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Original Article

Pterygium Excision with Suture- Free, Glue- Free Limbal Conjunctival Autograft By Cut And Paste Method – A Prospective Interventional Hospital Based Study

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Abstract

Aim: *To evaluate and analyze the surgical outcome of limbal conjunctival autograft by cut and paste method after pterygium excision.*

Materials and Methods: *Prospective, interventional, hospital based study. 65 eyes of 65 patients with primary pterygium were graded, and excision with free limbal conjunctival autograft (LCAG) was performed by the single surgeon allowing natural autologous coagulum of the recipient bed to act as a bio adhesive. The outcomes were assessed in terms of operative time, postoperative pain, any recurrence, and complication(s) at post operative day 1 and at each follow-up visit at day 7, 30,120 and 180 .*

Results: *There were 34 males (52.3%) and 31 females (47.7%). The mean age of all the patients was 43.48 ± 12.128 years, ranging between 23 to 76 years. Cosmetic blemish was the chief indication of surgery (48 eyes, 73.8%). Mean graft size was 14.4mm^2. No recurrence occurred. Graft related complications occurred in 5 eyes (7.6%); graft displacement in 3 eyes , cystic degeneration in 1 eye and sub-conjunctival haemorrhage in 1 eye . The average surgical time was 16.91 ± 2.972 minutes. Post operative pain was less which was graded on Visual analogue scale.*

Conclusion: *The- surgical technique of using a suture-free and glue-free conjunctivo-limbal autograft is safe and cost-effective method, with less operative time and post operative pain, without adding possible potential hazard of the surgical adjunct.*

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Keywords: *Pterygium, Autograft, Complications, Recurrence*

Introduction

A pterygium is a fibro-vascular, wing-shaped encroachment of the conjunctiva on to the cornea. The prevalence rates ranges from 0.7–31% among different populations and also influenced by age, race, and exposure to solar radiations.[1]

Ultraviolet light-induced damage to the limbal stem cell barrier with subsequent conjunctivalisation of the cornea is the currently accepted aetiology of this condition. Indication of surgery include visual impairment, cosmetic disfigurement, motility restriction, recurrent inflammation and interference with contact lens wear.[2]

The results of pterygium surgery are often compromised by postoperative recurrence, which is the leading cause of surgical failure in a significant number of cases.

The reported recurrence rates vary widely, from 5% for pterygium excision with conjunctival auto grafting to 89% for simple excision.[5] Risk factors for the recurrence are geographic location, age, gender, morphology and grade of pterygium, and the type of surgical technique.[6-7] Most of the recurrence takes place within first 6 months postoperatively, and it has been attributed to the upregulation of the inflammatory process.[8]

In 1985, Kenyon et al[5] proposed that a conjunctival autograft of the bare sclera could be used in treatment of recurrent and advanced pterygium.Sutures or glue is used to affix the conjunctival autograft after excision of the pterygium. Recently, a new technique of using patient's own blood present at the graft bed to fix the graft has been introduced. Sutures and glue being foreign materials are associated with complications such as infection, granuloma formation, chronic inflammation, hypersensitivity reactions or recurrence.[9] This technique is also cost effective when compared to the techniques using sutures or glue.

In this study, we aim to find out the surgical outcome of this new technique of a sutureless and glue free graft and the recurrence and complications associated with it.

Materials and Methods

This prospective study comprised sixty five eyes of sixty five patients undergoing pterygium surgery at our tertiary care hospital. Subjects included in the study were from 23 to 76 years of age having primary pterygium involving any eye. Necessary approval from Institutional Medical Ethics Committee was obtained beforehand. The study adhered to the tenets of Declaration of Helsinki.

Sample size has been calculated from the reference article titled 'Pterygium excision with suture-free, glue-free conjunctival autograft (SFGF-CAG): Experience of a tertiary care hospital of the Northern India ' by Dasgupta et al.[10] In the above stated study, cases with primary pterygium were

60 % i.e P= 60% and by taking 12 % absolute precision at 95 % confidence level, sample size was calculated as 65 by using OpenEpi , Version 2 software.

