Original article

Efficacy of sutureless and glue free limbal conjunctival autograft for primary pterygium surgery

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Abstract

Introduction: There are numerous adjunctive measures described to reduce the recurrence rates after pterygium excision.

Objective: To study the efficacy and complications of sutureless and glue free limbal conjunctival autograft for the management of primary pterygium over a period of one year.

Materials and methods: A prospective interventional case series was carried out in 40 consecutive eyes with primary nasal pterygium requiring surgical excision. Pterygium excision with limbal conjunctival autografting without using glue or sutures was performed in all the patients followed by bandaging for 48 hours. The patients were followed up post operatively on 2nd day, 1 week, 6 weeks, 6 months and 12 months. They were examined for haemorrhage, wound gape, graft shrinkage, chemosis, graft dehiscence, recurrence or any other complication.

Results: The mean age of the patients was 42.8 years (range 23-61), 75% of which were males. Total graft dehiscence occurred in 2 eyes (5%), graft retraction in 3 eyes (7.5%) and recurrence was seen in 1 eye (2.5%). At 6 weeks postoperatively, the gain in uncorrected visual acuity ranged from 0.18 to 0.5 log MAR in 7 eyes. No other complication was noted.

Conclusions: Sutureless and glue free limbal conjunctival autografting following pterygium excision is a safe, effective and economical option for the management of primary pterygium.

Keywords: Pterygium, conjunctiva, limbal-conjunctival autograft, fibrin glue, pterygium surgery

Introduction

Pterygium is a common disorder in many parts of the world, with reported prevalence rates ranging from 0.3 to 29% (Moran & Hollows, 1988; Taylor et al, 1984). In general, conservative therapy for pterygium is warranted as recurrences after pterygia excision are frequent and aggressive. Numerous adjunctive measures have been described to reduce the recurrence rates after its excision. These may be broadly classified as medical methods, beta-irradiation and surgical methods (Ang et al, 2007). Limbal -conjunctival autograft is currently the most popular surgical procedure as it has been suggested that including the limbal stem cells act as a barrier to the conjunctival cells migrating onto the corneal surface.

The most common method of autograft fixation is suturing, with drawbacks of prolonged operating time, postoperative discomfort, suture abcesses, buttonholes, and granuloma formation which usually requires a second operation for removal (Starck et al, 1991).

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Replacing sutures with tissue adhesives may shorten the operating time, improve postoperative comfort, and avoid suture related complications. However, the major concern of the commercial fibrin glue is the cost and the potential risk of transmitted infection. Autologous fibrin glue has been used as an alternative method for graft fixation by some authors (Cohen & Donald, 1993; Foroutan et al, 2011). A recent cross-sectional study also describes successful outcome with sutureless and glue-free conjunctival autograft (Wit et al, 2010). We conducted this prospective interventional study in a larger number of patients to determine the outcome of sutureless glue-free limbal conjunctival autograft for primary pterygium surgery.

Materials and methods

This prospective interventional case series included consecutive 40 eyes with primary nasal pterygium requiring surgical excision from July 2010 to December 2010. The indication for surgical intervention was one or more of the following: diminution of vision either because of induced astigmatism or encroachment onto the pupillary area, marked cosmetic deformity, marked discomfort and irritation unrelieved by medical management, limitation of ocular motility secondary to restriction or documented progressive growth towards the visual axis so that ultimate visual loss could reasonably be assumed. An informed consent was taken from each patient.

The study was approved by the Institutional Research Ethics Committee at Subharti Medical College, Meerut, Uttar Pradesh, India.

The primary outcome measures included graft dislocation and pterygium recurrence. Graft success was defined as an intact graft by the end of 6 weeks after operation without need for sutures. Recurrence was defined as any growth of conjunctiva exceeding 1mm onto the cornea.

