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Evaluation of Outcome of Pterygium Surgery After Conjunctival Autograft With the Use of Autologous Blood as Compared to Fibrin Glue

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Abstract

Aim: To evaluate outcome of pterygium surgery after conjunctival autograft with the use of autologous blood as compared to fibrin glue.
Materials And Methods: The present randomized case control study was conducted in the OPD, Department of Ophthalmology, JNMCH (Aligarh), Gandhi Eye Hospital (Aligarh) and Oculoplasty Clinic, Gandhi Eye Hospital (Aligarh) from Jan 15 to Nov 16. The study was conducted on patients suffering from Pterygium and was candidates for surgical intervention for the same. A detailed history of the visual loss was taken with emphasis on onset, duration and progression. All the surgeries were performed under operating microscope under aseptic conditions. All the patients were subjected to a thorough ocular examination at the baseline and at monthly follow ups for 3 months.Inquiries were made regarding the presence and duration of subjective symptoms including pain, foreign body sensation, tearing, and discomfort, at every follow-ups. Pain was assessed using Visual Analog Scale.
Results: Of the total 50 cases operated, 2 cases (8%) showed recurrence in 1st (AB) study group and in 2nd(FG) study group, no case showed recurrence.There was no significant difference among the study groups w.r.t. inflammation, subconjunctival haemorrhage and pain.
Conclusion: In conclusion, results of pterygium surgery in both groups were having same results.The autologous conjunctival graft surgery is safe and cost effective surgery. The cost of fibrin group is higher in comparison with autologous blood group.
Keywords: Pterygium, Surgery, Autologous Blood, Fibrin Glue, Outcome

Introduction

Pterygium is a degenerative condition of the conjunctival tissue which proliferate as vascularized granulation tissue to invade the cornea, which induces corneal astigmatism.[1] Typically, both eyes are affected, often with the lesion in the dominant eye preceding that in the other. Pterygium is most common in the so-called “pterygium area”, which is defined by a geographical latitude of 40° north and south of the equator. In this area, prevalence of up to 22% has been reported.[2-3] Pterygium is more often seen in men than in women.[4] This is attributed to the fact that males are exposed to dust and environmental irritants more than

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women. People working and living outdoors are shown to be more affected. Multivariate logistic analysis in an Australian population has identified risk factors including hazel-green eye colour, red hair, skin burns, time spent outdoors and use of sunglasses.[5]
Patient may have foreign body sensation, discomfort, congestion (redness), irritation, grittiness, blurring of vision either because of induced astigmatism or obscuring visual axis. Indications for surgery include visual impairment, cosmetic disfigurement, motility restriction, recurrent inflammation, interference with contact lens wear and rarely, changes suggestive of neoplasia. Postoperative recurrence rates could have been up to 50% of the cases. The basic goals of good pterygium surgery are to cleanly remove pterygium tissue from the ocular surface and to prevent recurrence. Today, satisfactory cosmetic results are also a concern. [6]
Placing an ipsilateral conjunctival autograft to cover the naked scleral bed after pterygium excision makes it possible to recreate the normal architecture of the limbus and has been associated with low rates of recurrence. The oldest description of conjunctival autograft for pterygium surgery dates back to sixties. The cut and paste technique for pterygium surgery was first reported by Kenyon et al. in 1985. [7]
Conjunctival autograft of the bare sclera could be used in treatment of recurrent and advanced pterygium. Recent reports favour the use of fibrin glue above sutures with improved comfort, decreased surgical time, reduced complications and recurrence rates having been reported. Suture-related complications include infection, granuloma formation, and chronic inflammation, whereas plasma-derived fibrin glue has the potential risk of prion disease transmission and anaphylaxis in susceptible individuals. Plasma derived products such as fibrin glue may produce possible hypersensitivity reactions whereas the risk of viral transmission remains.
We study sutureless and glue free [SGF] conjunctival autograft of achieving conjunctival autograft adherence during pterygium surgery avoiding potential complications associated with the use of fibrin glue or sutures. Primary outcome measured are recurrence of pterygium after its excision with conjunctivolimbal autologous transplantation (CLAT) with FG and autologous blood and evaluation of post-operative inflammation, subconjunctival haemorrhage, ocular pain and graft stability.