Eyes with any pathology which would hamper wound healing such as active infection or inflammation, symblepharon, past ocular surgery within last 6 months, trauma, and systemic diseases such as collagen vascular disease, pregnancy, and bleeding disorders were excluded. Written informed consent was taken from each patient. Preoperative ocular examination included refraction and assessment of best corrected visual acuity, slit lamp biomicroscopy, baseline intraocular pressure (IOP) measurement by Goldmann applanation tonometer and fundus examination . Patients who were on oral nonsteroidal anti- inflammatory drug(NSAID) and/or anticoagulant, discontinued these medications 1 week before surgery.

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 (Figure 1), Grade III- head between a point midway between limbus and pupillary margin and pupillary margin and Grade IV- crossing pupillary margin. All the surgeries were done under a microscope by the same single surgeon using the same technique.
Statistical analysis was done using SPSS software version 20 . Categorical variables were described through absolute (n) and relative frequencies (%) and continuous variables through mean ± standard deviation.

Procedure

The eye was anesthetized with topical proparacaine 0.5%, one drop every 10 mintues interval, repeated twice. Taking all aseptic precautions peribulbar block [2% xylocaine with adrenaline (1:100,000)] was given . Eyelid was separated by a speculum . The neck of the pterygium then lifted up with the help of Lims forceps and dissected using conjunctival scissors (Figure 2). The head of the pterygium gently peeled from the cornea using Lims forceps , keeping the same constant tractional force throughout (Figure 3). Gentle dissection was then carried out in between the conjunctiva and the sclera with the help of an angled or curved Vannas scissors (World Precision Instruments, Inc., FL, USA), to resect at least 4–5 mm of pterygium mass that included both the superior and inferior border (Figure 4). Residual pterygium tissue on the cornea was scraped with the help of crescent blade (Figure 5). Cautery was not used throughout the surgery . Tamponade with cotton tipped applicator was done whenever required to check excess bleeding . The size of the bare sclera defect was then measured with Castroviejo calipers (World Precision Instruments, Inc.,Fl, USA). Approximately 0.5 ml xylocaine 2% was used to balloon up an superotemporal or superior conjunctival flap (Figure 6). Conjunctival 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 (Figure 7). The graft was then laid over the bare sclera ensuring same limbus to limbus orientation (Figure 8). The surgeon waited for 10 min for haemostasis

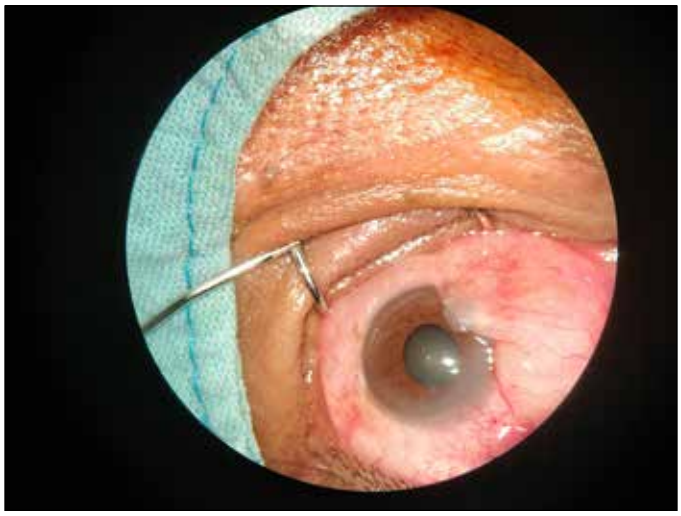

Figure 1: *Grade II nasal pterygium*

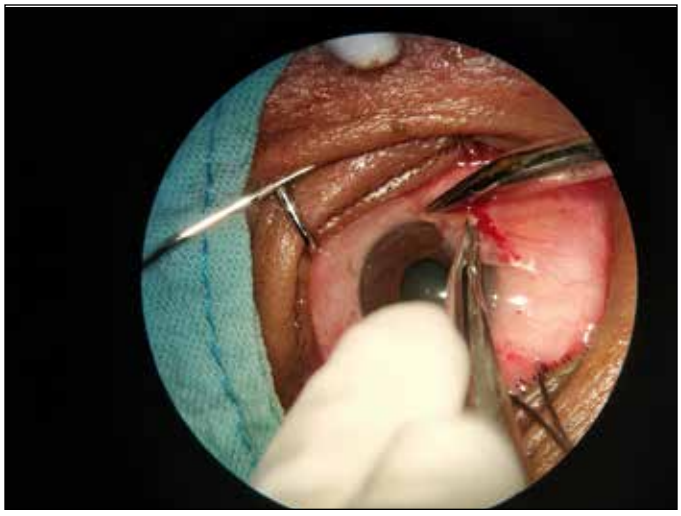

Figure 2: *Dissection of the neck of the pterygium with the help of Lims forceps and conjunctival scissors.*

