

Pterygium Excision with Autologous Blood Autograft Fixation: Experience of a District Hospital of Bangladesh

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Abstract

A prospective interventional self-control study to see the outcome of suture less and glue free limbal conjunctival autograft for the management of primary and recurrent pterygium was carried out using patient's own blood as a bio-adhesive to secure the graft in position, in the Department of Ophthalmology, 250 bedded General Hospital Jamalpur from 15.09.16 to 30.11.16 and followed up upto July 2017. A total of 48 cases (44 were primary nasal pterygium and 4 were recurrent pterygium) were included in the study. Regarding type of the pterygium, out of 48 patients 3(6.25%) were grade I, 21(43.75%) were grade II, 13(27.08%) were grade III and 11(22.92%) were grade IV. The mean age of the study population was 32±2 years. The male and female distribution was 18 and 30 respectively. All the eyes followed by bandaging for 24-48 hours and were examined for graft dislodgement, recession, edema sub-conjunctival hemorrhage. Out of 48 eyes only 1 (2.1%) had sub-conjunctival hemorrhage, 2 (4.2%) edema and 3 (6.3%) had graft recession after 24 to 48 hrs of operation. All the complications were resolved 1-2 month. There was no recurrence of pterygium. No recurrence, graft loss or granuloma was recorded. No other complication was noted. Suture less and glue free limbal conjunctival autografting following pterygium excision is an effective and safe option for the management of primary pterygium.

Keywords: Complications, pterygium, recurrence, suture free and glue free conjunctival autograft.

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Introduction

Pterygium is a degenerative ocular surface disorder with wing-shaped fibro-vascular growth of the

subconjunctival tissue onto the cornea. It is a common ocular surface disease, but also potentially blinding, so different surgical procedures have been used to prevent it. Recurrence after excision remains a great challenge. Our objective was also to lessen patient discomfort by autologous blood to secure the graft.

The pathogenesis of pterygia is still not completely understood. An overall view of the growth process reveals a multiplicity of factors that are correlated and interrelated¹. Recent evidence implicates anti-apoptotic mechanisms, immunological mechanisms, cytokines, growth factors, extracellular matrix modulators, genetic factors and viral infections, among other possible causative factors^{2,3}. The prevalence rates vary widely (from 2% to 29%)⁴, but generally they are higher in the tropics than at temperate latitudes^{5,6}. It is accepted that pterygium occurs in an equatorial belt delimited by Latitude 40N and S, associating it with ultra-violet light⁶⁻⁸. Prevalence increases geographically towards the equator and is greater in people exposed to outdoor environments⁹. In addition; there are associations with rural regions, increasing age and male gender, which correlate with outdoor work¹⁰.

Early pterygium is usually asymptomatic. Pterygium causes dryness, burning and itching due to irregular wetting of the cornea. Pterygium causes defective vision due to induced astigmatism or direct encroachment onto the visual axis. Lesions larger than 3.5mm onto the cornea are likely to be associated with >1 Diopter astigmatism¹¹. In early pterygium patients can be advised to use lubricants and protective eyewear.

Surgical Techniques

Recurrence is the most common complication of pterygium surgery. Several techniques have been advised to reduce the rate of recurrence. These include bare sclera excision, conjunctival and conjunctival limbal autograft and use of amniotic membrane¹². In addition several adjunctive therapies included the use of Beta irradiation, thiotepa, 5-FU, and mitomycin C has been recommended due to their antifibrotic and anti angiogenic properties. High recurrence rates are weighted against eye threatening postoperative complications. Amniotic membrane transplantation is used for advanced cases with bilateral heads or those who might need glaucoma surgery later¹³.

Kenyon et al introduced the surgical technique of using Conjunctival autograft in the management of primary and recurrent pterygium. Suturing the Conjunctival autograft is a standard surgery. In this method the grafts are stable and recurrence rate is around 15%. Pterygium Extended Removal Followed by Extended Conjunctival Transplant (P.E.R.F.E.C.T) is described by Dr. Hirst¹⁵. He reported only one recurrence in a series of 1000 cases. Suture related problems like post-operative discomfort, chronic inflammation and granuloma formation and long surgical time around 20 to 40 minutes are disadvantages of suturing the auto conjunctival grafts¹⁶.