Materials And Methods

The present randomized case control study was conducted in the OPD, Department of Ophthalmology, JNMCH (Aligarh), Gandhi Eye Hospital (Aligarh) and Oculoplasty Clinic, Gandhi Eye Hospital (Aligarh) from Jan 15 to Nov 16. The study was conducted on patients suffering from Pterygium and was candidates for surgical intervention for the same.

Inclusion Criteria

1. Patient with primary pterygium (Nasal/Temporal/Double/monocular)
2. Patient willing to participate in the study due to cosmetic disfigurement
3. Healthy Patient (No age, sex criteria)

Exclusion Criteria

1. Patient with recurrent pterygium
2. Patient with bleeding disorder or on anticoagulant therapy
3. Any other ocular pathology and past ocular surgery in last 6 month and historyof trauma

Clinical History

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Each patient was evaluated clinically and the details documented on a specially designed proforma. A detailed history of the visual loss was taken with emphasis on onset, duration and progression.
All the patients were subjected to a thorough ocular examination at the baseline and at monthly follow ups for 3 months.

Visual Acuity and Refractive Status
A pre and post surgery assessment of visual acuity and refractive status was carried out in all the cases. Visual acuity assessment was done at baseline and at monthly follow ups for 3 months.

Slit Lamp Biomicroscopy
Slit Lamp Bio-microscopy with Takagi SM-70N was performed for thorough examination of the anterior and posterior segment of the eye. Cornea, anterior chamber, iris, status of the lens was examined in detail. Anterior segment photography was to be performed pre and post-operatively.

Intraocular Pressure
Non-Contact tonometer was used for recording of intraocular pressure in all cases except in unco-operative patients, where Schiotz tonometer was used. A mean of three values was taken.

Keratometry
Corneal radius of curvature (K1 and K2) was measured with the help of keratometer (APPASWAMY). A mean of three values was taken.

Surgical Technique
All the surgeries were performed under operating microscope under aseptic conditions and after pre-operative evaluation based on above mentioned criteria.

- Peribulbar anesthesia was used in all cases.
- Surgical site and eyelashes were cleaned with 5% Povidone iodine and sterile drape was put in place.
- After insertion of lid speculum, lidocaine with adrenaline injection was injected into pterygium body.
- Blunt and sharp dissection was performed to separate the pterygium from the underlying sclera and surrounding conjunctiva.
- The pterygium was excised till limbus was reached.
- Head of the pterygium encroaching upon cornea was dissected with 3.2mm crescent blade from underlying cornea and to make corneal surface smooth.
- The remaining Tenon’s capsule and episcleral tissue was removed using Vannas scissors to prepare a smooth and clean graft bed.
- •Minimal bipolar wet field cautery was used to achieve hemostasis before harvesting the free conjunctival auto-graft from supero-temporal limbus, the graft bed was measured using a caliper.
- A lidocaine-epinephrine injection was injected under the donor supero-temporal conjunctiva and balloon out the area of graft and separate it from underlining Tenon's capsule.
- Injection site of lidocaine was kept outside the graft area to avoid button hole in the graft.

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- The donor graft was excised with an additional 1.0 mm of length and width relative to the dimensions of the graft bed by measuring a caliper.
- By use of minimal manipulation with atraumatic conjunctival forceps and Vannas scissors, the conjunctiva was carefully dissected away from the Tenon's capsule.
- The limbal and temporal side of the graft was marked by a Viscoat marker.
- Care was taken to prevent buttonholes and graft rollover. The dissected graft was flipped over the cornea, and then including the palisades of Vogt which contains the limbal stem cells, the graft was excised from limbal attachment by Vannas scissor.
- The free graft then was placed on top of the cornea and kept moist.