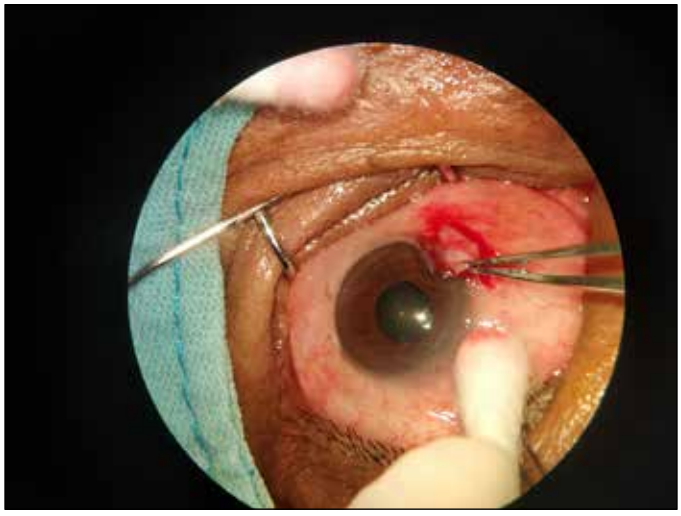

Figure 3: *Peeling of the head of the pterygium from the cornea using Lims forceps .*

Figure 4: *Dissection of the conjunctiva and the sclera and resection of pterygium mass*

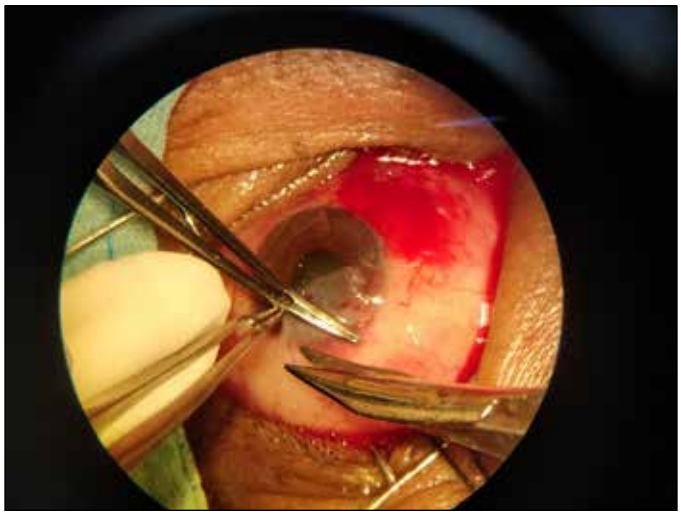

Figure 7: *Harvesting of conjunctival autograft*

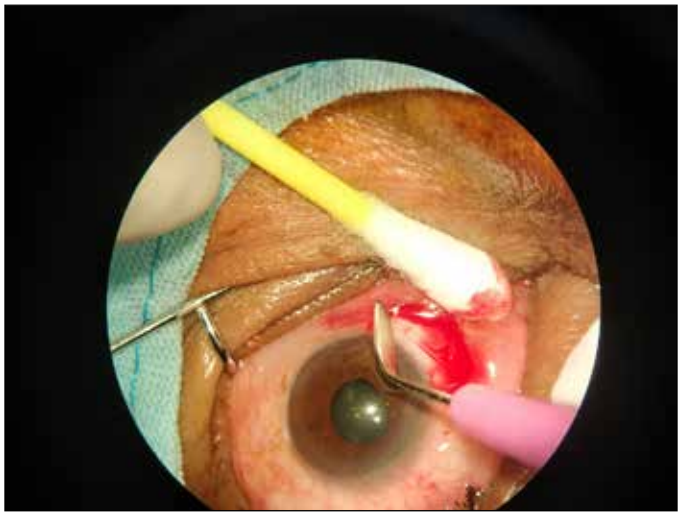

Figure 5: *Scraping of residual pterygium tissue on the cornea with crescent blade .*