The use of fibrin glue during pterygium surgery was first described by Cohen et al in 1993¹⁷. This is faster and simpler. Post-operative pain and discomfort are less^{18,19}. Disadvantages with fibrin glue are it is expensive than sutures and is difficult to obtain. Fibrin glue has potential risk of transmission of viral disease and hypersensitivity reactions as it is a blood derivative²⁰. This glue has two components. One consists of fibrinogen mixed with factor XIII and aprotinin. The other component is a thrombin-CaCl₂ solution. All components are prepared from banked and well controlled human blood. Equal amounts of the components are mixed together. Through the action of thrombin, the fibrinopeptides are split to fibrin monomers. These monomers aggregate by cross linking, resulting in a fibrin clot.

The latest approach is fixation of the graft with autologous blood, a technique also known as suture and glue free autologous graft¹⁶. Patients own blood is used as a bio-adhesive or fixative²². Autologous blood is natural, has no extra cost, no associated risk and can overcome post-operative irritation, redness, and foreign body sensation. Surgical time is very less when compared to suturing technique^{21,22}. "Autologous blood is natural, has no extra cost or associated risks, and can overcome the postoperative irritations to a great extent," said Dr. Mitra, who is a consultant at Disha Eye Hospitals in Kolkata, India.

With this approach, after the pterygium and associated conjunctiva are excised, the surgeon allows a thin film of blood clot to form over the bare area. Any active bleeding is stopped by direct tamponade. Next, a thin, Tenon-free conjunctival autograft, with or without inclusion of limbal stem cells, is fashioned. After the graft is aligned, it is placed over the blood film in the bare area, and the edges are held with forceps, usually for three to five minutes, to give adequate time for graft fixation to occur.

Materials and Methods

Type of study was prospective study. The present study was conducted in Department of Ophthalmology, 250 bedded General Hospital Jamalpur. 48 patients of nasal pterygium were included in the group [44 were primary nasal pterygium and 4 were Recurrent pterygium]. All the

patients underwent pterygium excision with suture and glue free autologous graft. Subjects included in the study were from 24 to 70 years of age having pterygium (primary and recurrent) involving any eye. Necessary approval from Institute was obtained beforehand. Written informed consent was taken from each patient. Preoperative ocular examination included refraction and assessment of best-corrected visual acuity, slit lamp biomicroscopy, fundus examination, and photographic documentation of the pterygium. Surgeries were done from 15.09.16 to 30.11.16 and followed up upto July 2017. Wherever Grading of the pterygium was done as

Grade I- pterygium head up to the limbus

Grade II-head between the limbus and a point midway between limbus and pupillary margin

Grade III-head between a point midway between limbus and pupillary margin and pupillary margin

Grade IV-crossing pupillary margin.

Inclusion criteria were primary nasal pterygium and recurrent pterygium.

Exclusion criteria were temporal pterygium, patients taking oral nonsteroidal anti-inflammatory drug (NSAID) and anticoagulant, active infection or inflammation, symblepharon, past ocular surgery within last 6 months, trauma, systemic diseases such as diabetes mellitus, collagen vascular disease, pregnancy bleeding disorders.

