 DOI: 10.18231/2455-8478 .2017.0016

No glue no sutures - Natural hemostasis for conjunctival autografting following pterygium excision

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Abstract

Introduction and purpose of the study: To study the effectivity of natural hemostatic mechanism for attachment of the graft, reducing the cost as well as risks associated with the use of fibrin glue and post-op discomfort associated with sutures.

Materials and Methods: Prospective comparative study was carried on 60 eyes of 51 patients undergoing pterygium excision with conjunctival autografting for primary pterygium. Patients were randomised into two groups. Sutures used in one of the groups and natural hemostasis in the other, for attaching the graft. Operating time, post-op graft stability, discomfort and recurrence rate were studied.

Result: Operating time (12mins) and post-op discomfort was significantly reduced in sutureless group compared to sutured group (20mins). Post-op day1, 2 out of 30 eyes had graft displacement in sutureless group compared to 1 in sutured group. 2 out of 30 eyes had recurrence in sutureless group compared to 1 in sutured group.

Conclusion: Natural hemostatic mechanism for attaching conjunctival limbal autografting considerably decreased the operative time and post-op discomfort in patients with primary pterygium.

Keywords: Autograft, Glue, Natural hemostasis, Pterygium, Sutureless

Introduction

Pterygium is a wing shaped conjunctival encroachment onto the cornea generally situated on the nasal side. It sometimes occurs both nasally and temporally, and rarely only on the temporal side. Pterygium is more frequent in areas with more ultraviolet radiation.[(1)] In hot, dry, windy, dusty, and smoky environments.[(2,3)] There is also a hereditary factor.[(4)] Some researchers have also discussed the role of stem cells.

Surgical removal is the treatment of choice. Many techniques have been suggested to prevent recurrence such as adjunct therapy with β radiation, thiotepa, 5-FU, and mitomycin C. High recurrence rates are weighted against eye threatening postoperative complications. Autologous conjunctival grafting seems to be the best method, giving both low recurrence rate and high safety.[(5-7)]

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. Recent reports favour the use of fibrin glue[(8-11)] above sutures for improved comfort, decreased surgical time, reduced complication and recurrence rates. Suture-related complications include infection, granuloma formation, and chronic inflammation,[(12)] whereas plasma-derived fibrin glue has the potential risk of prion disease transmission and anaphylaxis in susceptible individuals.

Although generally considered safe, fibrin glue is currently manufactured from human plasma and therefore carries the theoretical risk of transmissible disease.[(13)] Virus removal and inactivation procedures are included in the manufacturing process although may be of limited value against nonenveloped viruses such as hepatitis A virus and parvovirus B19.[(14)] New devices, such as the CryoSeal FS System, that generate fibrin sealant from autologous blood may eliminate the current risks associated with pooled plasma. They are not currently in widespread use however and the time taken to procure the fibrin may be prohibitive in day care pterygium surgery.[(15)] Fibrinogen compounds may also be susceptible to inactivation by iodine preparations such as those used for conjunctival disinfection before pterygium surgery.[(16)]

Sutureless grafting has been used successfully in gingival grafts[17] and represents a similar mucosal membrane tissue environment to the conjunctiva of the eye.

Objectives of the study

To study the following aspects in patients undergoing pterygium excision and conjunctival autografting with suture and by natural hemostasis.

1. Operating time
2. Post-operative graft stability
3. Post-operative discomfort
4. Recurrence

Source of data collection: Patients attending out-patient and in-patient department, department of ophthalmology, K R Hospital, Mysore, diagnosed with pterygium who fulfill the inclusion and exclusion criteria.

Method of data collection

Sample size: 30 + 30

Study type: prospective comparative study

Inclusion criteria: All the subjects diagnosed with pterygium (symptomatic and more than or equal to 2mm encroaching the cornea) requiring surgery.

Exclusion criteria

1. Recurrent pterygium.
2. Patients with bleeding disorders and on anticoagulants.

Methodology

Detailed history and examination was done in all the cases meeting the objectives of the study after an informed consent.

All the patients were taken up for pterygium excision. Pterygium tissue held with collibri forceps, and dissected, cut on the tail side, then shaved off from the cornea. Care taken to remove all the tenons and bare sclara exposed. No cautry done. Graft harvested from the supero-temporal limbus. Size of the graft was 1-2mm more than the area of bare sclera, to account for tissue shrinkage post-operatively.

In one group, grafting done taking the advantage of natural hemostatic mechanism. Small perforating veins and capillaries are purposely punctured to encourage a thin layer of fresh blood to cover the bare sclera. Graft placed over the sclera with epithelial side facing up and opposing limbal part to limbus. Graft was tucked under the host conjunctiva and secured at other sites. 3-5 minutes of time left for the graft to stick firmly to the underlying sclera. Stability checked by a jet of saline over the graft.