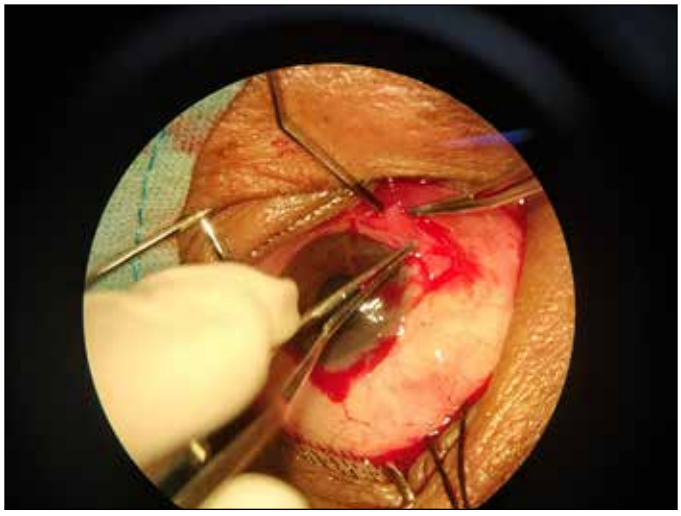

Figure 8: *Laying of autograft on bare sclera .*

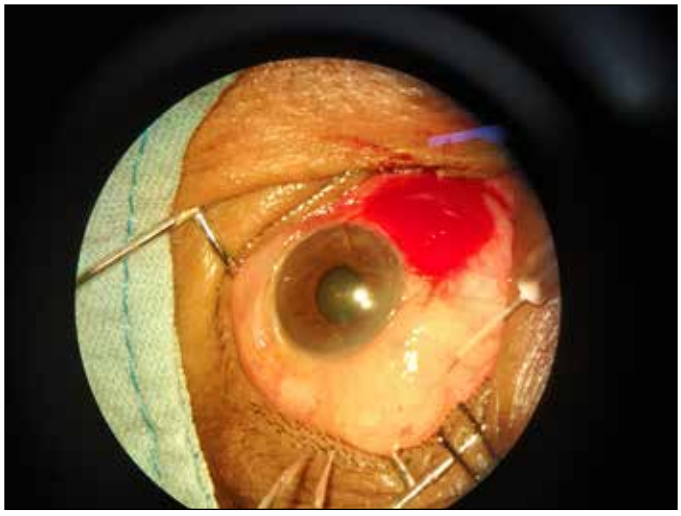

Figure 6: *Ballooning of superior conjunctival flap with 0.5ml xylocaine .*

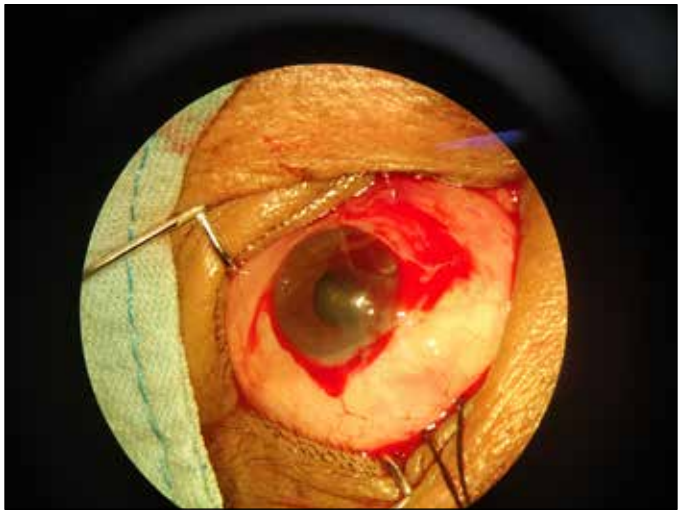

Figure 9: *Waiting for haemostasis to occur.*

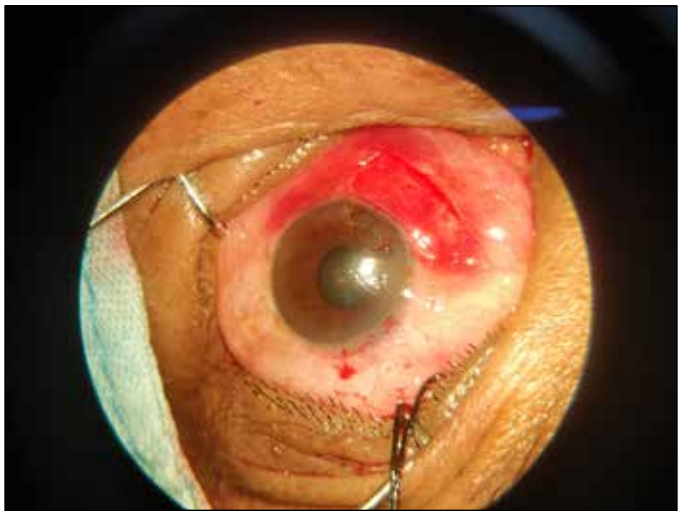

Figure 10: *Pterygium excision with limbal conjunctival autograft with good haemostasis and graft insitu.*

to occur (Figure 9) In cases, where the surgeon appreciated the lack of adequate amount of bleed at the recipient site, episcleral blood vessel was intentionally punctured to create bleeding. At the end of surgery it was ensured that graft was insitu with good haemostasis (Figure 10). The eye was then patched for 24 hours.

Any intraoperative complication, as well as the operative time, was documented. Next day, the eye was assessed for symptom, post operative pain by visual analog scale, graft adherence, or any complication(s) under slit lamp.

Postoperatively, patient was put on topical Moxifloxacin 0.5% with Ketorolac tromethamine 0.5% eye drop four times daily with Carboxymethyl cellulose 1% eye drop six times daily for 1 week followed by Fluoromethalone 0.1 % with Tobramycin 0.3 % 4 times daily tapered over next 2 weeks and Carboxymethyl cellulose 1% eye drop four times daily for 6 weeks.
Thereafter, an attempted follow- up of cumulative 6 months (at postoperative day 1, 7, 30, 120, and 180) was done for every patient. At each postoperative visit, thorough slit lamp examination and tonometry were done, and any recurrence, complication(s), or any complaint were recorded.

The primary outcome measure was the recurrence and the secondary measures were complication(s), surgical time and post operative pain.
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. (3) " Post operative pain "analysed by visual analog scale.
Visual analog scale is a simple scale, consists of a 10 cm line anchored at one end by a label ''no pain'' and at the other end by ''worst possible pain.'' The patient marks on the line how severe the pain is at the moment.

Results