Procedure of Autologous Blood

- If no blood was available at the recipient site to provide autologous fibrin, small veins and capillaries puncture with 26G disposable sterile needle was done purposely to encourage a thin layer of fresh blood to cover the bare sclera.
- Care was taken to position of limbal edge of the graft at the host bare sclera over the blood film.
- The scleral bed was seen through the transparent conjunctiva and to ensure residual bleeding was not be done relift the graft, small central hemorrhages were tamponaded with direct compression using McPherson Kelman forceps until hemostasis was achieved, usually within 8–10 min.
- The stabilization of the graft was tested centrally and on each free edge to ensure firm adherence to sclera.

Procedure of Fibrin Glue

- The day on under fibrin glue was going to be used, fibrin glue was taken out from refrigerator half an hour before surgery.
- A drop of fibrinogen solution was placed on the bare sclera and spread out with a needle cannula.
- Thrombin solution was applied on the donor graft surface placed on top of the cornea.
- The graft coated with thrombin solution was then immediately flipped over and spread out onto the bare sclera coated with fibrinogen solution by using two McPherson forceps, and soon thrombin and fibrinogen reacted to seal the donor graft to bare sclera.
- It was ensured that the limbal stem cell population was oriented toward the limbus and the sides of the graft were opposed to the edges of the recipient conjunctiva.
- After a drying period of 5 minutes, the redundant margins of the graft was excised with Vannas scissor and the lid speculum was removed.
- Operating time was measured starting from the placement of the lid speculum to its removal at the end of surgery.

Post Operative

- Topical preservative free Moxifloxacin (0.5%) was instilled in the operative eye.
- Operated eye was patched for 24 hrs.
- LoteprednolEtabonate (0.5%) and (0.5%) Moxifloxacin eye drops were applied 4 times daily for one month after the surgery and then tapered over next two week after the surgery.

Surgical Results Evaluation

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- To evaluate the efficacy of Autologous blood and Fibrin glue as tissue adhesive during conjunctivolimbal autograft surgery for pterygium and patients were questioned about subjective symptoms in the postoperative follow-ups over 3 months.
- The patients were followed up on the first day after surgery and then on weeks 1, 2, 4, 8 and 12. Inquiries were made regarding the presence and duration of subjective symptoms including pain, foreign body sensation, tearing, and discomfort, at every follow-ups.
- Pain was assessed using Visual Analog Scale.

Data was subjected to statistical analysis using SPSS version 24.

Results

First 25 cases were in first group which operated with Autologous blood (AB) and other 25 cases were in second group which operated with Fibrin glue (FG). All the surgeries were performed by a two surgeons. The mean age of this study group was 36.92 years with a standard deviation of ±13.79 and age group of second group (FG) ranged between 20 years to 60 years. The mean age of this study group was 45.28 years with a standard deviation of ±10.48. In first study group 13 cases were Male (52%) and 12 cases were Female (48%) and in second group 16 cases were Male (64%) and 9 cases Female (36%). The corneal involvement measured in mm of encroachment of cornea from limbus on slit lamp examination ranged from 2-5mm in both study groups as shown in table 1.

Table 1: The age, gender and corneal involvement of pterygium distribution of patients in both study groups

Age group	**Group-1(AB) Number (%)**		**Group-2(FG) Number (%)**	
20-30	9(36%)		3(12%)	
31-40	9(36%)		5(20%)	
41-50	4(16%)		9(36%)	
51-60	2(8%)		8(32%)	
61-80	1(4%)		0%	
Group	**Male**		**Female**	
AB(1)	13(52%)		12(48%)	
FG(2)	16(64%)		9(36%)	
CornealInvolvement (mm)	**1st (AB)**		**2nd (FG)**	
	Number	**Percentage**	**Number**	**Percentage**
2-3	18	72%	7	28%
3-4	4	16%	14	56%
4-5	3	12%	4	16%

The history of exposure to outdoor irritants like sun rays, dust, smoke was present in 13 patients (48%) and absent in 12 patients (52%) in first study group (AB) and in second study group (FG), exposure was present in 7 patients (28%) and absent in 18 patients (72%) as shown in graph 1.