Indications of Surgery

- Pterygium causing foreign body sensation
- Defective vision
- 3 to 4 mm encroachment on the cornea
- Cosmetic intolerance
- Diplopia due to interference with ocular movements

Surgical Technique

All surgical procedures were done under peribulbar anesthesia. All the surgeries were done under a microscope by the same single surgeon using the same technique. Taking all aseptic precautionary, eyelid was then separated by a speculum, and sub-conjunctival and subpterygial 0.5 ml lignocaine solution (xylocaine 2%) was injected. Gentle massage over the lesion was applied by cotton-tipped applicator for few seconds. The neck of the pterygium was then lifted up with the help of fine-toothed forceps, while the head of the pterygium was gently avulsed from the cornea by placing closed tips of a curved corneal scissors or Iris repository underneath the neck of the pterygium mass, keeping the same constant tractional force throughout. Gentle dissection was then carried out in-between the conjunctiva and the sclera with the help of crescent knife, to resect at least 4-5 mm the pterygium mass that included both the superior and inferior border. Neither cautery nor saline irrigation was

used throughout the surgery, except active bleeding, with bi-polar cautery whenever required to check excess hemorrhage. The size of the bare sclera defect was then measured with Castroviejo calipers. Corneal care was taken by applying wet cotton throughout the procedure. Now, approximately 0.5 ml xylocaine 2% was used to balloon up aconjunctival flap. Corneal scissor was used to make a fine film of 0.5 mm oversized, free conjunctival graft, carefully avoiding inclusion of tenon, or making buttonhole within it. The graft was then laid over the bare sclera ensuring same limbus to limbus orientation. We waited for 5 to 10 min for hemostasis to occur. In cases, where the surgeon appreciated the lack of adequate amount of blood at the recipient site, episcleral blood vessel was intentionally punctured to create bleeding. The eye was then patched for 24 h to 48 h with Chloramphenicol ointment. The eye was assessed for symptom, graft adherence, or any complication(s) under slit lamp. Postoperatively, patient was put on topical antibiotic and steroid combination for first 2 weeks thereafter tapered over next 4. Thereafter, an attempted follow-up of cumulative 6 months (at postoperative day 1, 7, 15, 30, 120, and 180) was done to every patient. At each postoperative visit, thorough slit lamp examination, tonometry was done, and any recurrence, complication(s), or any complaints were recorded. The primary outcome measure was the recurrence and the secondary measures were complication(s) and surgical time.

We defined

- (1) "recurrence" as the reappearance of fibrovascular growth at the site of previous pterygium excision extending beyond the limbus onto the clear cornea.
- (2) "Complication" as any adverse event related to
 - (a) the surgery in the intra- and post-operative period,
 - (b) the graft itself, or
 - (c) the drugs prescribed.

Results

A total of 48 cases were included in the study. The mean age of the study population was 32±2 years. The male and female distribution was 18 and 30 respectively. The detail profile of the study population is shown in table-I.

Table-I: Age and sex distribution of patients

Age Groups (Years)	Total=48	Male=18	Female=30
	No. of pt.	No. of pt.	No. of pt.
21-30	7	2	5
31-40	14	6	8
41-50	18	5	13
51-60	8	4	4
61-70	1	1	0

All the patients were examined after 24-48hrs following operation for graft dislodgement, recession, edema sub-conjunctival hemorrhage. Out of 48 eyes only 1 (2.1%) had sub-conjunctival hemorrhage, 2 (4.2%) edema and 3 (6.3%) had graft recession after 24 to 48 hrs of operation (table-II).

All the complications were resolved 1-2 month and 6-8 month follow up follow up. There was no recurrence of pterygium (table-II).

Table -II: Post-operative complications

Follow up	Hge %	Retraction %	Oedema %	Recurrence %	Graft Loss %	granuloma %
1-2 days	2.1	4.2	6.3	0	0	0
1-2 months	0	0	0	0	0	0
6-8 months	0	0	0	0	0	0

No recurrence, graft loss or granuloma was recorded. The mean operation time was 15±1 minutes. Regarding type of the pterygium, out of 48 patients 3(6.25%) were grade I, 21(43.75%) were grade II, 13(27.08%) were grade III and 11(22.92%) were grade IV (table-III).