A total of 65 eyes of 65 patients underwent suture less and glue free autologous conjunctivolimbal auto graft after pterygium excision. The mean age of all patients was 43.48 ± 12.128 years, ranging between 23 to 76 years.
There were 34 males (52.33%) and 31 females (47.7%). All patients had primary nasal pterygium . Grade II pterygium was found to be the most common grade (62 eyes, 95.4%), followed by Grade III (3eyes; 4.6%). No patient had Grade I, Grade IV, bilateral, temporal, or double headed pterygium . Laterality was almost equal (Right eye – 32 eyes ; 49.2 % , Left eye- 33 eyes; 50.8%) with no statistical significance.

Most common indication of surgery was cosmetic blemish (48 eyes, 73.8%), followed by recurrent inflammation (15 eyes, 23.1%) and diminution of vision (2 eyes , 3.1 %) Mean operative time was 16.91 ± 2.972 min, ranging between 14–25 min. Mean graft size was 14.4 mm^2 while in majority of patients (28 eyes ; 43.1%) the size was 18mm^2 . Majority of patients (63; 96.9%) did not have any improvement in visual acuity post operatively while two patients(3.1 %) had one line improvement at 1 month follow up.

Follow- up of 6 months observed in 100% patients. Postoperatively, no recurrence was seen.

Partially displaced graft of 0.5 to 1 mm (hence, graft related complication)was noticed in three patients (4.6%) at the first postoperative day, post operative 1 week and post operative 1 month. No intervention was done for the displacement of the graft. Cystic degeneration was seen in one patient at post operative 1 week which got resolved on treatment with increased dose of steroids. Sub graft haemorrhage was seen in one patient at post operative day 1 and post operative 1 week which got resolved spontaneously with routine treatment at post operative 1 month. No other complication(s) related to the graft, surgery, or drugs were evident until the end of our study.

Post-operative pain on day 1 after surgery was consistently rated as less than or equal to 3 out of 10 on a visual analogue scale. Pain did not increase after the first post-operative day. Results and observations have been summarized in (Table 1).