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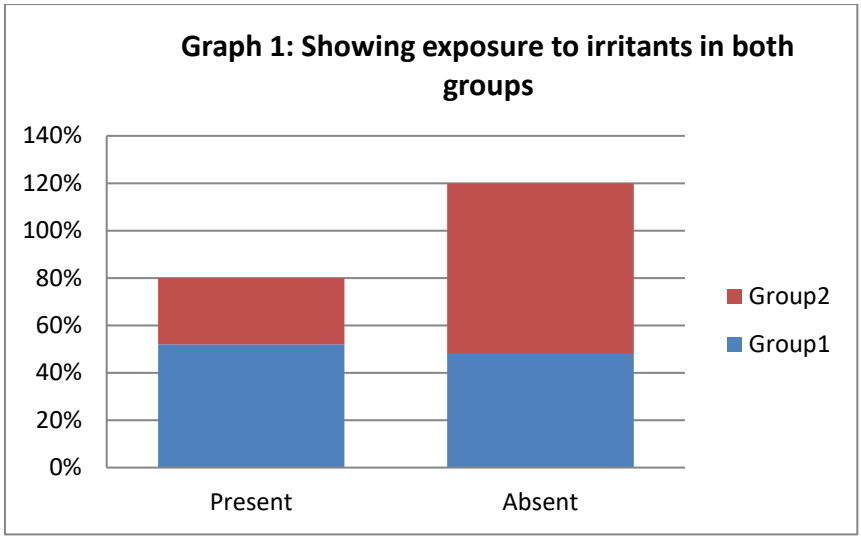

Recurrence of pterygium after its excision with the conjunctival auto graft using autologous blood and fibrin glue was defined as primary outcome measure. Recurrence was defined as any fibro vascular growth over cornea by slit lamp examination during the follow up period of 3 months. In both study group total 25 cases operated per group and 2 cases (8%) showed recurrence in 1st (AB) study group. Both recurrence was seen at the end of 2nd month in follow up period and None of the recurrent case showed in 2nd (FG) study group (table 2).

Table 2: Showing recurrence

Recurrence			
AB (1st)	**Yes**	**No**	
	2(8%)	23(92%)	25
FG (2nd)	0(0%)	25(100%)	25
Total	2	48	50
P value- 0.24 (Fisher's exact test)			

In 1st (AB) study group of the total 25 cases, 10 cases showed no graft displacement and were classified as grade 0. Thirteen cases showed gaping at nasal side of the graft bed and were classified as grade 1. Two cases showed nasal and superior gaping and were classified as grade 2. No case showed displacement on three side (grade 3) and complete displacement of graft from graft bed (grade 4). In 2nd (FG) study group of the total 25 cases, 16 cases showed no graft displacement and were classified as grade 0. Six cases showed gaping at nasal side of graft bed and were classified as grade 1. Three cases showed nasal and superior gaping and were classified as grade 2. No case showed displacement on three side (grade 3) and complete displacement of graft from graft bed (grade 4). In 1st (AB) study group, of the total 25 cases operated, 17 cases showed no signs of inflammation and were graded as grade 0. In 2nd (FG) study group, 19 cases showed no signs of inflammation and were graded as grade 0. Five cases showed grade 1 and one cases showed grade 2. In 1st (AB) study group, of the 25 cases operated, eight cases showed no subconjunctival haemorrhage on graft bed and was graded as grade 0. In 2nd (FG) study group, 21 cases showed no subconjunctival haemorrhage on graft bed and two cases showed grade 1. Two cases showed grade 2. None of the cases showed grade 3 and grade 4as shown in table 4.

