surgical timing	15 min (12 to 18 min)
Mean follow up	12 (6-15 mins)
Graft displacement on 1st post-operative day	3 (10%)
Graft reaction is 1st post-operative day	5 (16.6%)
Graft reaction at 1 month	1 (3.3%)

Recurrence

Table 2: Comparison of results with autograft SGF studies

Parameters	de Wit et al	Singh et al	Malik et al	Our Study
Total no of cases	15	10	40	30
Graft displacement	-	1 (10%)	2 (5%)	3 (10%)
Graft reaction	-	1 (10%)	3 (7.5%)	1 (35%)
Recurrences	more	1 (10%)	1 (2.5%)	more

Discussion

The use of fibrin glue and sutures to secure conjunctival autografts have their own disadvantages. The use of sutures prolong the operating time, increased post-operative discomfort and other suture related complications like prolonged wound healing and fibrosis and more chances of pyogenic granuloma formation^[7,16].

Fibrin glue is used as an alternative for suturing for its advantages in decreasing the operating time of pterygium surgery and decreased post-operative discomfort by avoiding suture related complications. But there is always a risk of hypersensitivity to the foreign body and Viral transmission. The viral removal and inactivation procedures are included in the manufacturing process, but they may be of limited value against non-enveloped viruses such as hepatitis A virus and parvovirus B19^[18]. The cost of fibrin glue is also a concern in our country.

Recurrence is a source of frustration for both patients as well as surgeons in pterygium surgery. It is defined as the presence of fibrovascular tissue regrowth extending beyond the surgical limbus on to the clear cornea^[18]. We did not have any recurrences noted in our follow up procedures.

Recurrence needs a long term study. However comparing from commonly used techniques for Pterygium surgery (a study by Alpay et al)^[19] the reported mean time for any complication to appear is 4 to 6 months,^[20] which includes recurrences also. It is found that the graft size need not be bigger than the recipient bed, as the sutures or the fibrin glue are not used and some amount of conjunctival refraction is expected. Irrespective of graft size, some amount of gap is expected at graft-host junction. Specially the risk of graft retraction as described by Tan^[21] appears to be no greater with no suture and no glue technique as long as a meticulous dissection of the sub-epithelial graft tissue is done. There is a postulate that as there is even tension across the whole of graft interface and no direct tension on the free graft edges, chances of graft adherence are more with reduced stimulus for sub-conjunctival scar tissue to form^[21].

Our study of 30 eyes is one of the case series using SGF conjunctival autograft technique that has been reported so far. An effort has been made to compare the results of similar case studies like ours (Table 2). We have found almost similar rate of graft displacement, although the rate of graft retraction and recurrence of pterygium is lesser in comparison to others, and almost similar to the study by Shet, et al^[23]. We did not encounter any recurrences in our series during our follow up period. Further follow-up is necessary to report any recurrences. Evaluating pain is one of the limitations in our study as it is not easy. Different patients report different sensitivity for the same stimulus. Additionally they have different pain threshold. In our study the pain reported by the patients was not objectively compared with patients in whom sutures or fibrin glue were used. However in the post-operative period, patients did not complain of significant pain subjectively in our study series. The most important fact is that the operating time, post-operative symptoms, recurrence and complication rate of pterygium surgery with no suture, no glue technique appear to be significantly less as compared to conventional suture and glue techniques with a similar follow-up duration^[7,16,17,22].

Conclusion

The potential adverse reactions seen with the use of materials such as sutures or fibrin glue, can be prevented with the use of the above said techniques for pterygium surgery. This technique should be a preferable technique for surgeons in order to obtain a better surgical outcome in the form of good cosmesis, minimal chances of recurrences, lesser surgical time,

less instruments and early rehabilitation to make it affordable to more patients and community at large.