In the other group, graft was secured by using 10-0 ethylon suture. Knots were buried while suturing.

Subconjunctival injection of steroid-antibiotic given. Eye was closed by instilling lubricant.

Operating time was noted from the start of pterygium excision to the removal of eye speculum.

Bandage was removed next day (post-op day 1) morning. Post-operatively all patients were given steroid-antibiotic drops. Graft displacement (loss of opposition of limbal part of the graft from host limbus) and ocular discomfort (in terms of visual analogue scale) on post-op day 1, and recurrence after six months were assessed. Recurrence was defined as the presence of fibrovascular tissue regrowth extending beyond the surgical limbus onto clear cornea as agreed by Sebban and Hirst.[18]

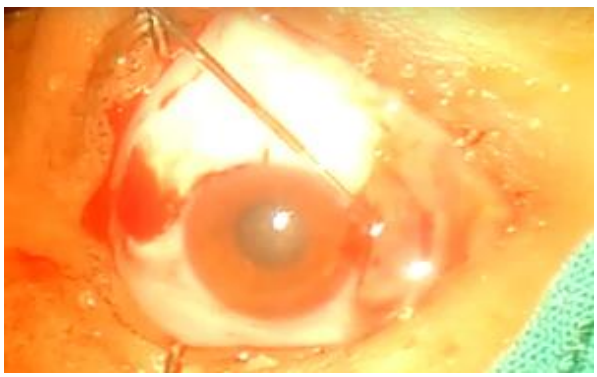

Fig. 1: Well adherence of the graft checked with a jet of saline

Fig. 2: Post-operative day one

Fig. 3: Postoperative 1 week

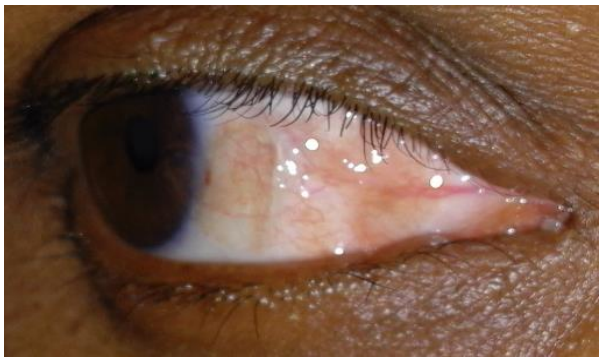

Fig. 4: Postoperative 6 weeks

Results

This is a prospective comparative study, where 60 eyes of 51 patients underwent pterygium excision with conjunctival limbal autografting. 42 Patients were randomly assigned into two groups. Sutures were used in one group (first group) to secure the graft. In the other group (second group), graft was secured taking the advantage of natural hemostasis. 9 patients underwent pterygium excision in both the eyes. One of the eyes was chosen randomly for the sutureless group (second group) and the other eye for the suture group (first group). Second surgery was carried out after a period of 4-6 weeks. For all the statistical analysis, individual eye was considered and not the individual patient. Operation time, post-operative ocular discomfort, graft stability and recurrence after 6 months were studied. Statistical analysis done using SPSS software version 22.

60 eyes of 51 patients between 23 and 56 years of age underwent pterygium excision with conjunctival limbal autografting. There were a total of 28 female patients and 23 male patients. Randomisation was maintained between the groups and there was no statistically significant difference in age and sex distribution between the groups.

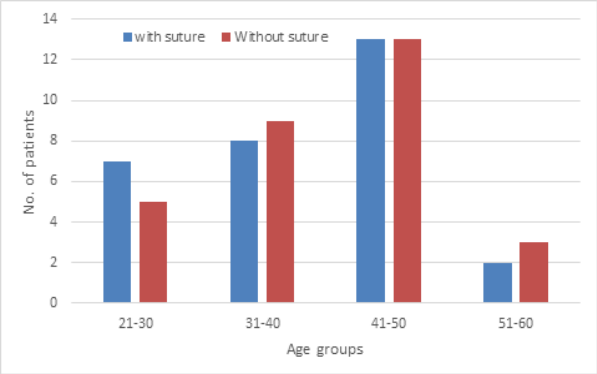

Fig. 5: Bar diagram showing age distribution of the subjects

Most of the patients in both the groups were BPL card holders.