Table 4: Showing graft stability, degree of inflammationand subconjunctival haemorrhagein both study groups

Graft stability						
Grade	**0**	**1**	**2**	**3**	**4**	**Total**
Group1 (AB)	10	13	2	0	0	25

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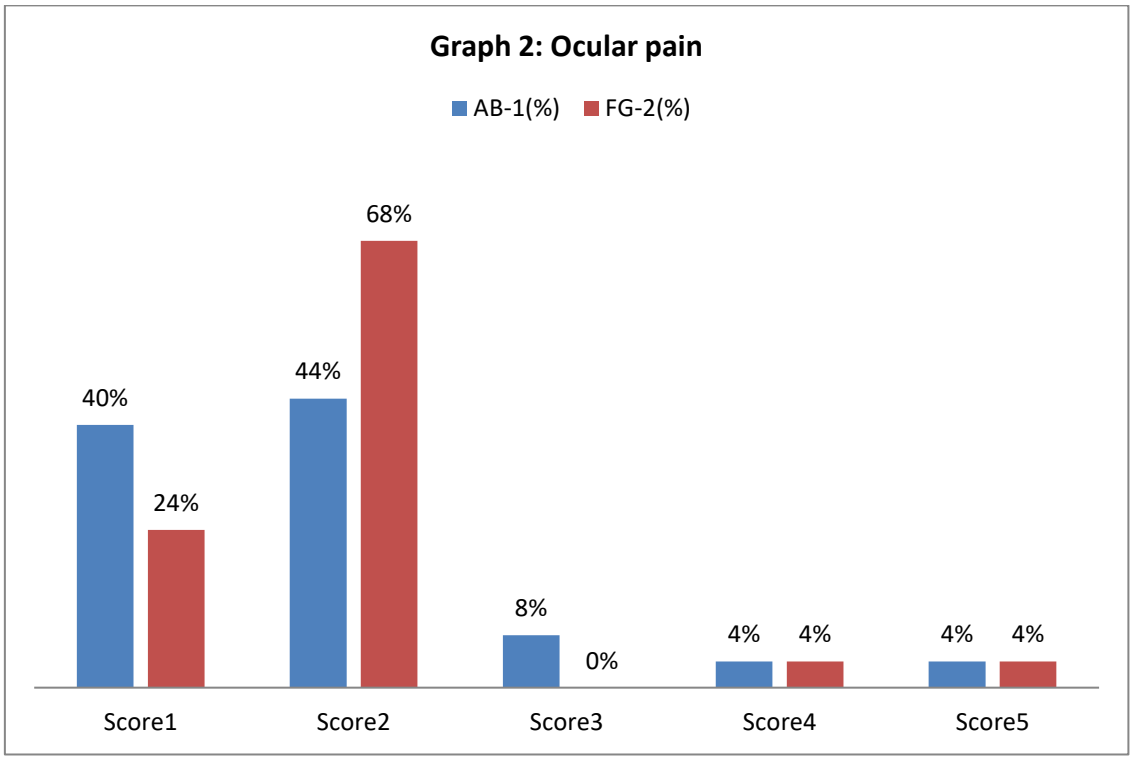
Group2 (FG)	16	6	3	0	0	25
Total	26	19	5	0	0	50
P value-0.1247 (Chi square test)						
Degree of inflammation						
Grade	**0**	**1**	**2**	**3**	**4**	**Total**
Group 1	17	5	3	0	0	25
Group 2	19	5	1	0	0	25
Total	36	10	4	0	0	50
P value- 0.5738 (Chi square test)						
Subconjunctival haemorrhage						
Grade	**0**	**1**	**2**	**3**	**4**	**Total**
Group1	8(32%)	11(44%)	6(24%)	0(0%)	0(0%)	25
Group2	21(84%)	2(8%)	2(8%)	0(0%)	0(0%)	25
Total	29	13	8	0	0	50
P value: 0.0009 (Chi square test)						