A detailed medical and ophthalmic history, including gender, age and previous eye surgery was taken. Exclusion criteria included recurrent pterygium, glaucoma, retinal pathology requiring surgical intervention, history of previous ocular surgery or trauma. Preoperative ophthalmic evaluation comprised of uncorrected and best corrected visual acuity (BCVA), digital anterior segment photography, slit lamp examination and funduscopy.

Surgical technique

All surgical procedures were performed by the same surgeon (KPSM) to ensure consistency. Operations were performed under peribulbar anaesthesia using 2% Xylocaine injection. The body of the pterygium was dissected 4 mm from the limbus, down to the bare sclera. Blunt and sharp dissection by Wescott scissors (Geuder, Germany) was done for separating the fibrovascular tissue from the surrounding conjunctiva. The pterygium was removed from the cornea (superficial keratectomy) using a crescent knife. Only the thickened portions of conjunctiva and the immediate adjacent and subjacent Tenon's capsule showing tortuous vasculature were excised. Where possible, haemostasis was allowed to occur spontaneously without the use of cautery. The size of the defect was measured with Castoveijo callipers (Bausch & Lomb Storz; Storz instruments, St Louis, MO, USA).

For harvesting the donor limbal conjunctival autograft, 0.5ml of Xylocaine was injected using 30 G needle subconjunctivally to allow dissection between the conjunctiva and tenon's layer in the superior bulbar conjunctiva. An oversized graft with an additional 2.0mm of length and width relative to the dimensions of the bare sclera was dissected including the superior limbal stem cells.

The graft was placed on the bare sclera in such a way so as to maintain the original orientation of the juxtalimbal border towards the cornea. The scleral bed was viewed through the transparent conjunctiva to ensure that residual bleeding does not lift the graft. Small central haemorrhages were tamponaded with direct compression. The free graft was held in position for 10 minutes by application of gentle pressure over it with a lens spatula. The stabilisation

of graft was tested with a Merocel spear centrally and on each free edge to ensure firm adherence to the sclera. The eye was bandaged for 48 hours.

Postoperative regimen

After removal of the patch, the patient was advised not to rub the eye and topical Loteprednol eye drops were administered four times a day which was tapered over 6 weeks. Chloramphenicol eye drops were instilled four times a day for 2 weeks.

The patients were followed up post operatively on 2nd day, 1 week, 6 weeks, 6 months and 12 months (Figure 1a and b). Refraction was performed at 6 weeks. The patients were examined for haemorrhage, wound gape, graft shrinkage, chemosis, graft dehiscence, recurrence or any other complication.

Results

The mean age of the patients was 42.8 years (range 23-61), 75% of which were males. All the patients were followed up for one year after surgery and there were no drop outs. Table 1 summarizes the patient profile and outcomes.

Total graft dehiscence occurred in 2 eyes (5%). In one patient, it developed following injury with a finger on the 4th postoperative day. In the other there was lack of adhesion due to accidental inclusion of Tenon's in the free limbal conjunctival graft.

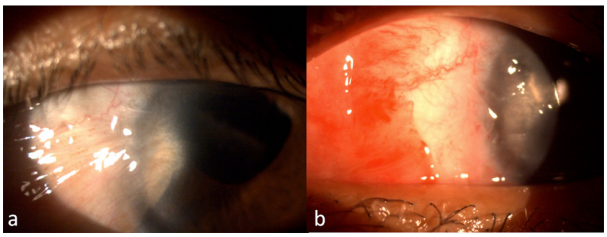

Figure 1(a). Preoperative photograph of pterygium causing cosmetic deformity. (b) Post operative photograph at 1 week showing satisfactory graft take up.