Table 1: Subjects below poverty line

			Groups		Total
			with suture	Without suture	
BPL	no	Count	6	5	11
			20.0%	16.7%	18.3%
	yes	Count	24	25	49
			80.0%	83.3%	81.7%
Total		Count	30	30	60
			100.0%	100.0%	100.0%

Randomisation was maintained in the laterality of the eye operated in the two groups.

Table 2: Laterality of the eye operated

			Groups		Total
			with suture	Without suture	
Eye	left	Count	16	11	27
			53.3%	36.7%	45.0%
	right	Count	14	19	33
			46.7%	63.3%	55.0%
Total		Count	30	30	60
			100.0%	100.0%	100.0%

Operation time was approximately 20 minutes when sutures were used and 12 minutes in natural hemostasis method. Statistically significant reduction operation time is seen in natural hemostasis method.

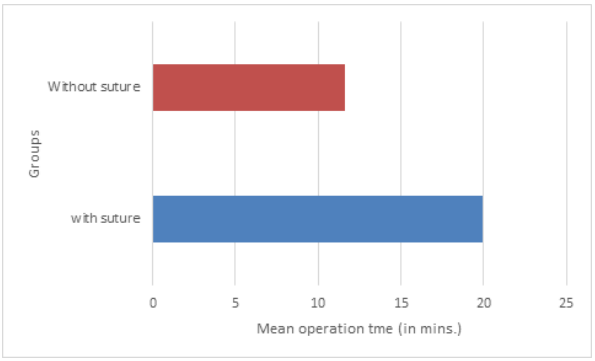

Fig. 6: Bar diagram showing mean operation time

Post-operative day 1, graft displacement was seen in 2 out of 30 eyes in sutureless group and 1 out of 30 in suture group. This difference is statistically insignificant. These eyes were taken for resurgery and graft was secured.

Table 3: Graft displacements in the two groups

			Group		Total
			with suture	Without suture	
Graft displacement	no	Count	29	28	57
			96.7%	93.3%	95.0%
	yes	Count	1	2	3
			3.3%	6.7%	5.0%
Total		Count	30	30	60
			100.0%	100.0%	100.0%

Post-operative ocular discomfort was assessed in patients using visual analogue scale. A score of 0 for no discomfort and 10 for worst possible discomfort, unbearable, excrutiating pain. Patients were asked to mark the score on the scale provided, depending upon the severity of ocular discomfort experienced by them on post-op day 1, after half an hour after the removal of the bandage.

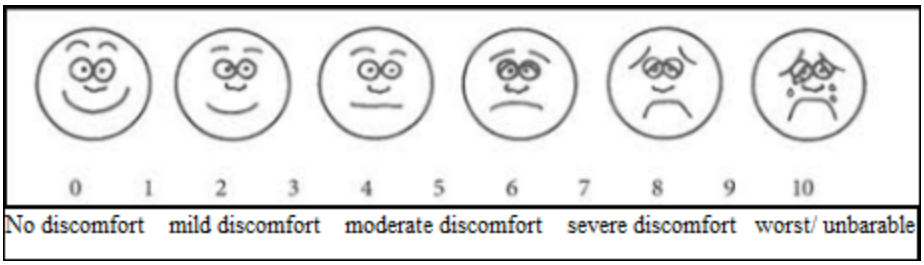

Fig. 7: Visual analogue scale for evaluating postoperative discomfort

Mean score was 4.7 in sutureless group and 7.3 in suture group. This finding was statistically significant.

Table 4: Ocular discomfort score

	group	N	Mean
ocular discomfort	with suture	30	6.4000
	Without suture	30	4.7333

6 months follow-up was done and recurrence noted. Out of 30 eyes that underwent sutureless autografting, 2 eyes showed recurrence of pterygium. Out of 30 eyes that underwent sutured autografting, there were 3 loss to follow-up. One of the eyes showed recurrence. This finding is statistically insignificant.

Table 5: Recurrence in two groups

			Groups		Total
			with suture	Without suture	
Recurrence	Loss to Follow-up	Count	3	0	3
			10.0%	0.0%	5.0%
	no	Count	26	28	54
			86.7%	93.3%	90.0%
	yes	Count	1	2	3
			3.3%	6.7%	5.0%
Total		Count	30	30	60
			100.0%	100.0%	100.0%

Discussion

There have been many attempts to optimise pterygium surgery. Today, a wide variety of techniques are in use, from conjunctival autografting to very complex approaches like amniotic membrane transplantation and lamellar keratoplasty.[7,19] The aim is to excise the pterygium and prevent its recurrence. However, most of the recent studies on the treatment of pterygium concluded that conjunctival autograft remains the safest technique and offers the lowest rate of recurrence in the management of primary pterygium.[20]

Here in this study, we compare the two different techniques of securing the conjunctival autograft, using sutures or the natural hemostatic mechanisms.