Table-III: Grade of the pterygium

Grade	No. of patient	% of patient
I	3	6.25
II	21	43.75
III	13	27.08
IV	11	22.92
Total	48	100

Discussion

Pterygium surgery should ideally have a low or no recurrence, minimal complications and be cosmetically acceptable. Conjunctiva auto graft using sutures was a standard procedure. The grafts were stable with acceptable cosmetic results. Suture related problems like post-operative inflammation, granuloma formation, pain, foreign body sensation were present. The presence of sutures may lead to prolonged healing and fibrosis. Subsequent complications such as symblepheron formation, forniceal contracture, ocular motility restriction, diplopia, scleral necrosis and infection are much more difficult to manage and may be sight threatening²³.

Fibrin glue usage is faster and simpler with less post-operative complications. Fibrin glue is expensive and difficult to obtain. Foreign materials or Plasma derived products such as fibrin glue may produce possible hypersensitivity reactions or anaphylaxis in susceptible individuals and transmission of viral diseases²⁰.

Recent introduction of auto graft technique using patient's own blood as bioadhesive substance on the excised bed of the pterygium has gained popularity. The technique has eliminated several disadvantages encountered with earlier methods. It has minimized the surgical time, trauma to the conjunctiva, cost of surgery and recurrence rate. In our series, the operation time was only 14 to 16 minutes and there was no single case of pterygium recurrence after 3 months of surgery though we had 2 cases of graft recession. One case which was operated in our hospital is shown in the figures. Fig-1(a) is the preoperative picture where the patient is having advance nasal Pterygium. Fig-1(b) shows mild congestion but no graft retraction in 1st POD. Fig-1(c) shows good result with no congestion or oedema or graft lost in 10th POD.



Fig-1(a): Pre-operative.

Fig-1(b): 1st POD.Fig-1(c): 10th POD.

The technique is cost effective and easy to perform with less discomfort to patient. There was no other complication observed in our cases.

The result was comparable to other studies with similar techniques²⁴. Sutureless and glue free conjunctival auto graft using blood clot as a bioadhesive is a useful alternative method for graft fixation in pterygium surgery. We found the new procedure of auto grafting free of any untoward complications.

Suture and glue free autologous graft has no extra cost or associated risks and can overcome the post-operative irritation, pain and foreign body sensation to a great extent. The procedure was cosmetically better. The opposition of the lids to the bulbar conjunctiva provides a natural biological dressing and confers a unique wound healing environment²⁰. The main disadvantage of this method is the risk of graft getting lost in the immediate post-operative period. Graft loss is usually seen in first 24 to 48 hours. These complications were associated with larger grafts. This could be due to inadequate excision of the pterygium tissue or leaving too much tenons tissue on the graft¹⁸. Meticulous dissection of the sub-epithelial graft tissue is respected²⁰. This study was performed in a district hospital with huge turnover of cases. Exact learning and easy reproducibility with far greater results is the advantage of this procedure.

Conclusion

Pterygium excision and conjunctival auto graft with autologous blood is a viable and better surgical option for management of primary as well as recurrent pterygium. The feasibility of adherence of graft without glue and sutures is promising. The potential risks associated with the use of fibrin glue and suture related problems can be avoided in this technique. This procedure has excellent outcome. It is cost effective, time saving, easy to perform and safe for the patients with good cosmetic output.