Table 1 : Summary of results and observations

Variable	Total (%)
Total no of eyes	65
Male	34(52.33)
Female	31(47.7)
Age, range (years)	23-76
Age, mean±SD (years)	43.48±12.128
Location	Nasal
Primary pterygium	65
Grade I	Zero(0)

Discussion

The modern concern of avoiding recurrences and complications while offering rapid recovery safely with minimal discomfort has encouraged surgeons to revise the conventional surgical methods for pterygium despite very favourable outcomes.

A recently reported meta analysis by Kaufman et al. indicated the superiority of conjunctival autograft (CAG) and LCAG over amniotic membrane graft (AMG), as well as the associated risk of vision threatening complications with mitomycin C (MMC).[11]
Nonetheless, CAG, AMG, or LCAG requires either suture, fibrin glue, or autologous blood as an additional surgical adjunct to secure the graft in place.[9]

The presence of sutures may lead to prolonged wound healing and fibrosis. [12, 13]Subsequent complications such as pyogenic granuloma formation are easily treated; others such as symblepharon formation, forniceal contracture, ocular motility restriction, diplopia, scleral necrosis and infection are much more difficult to manage and may be sight threatening.[14,15]

Commercial fibrin glue, although has the advantage of avoiding suture related complication(s), is not easily available everywhere, is costly and carry the risk of transmission of prions and parvovirus B19. Anaphylaxis and even death has been reported from its use, where bovine protein aprotinin is the allergen to be believed. [16] Whereas, in house preparation of autologous blood is expensive, requires sophisticated laboratory backup, and at least 24 hours of processing and the resultant product has a variable concentration of clotting components (thrombin, fibrinogen).

Although scanty data exist, recent reports on suture-free, glue -free CAG by different Indian authors, such as Kurian et al.,[17] Singh et al.,[18] Choudhury et al.,[19]Kulthe et al.[20] Sharma et al.,[21] and Mitra,[22] are very encouraging and comparable with our present study. Whereas, studies conducted in the United Kingdom by de Wit et al. and Shaw et al.[23] amazingly showed no complication or recurrence at all.

We have observed some amount of graft dehiscence from the host conjunctiva (up to 1 mm) is common because of graft shrinkage or ocular movement. This is well tolerated and does not need to be surgically addressed as long as the graft is secure in its place, and it heals up well.

One case had cyst, which showed only pterygium tissue in histopathology report and another case had sub graft haemorrhage .These are risk factors for development of recurrence of pterygium and hence were followed closely.
The inclusion of tenon in the graft, graft edema, or subgraft hemorrhage has been linked with recurrence by several authors.[24]
None other patient in our study showed any graft related complication(s) such as excess graft edema, graft loss or necrosis, infection, dellen formation, symblepharon and granuloma as comparable with other quoted studies.

Mitra reported, "The main disadvantage of suture-free, glue-free CAG is the risk of graft loss in the immediate postoperative period, but once the graft stays in place for the first 24–48 hours, it is going to stick around."

de Wit et al. in their similar study postulated that there is an even tension across the whole graft interface and no direct tension on the free graft edges as with sutures, thus reduced the stimulus for subconjunctival scar tissue formation and hence there is reduced chance of graft retraction .

Average operative time in our study was 16.91 ± 2.972 min (standard deviation), which was comparable with other studies as well, and definitely lesser than the suturing technique and possibly the extra time taken to prepare fibrin glue
Our study has several limitations. It was non-randomised and consisted of a small study population and a relatively short follow-up period of 6 months.
However, the mean time for appearance of any complication, including recurrence as reported by one study which compared the four commonly used surgical techniques for pterygium surgery was 4 months.[26] Koranyi et al. also reported that there were recurrences in their patients within 2–3 months of surgery.

Conclusion

Superotemporal or superior conjunctivolimbal auto graft is an effective technique in the surgical management of pterygium. The inclusion of limbal tissue in the conjunctival auto graft following pterygium excision is essential to ensure low recurrence rate.
The surgical technique of using a suture-free and glue-free conjunctivolimbal autograft is safe and cost-effective method, reduces complications related to the use of foreign materials and reduces surgical time when compared to the technique using sutures and fibrin glue.
Autoblood used for graft fixation is having excellent outcome with less operative time and post operative pain, without adding possible potential hazard of the surgical adjunct.

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