We included 60 eyes of 51 patients, aged between 23 and 56 years, who presented with primary pterygium, encroaching 2mm or more of the cornea. All the eyes underwent pterygium excision with conjunctival autografting by a single surgeon. Further, eyes were randomly selected into two groups, for the technique to be used for securing the graft. In 30 eyes, sutures were used and in the other 30 eyes, natural hemostatic mechanism for attaching the graft.

Randomisation was maintained in distribution of age, sex and laterality of the eye between the two groups. Most of the patients in both the groups belonged to BPL category, who could not afford to costlier procedures.

Mean operation time was 12 minutes in sutureless group and 20 minutes in suture group. A significant decrease in the operation time was noted in sutureless group. In a similar study conducted by D de Wit et. al., mean time of 14 minutes was taken for the surgery.[21]

It takes around 8 to 12minutes for the adhesive fibrinogen component to be formed to hold the graft against the sclera.[8,9] Further, the apposition of the lids to the bulbar conjunctiva provides a natural, frictionless biological dressing and confers a unique wound-healing environment, without disturbing the graft. Time taken for the surgery depends upon the surgical skill and experience of the surgeon.

There were no significant intra-op complications in any of the patients.

Post-operatively, 4 in sutureless and 7 in suture group had subconjunctival haemorrhage and 4 in suture group had graft edema, none of them causing graft displacement. Similar findings are reported by other workers. Allan and colleagues encountered one tenon

granuloma, one conjunctival inclusion cyst, and three wound dehiscence in a series of 93 cases, and concluded that the conjunctival autografting technique results in lower complication rates.[12]

Graft displacement was seen in one (3.3%) of the patients in suture group and in two (6.7%) among the sutureless group. There was no statistically significant graft displacement between the groups. 20% graft displacement was seen in similar studies on natural hemostasis for attaching conjunctival autograft by Lt Col Sonali V Kumar et.al.[22] Proper placement of the graft, allowing sufficient time for the adhesive fibrin components to secure the graft to the underlying sclera before closing the eye and proper patient education reduces the graft displacement rates.

Another parameter studied was post-operative ocular discomfort, may it be in the form of pain or pricking sensation or ocular surface irritation. Patients report different sensitivity for the same stimulus. In addition, they have different threshold for pain. Furthermore, they have different ability to report their experience. Patients were asked to mark the degree of discomfort that they experienced, on a visual analogue scale (from 0 to 10). Similar methods have been used by other researchers to evaluate post-operative pain following pterygium surgery.[10,23,24] Sutureless group had significantly decreased post-operative ocular discomfort than the suture group. Lt Col Sonali V Kumar et.al.,[22] and D de Wit et, al.,[21] also have demonstrated decreased post-operative pain following pterygium surgery with conjunctival limbal autografting using natural hemostatic method.

We followed-up the patients till 6 months post-operative period. Studies comparing four commonly used techniques for pterygium surgery reported mean time for appearance of any complication including recurrence was 4 months.[25] Hence, 6 months was a reasonable period of follow-up. 3 among suture group did not turn up. 1 out of 27 in suture group and 2 out of 30 in sutureless group had recurrence of pterygium. There appeared no significant difference in the recurrence rate between the two groups. This is in accordance with other studies. There were no recurrences seen in a follow-up period of 9 months by D de Wit et.al.[21] Similar recurrence rate was seen in conjunctival autografting with sutures by other workers. Syam and colleagues reported a recurrence rate of 3.3% in a study of 27 eyes. Recurrences were found to develop within 3 months after surgery.[26]

Ti and Tseng demonstrated that increased inflammation during the postoperative period increases the risk of pterygium recurrence.[27] Zu the use of silk and nylon sutures placed in the conjunctiva can cause inflammation, and migration of Langerhans' cells to the cornea.[28] In a large retrospective study, Koranyi et.al., were able to demonstrate a statistically significant decreased recurrence rate with the use of FG when compared with the use of sutures.[11] They postulated that a possible reduction in the migration of fibroblast cells caused by the rapid adhesion of the graft with the FG may lead to decreased postoperative inflammation.

Although the aetiopathogenesis of pterygium recurrence may be multifactorial, it is believed that reducing postoperative inflammation may play a significant role in reducing the recurrence rate.[27]

Conclusion

Conjunctival limbal autografting by taking the advantage of natural hemostasis following primary pterygium excision is a simple procedure, inexpensive, time saving, requires no special skills and eliminates suture related complications. It significantly reduces post-operative discomfort pterygium recurrence rate is comparable with other grafting procedures.

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