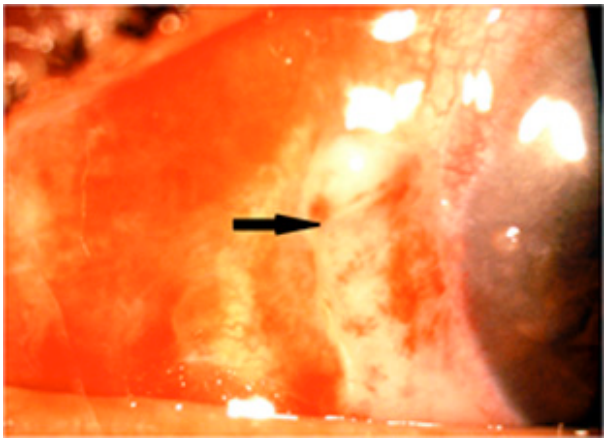

Figure 2. Post operative photograph on day 3 showing a thickened and congested graft where Tenon's was accidentally included.

The removal of Tenon's also caused delayed healing of the donor site. The graft appeared thickened and congested on the 3rd postoperative day (Figure 2) and the dehiscence was noticed on the 7th day. Both the patients were managed by securing the same graft using 8,0 vicryl suture.

Graft retraction occurred in 3 eyes (7.5%) on the conjunctival side. There was mild chemosis in all these patients. All the three patients were managed conservatively by bandaging for 48 hours. The chemosis disappeared by the end of 7th postoperative day.

At 6 weeks postoperatively, the gain in uncorrected visual acuity (UCVA) ranged from 0.18 to 0.5 log MAR in 7 eyes. There was no change in UCVA in rest of the patients. The BCVA showed no change following surgery.

Recurrence was seen in 1 eye (2.5%) at 6 months. None of the patients developed button hole of conjunctival graft, excessive bleeding, perforation of the globe with suture needle, injury to medial rectus, dellen, pyogenic granuloma, symblepharon formation or scleral necrosis.

Table 1

Patient characteristics, outcomes and complications of sutureless and glue free limbal conjunctival autograft for primary pterygium surgery

S.no	Sex	Age (years)	Total graft dehiscence	Graft retraction	Recurrence	Improvement in uncorrected visual acuity(log MAR)
1	M	23	No	No	No	0
2	M	58	No	No	No	0
3	M	34	No	No	No	0
4	M	56	No	No	No	0
5	F	39	No	No	No	0.18
6	M	46	No	No	No	0
7	M	45	No	No	No	0.3
8	F	35	No	No	No	0
9	M	46	No	No	No	0
10	F	34	No	Yes	No	0
11	M	31	No	No	No	0
12	M	50	No	No	No	0.5
13	M	60	No	No	No	0
14	F	49	No	No	No	0
15	M	45	No	No	No	0
16	M	35	No	No	No	0
17	M	39	No	No	No	0
18	M	35	No	Yes	No	0
19	M	29	No	No	No	0
20	M	42	No	No	No	0.18
21	M	32	No	No	No	0
22	M	43	No	No	No	0
23	F	32	No	No	No	0
24	M	54	No	No	No	0.18
25	F	34	Yes	No	No	0.18
26	M	51	No	No	No	0
27	M	55	No	No	No	0
28	F	43	No	No	No	0
29	M	27	No	No	Yes	0
30	M	51	No	No	No	0
31	M	32	No	No	No	0
32	M	41	No	No	No	0
33	F	61	No	No	No	0
34	F	36	No	Yes	No	0
35	M	42	No	No	No	0.3
36	M	29	Yes	No	No	0
37	F	57	No	No	No	0
38	M	41	No	No	No	0
39	M	59	No	No	No	0
40	M	60	No	No	No	0

Discussion

Recurrence after a successful excision continues to remain a challenge in pterygium surgery. Various adjunctive therapies like radiotherapy, antimetabolite or antineoplastic drugs, conjunctival flap, amniotic membrane, lamellar keratoplasty, conjunctival and limbal conjunctival grafts have been proposed to prevent recurrence. Ex-vivo expanded conjunctival epithelial sheet on an amniotic membrane substrate has been shown to achieve immediate epithelialisation of ocular surface, reduced postoperative inflammation and faster ocular rehabilitation. The procedure is especially useful for closing large surgical defects following excision of extensive pterygium (Ang et al., 2003).