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References

1. Solomon A. Pterygium. *Br J Ophthalmol*. 2006;90:665-666.
2. Bradley J, Yang W, Bradley R, Reid T, Schwab I. The science of pterygia. *Br J Ophthalmol*. 2010; 94(7):815-820.
3. Song Y, Ryu Y, Choi S, Kim C. The involvement of adult stem cells originated from bone marrow in the pathogenesis of pterygia. *Yonsei Med J*. 2005;46:687-692.
4. Leonard P, Jocelyn L, Donald T. Current concepts and techniques in pterygium treatment. *Curr Opin Ophthalmology*. 2007;18:308-313.
5. Gazzard G, Saw S, Farook M, Koh D, Widjaja D, Chia S, et al. Pterygium in Indonesia: prevalence, severity and risk factors. *Br J Ophthalmol*. 2002;86:1341-1346.2.
6. Luthra R, Nemesure B, Wu S, Xie S, Leske M. Frequency and risk factors for pterygium in the Barbados Eye Study. *Arch Ophthalmol*. 2001;119:1827-1832.
7. Cameron M. Pterygium throughout the World. Edited by Thomas CC. Illinois: Spring field; 1965.
8. Vojnikovic B, Njiric S, Cocklo M, Toth I, Spanjol J, Marinovic M. Sunlight and incidence of pterigium on Croatian Island Rab: epidemiological study. *Coll Antropol*. 2007;31:61-62.
9. Ti S, T Seng S. Management of primary and recurrent pterygium using amniotic membrane transplantation. *Curr Opin Ophthalmol*. 2002;13:204-212.
10. Ma K, Xu L, Jie Y, Jonas J. Prevalence of and factors associated with pterygium in adult Chinese: the Beijing Eye Study. *Cornea*. 2007;26:1184-1186.
11. Ardalan Aminlari, Ravi Singh, David Liang. Management of pterygium. *Ophthalmic Pearls Cornea American Academy of Ophthalmology*. 2010 Nov/dec; Eye Net:37-39.
12. S Srinivasan, M Dollin, PMC Allum, Y Berger, DS Rootman, AR Slomovic. Fibrin glue vs sutures for attaching the conjunctival autograft in pterygium surgery a prospective observer masked clinical trial. *BJO*. 2009;93:215-218.
13. Pinnita Prabhasawat. Comparison of conjunctival autografts, Amniotic membrane grafts & primary closure for pterygium excision. *Ophthalmology*. 1997 June; 104(6):974-985.

14. Kenyon KR, Wagoner, Hettinger ME. Conjunctival autograft transplantation for advanced and recurrent pterygium. *Ophthalmology*.1985;92:1461-70.
15. Hirst L. W Survey of *Ophthalmology*. 2008;115(10):1663-1672. Extensive incision and conjunctival transplantation for pterygium. Results of 1000 surgeries, presented at world cornea congress. Boston.2010 April:7-9.
16. Jean Shaw, LW Hirst, Santanu Mitra, Jonathan E Moore. American academy of *Ophthalmology*. A new approach emerges for pterygium surgery. *Clinical update. Cornea*.2012 Feb;Eye net: 27-29.
17. Cohen RA, Mc Donald MB. Fixation of conjunctival autograft with an organic tissue adhesive. *Arch ophthalmol*.1993; 111:1167-8.
18. G Koranyi, S Seregard, ED Kopp. Cut and paste; A no suture, small incision approach to pterygium surgery. *British Journal of Ophthalmology*.2004; 88:911-914.
19. Harvey S Uy, John Micheal G Reyes, John DG flores, Ruben, Lim-Bon-Siong. Comparison of fibrin glue and sutures for attaching conjunctival autograft after pterygium excision. *Ophthalmology*.2005 April;112(4):667-671.
20. D de Wit, I Athanasiadis, A Sharma, J Moore. Suture less and glue free conjunctival autograft in pteygium surgery. *Eye* (2010) 24,14741477.
21. Abraham Kurian, Iodine Raghunandhan. Autologous blood versus fibrin glue for conjunctival autograft adherence in suture less pterygium surgery. A randomised controlled trail. *KGR Nair BJO*.2015 99 467470.
22. Singh PK, Singh S, Vyas C, Singh M. Conjunctival autograft without fibrin glue or sutures for pterygium surgery. *Cornea*. 2013 Jan;32 (1):104-7.
23. BD Allan, P Short, GJ Crawford, GD Barrell, IJ Constable. Pterygium excision with conjunctival autografting ; an effective and safe technique. *British Journal of Ophthalmology*. 1993 Nov; 77(11): 698-701.
24. Sharma A, Raj H, Gupta A, Raina AV. Sutureless and glue-free versus sutures for limbal conjunctival autografting in primary pterygium surgery: a prospective comparative study. *J ClinDiag Res*. 2015;9(11): NC06NC09.