References

1. Prabhakar SK. Safety profile and complications of autologous limbal conjunctival transplantation for primary pterygium. *Saudi J Ophthalmol.* 2014;28:262-7.
2. Austin P, Jakobiec FA, Iwamoto T. Elastodysplasia and elastodystrophy as the pathologic bases of ocular pterygia and pinguecula. *Ophthalmology.* 1983;90:96-109.
3. Saw SM, Tan D. Pterygium: prevalence, demography and risk factors. *Ophthalmic Epidemiol.* 1999;6:219-28.
4. Kase S, Takahashi S, Sato I, Nakanishi K, Yoshida K, Ohno S. Expression of p27 (KIP1) and cyclin D1, and cell proliferation in human pterygium. *Br J ophthalmol.* 2007;91:958-61.
5. Cameron ME. Histology of pterygium: an electron microscopic study. *Br J ophthalmol.* 1983;67:604-8.
6. Ashok G, Toukhy Essam EL, Nassaralla Belquiz A, Sunil M. *Surgical and Medical Management of Pterygium.* India: Jaypee Brothers Medical Publication; 2009.p.1.
7. Koranyi G, Seregard S, Kopp ED. Cut and paste: A no suture, small incision approach to pterygium surgery. *Br J Ophthalmol* 2004;88:911-4.
8. Hirst LW. The treatment of pterygium. *Surv Ophthalmol.* 2003;48:145-80.
9. Pan HW, Zhong JX, Jing CX. Comparison of fibrin glue versus suture for conjunctival autografting in pterygium surgery: a meta-analysis. *Ophthalmology.* 2011;118:1049-54.
10. Ma DH, See LC, Liao SB, Tsai RJ. Amniotic membrane graft for primary pterygium: Comparison with conjunctival autograft and topical mitomycin C treatment. *Br J Ophthalmol* 2000;84:973-8.
11. Sánchez-Thorin JC, Rocha G, Yelin JB. Meta-analysis on the recurrence rates after bare sclera resection with and without mitomycin C use and conjunctival autograft placement in surgery for primary pterygium. *Br J Ophthalmol.* 1998;82:661-5.
12. Tan DT, Chee SP, Dear KB, Lim AS. Effect of pterygium morphology on pterygium recurrence in a controlled trial comparing conjunctival autografting with bare sclera excision. *Arch Ophthalmol.* 1997;115:1235-40.
13. Singh PK, Singh S, Vyas C, Singh M. Conjunctival autografting without fibrin glue or sutures for pterygium surgery. *Cornea.* 2013;32:104-7.
14. Malik KP, Goel R, Gupta A, Gupta SK, Kamal S, Malik VK, Singh S. Efficacy of sutureless and glue free limbal conjunctival autograft for primary pterygium surgery. *Nepal J Ophthalmol.* 2012;4:230-5.
15. Kanski JJ. *clinical Ophthalmology.* 6th ed. New York: Butterworth-Heinemann/Elsevier;2007.
16. Allan BD, Short P, Crawford GJ, Barrett GD, Constable IJ. Pterygium excision with conjunctival autografting: an effective and safe technique. *Br J Ophthalmol.* 1993;77:698-701.
17. De Wit D, Athanasiadis I, Sharma A, moore J. sutureless and glue-free conjunctival autograft in pterygiumsurgery: A case series. *Eye(Lond)* 2010;24:1474-7.
18. Gröner A. Pathogen safety of plasma-derived products—Haemate® P/Humate-P®. *Haemophilia.* 2008;14:54-71.
19. Alpay A, Ugurbas SH, Erdogan B. Comparing techniques for pterygiumsurgery. *Clin Ophthalmol* 2009;3:69-74.
20. MarkovichaL, Bahar, Srinivasan S, Slomovic ARI: Surgical management of pterygium. *Int Ophthalmol Clin* 2010;50:47-61.
21. Tan D. Conjunctival grafting for ocular surface disease. *Curr Opin Ophthalmol.* 1999;10:277-81.
22. Sebban A, Hirst LW. Pterygium recurrence rate at the Princess Alexandra Hospital. *Aust N Z J Ophthalmol.* 1991;19:203-6.
23. Satish DS, Piyush G, Yallappa BB, S Sahana. Cut and paste: No suture, No glue Conjunctival Autograft Technique for pterygium Surgery-Our Experience. *J Vision Sci.* 2015;1:3-8.