Generally, the pterygium recurrences occur during the first 6 months after surgery Adamis et al., 1990). Conjunctival autografts are associated with recurrence rates of 2-39% that are comparable to that of Mitomycin-C and beta-irradiation, without the attendant risk of sight-threatening complications (Ang et al., 2003). The limbal conjunctival autograft has a recurrence rate ranging from 0-15% (Du et al., 2002; Al-Fayez, 2002). Though it has been suggested that limbal conjunctival grafts are more effective than conjunctival autografts, it is technically more demanding and there is added risk of limbal damage.

Fibrin glue has been used as an alternative to sutures for securing the conjunctival grafts. Koranyi et al (2004) demonstrated a recurrence rate of 5.3% with glue versus 13.5% with sutures and suggested that immediate adherence of the graft and lack of postoperative inflammation may inhibit fibroblast ingrowth and reduce the recurrence.

The main issue in using commercial fibrin glue, despite viral inactivation techniques, is transmission of infectious agents like Human Infection of parvovirus B19 (HPV B19) and prions (Foroutan et al, 2011). In addition, three cases of anaphylactic reaction have been reported after use of TISSEEL fibrin sealant which was possibly due to bovine protein aprotinin, used as an antifibrinolytic agent (Oswald et al, 2003). Foroutan et al (2011) prepared autologous fibrin glue and used tranexamic acid as a antifibrinolytic agent to tide over the problem of disease transmission and anaphylaxis respectively. Autologous fibrin, though much safer, is yet to be used widely because of the time taken to procure the fibrin and lack of laboratory facilities at all centers. Fibrinogen compounds may be susceptible to inactivation by iodine preparations such as those used for conjunctival disinfection before pterygium surgery (Wit et al, 2010).

In our series only one eye (2.5%) had a recurrence. Foroutan et al (2011) had a recurrence rate of 13.33% (2 eyes out of 15) in three year follow up with autologous fibrin. Using similar procedure as ours, Wit et al (2010) had no recurrence in 15 eyes with a mean follow up of 9.2 months. The authors suggested that apposition of the lids to the bulbar conjunctiva provides a natural biological dressing and confers a unique wound healing environment. The lids provide compression, a smooth frictionless surface, and a vascular bed with immune capability in close proximity to the injury site.

Graft retraction, was seen in 3 eyes (7.5%) in our series which disappeared once the chemosis was controlled. It did not affect the final position of the graft. Graft retraction occurred in 20% cases in Foroutan et al (2011) series. Tan (1999) advocated that risk of graft retraction could be minimised with meticulous dissection of subepithelial graft tissue. Wit et al (2010) postulated that sutureless and glue free graft resulted in an even tension across the whole of the graft interface and no direct tension on the free graft edges resulting in reduced stimulus for the formation of subconjunctival scar.

Graft dehiscence is a recognized complication of using tissue glue (Uy et al, 2005; Srinivasan & Slomovic, 2007). With autologous fibrin, dehiscence occurred in 13.33% cases and was attributed to a low concentration of thrombin and fibrinogen in the autologous glue as compared to commercial preparation.

Graft dehiscence occurred in two of our eyes of which one resulted following trauma and the other was the result of accidental inclusion of Tenon's tissue in the free graft. The importance of a thin

graft with careful dissection from the Tenon's capsule is mandatory for a successful graft take up.

The preference for the site of donor graft in our series was superior as this area gets covered by the upper lid enabling better cosmesis and healing. Some authors prefer inferior bulbar conjunctiva, considering that the superior conjunctiva may be required for a future filtration surgery (Broadway et al, 1998).

None of our patients developed corneal ulcer, scleral melting, conjunctivitis, dellen, symblepheron formation, excessive bleeding, injury to medial rectus muscle, secondary glaucoma, iritis, corneal perforation or corneal ulcer.

Conclusion

Sutureless and glue free limbal conjunctival autografting following pterygium excision is a safe, effective and economical option for the management of primary pterygium requiring surgical intervention.

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