Discussion

Management of pterygium still remains an enigma. Literature is replete with a variety of surgical procedure with variable success rates. However, the recurrence of pterygium still remains the most enigmatic complication. Recurrence rate varies from procedure to procedure. Both simple excision and excision with bare sclera technique (D'ombrain's) carry a high recurrence rate of 30% to 100%. [8]

To improve the success rate various adjunctive modalities have been described like post-operative beta irradiation, thiotepa, Mitomycin C (MMC), conjunctival autograft, amniotic membrane graft and lamellar keratoplasty. Fibrin-based adhesives may be used under a superficial covering layer (conjunctiva, amniotic membrane etc) without inducing inflammation. Fibrin glues had been used in an array of ophthalmic procedures such as conjunctival closure in strabismus, vitreoretinal and glaucoma surgery. Tissue adhesives of

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different types had been used in previous studies to attach conjunctival grafts and, compared with the use of sutures, were associated with a shorter operative time and reduced postoperative complaints. However, the recurrence rates after the use of fibrin glue had been investigated in only a few studies, the results of which have been inconsistent.

Patients own blood was used as a bio adhesive in pterygium surgery and the recurrence rate was found to be similar to fibrin glue. It avoided the use of foreign materials such as suture and glue associated with increased inflammation, infection and hypersensitivity reactions.

In present study 25 patients of primary pterygium underwent pterygium excision with conjunctival autograft using autologous blood and 25 patients of primary pterygium underwent with conjunctival autograft using fibrin glue.

In present study maximum number of cases were in age group 20-30 years (36%) in 1st (AB) study group. Mean age of first study group was 36.92 years with a standard deviation of ± 13.79. In 2nd (FG) study group, maximum number of cases were in age group 41-50 years (36%). Mean age of second study group was 45.28 years with a standard deviation of ± 10.48.

GunjanRathi et al (2015) reported a mean age was 42.5 ± 4 years (range 30-55 years) in their study done on 50 eyes from 50 patients. Sirisha G et al (2016) reported a mean age was 43.82 years and SD was ± 12.66 years in their study done on 50 eyes from 50 patients. Kulthe et al [9] reported a mean age was 46.85 years and a SD was ±10.59 years in 53 female patients and a mean age was 45.04 years and a SD was ±17.27 years in 26 males in their study done on 79 eyes of 74 patients.

The age group in our study with autologous blood, was comparable with the age group reported by Dasgupta et al [10] in their study and age group in our study with fibrin glue, was comparable with age group reported by other all studies with exception of study done by De Wit et al [11].

In present study, of the total 50 cases, 13 cases were male (52%) and 12 were female (44%) in 1st (AB) study group and in 2nd (FG) study group, 16 cases were male (64%) and 9 cases were female (36%). The sex ratio in our study group was in accordance with the sex ratio reported by other studies with the exception of study done byElwan S. A. M. [12]. By the nature of their occupation, men are exposed to dust and environmental irritants more than women.

Recurrence of pterygium was the primary outcome measure in the present study. Recurrence of pterygium in our study was seen in 2 cases (8%) over a follow up period of 3 month in 1st (AB) study group. Both the cases recurrence was noted at the end of 2nd month. No case of recurrence was reported in FG group. None of the recurrent cases were operated. However, the difference was not found to be statistically significant (P = 0.24; Fisher exact test) in both study group.

De Wit et al [11] and Sharma et al [13] reported no recurrence over a period of 12 months follow up with autologous blood and Kulthe et al [9] reported no recurrence over a period of 6 months follow up with autologous blood. The reason being, apposition of the lids to the bulbar conjunctiva provides a natural biological dressing which allows a unique wound healing environment. Limbal conjunctival autograft transplantation re-establishes the barrier function of limbus and hence significantly lowers the recurrence rate. Singh PK et al [14] reported recurrence of 10% with use of autologous blood in a study group of 20 patients. Elwan S. A. M. [12] reported recurrence of 6% with use of autologous blood in a study group of 50 patients and pterygium excision with limbal conjunctival autograft had been reported to be more effective with low recurrence. Sati et al [14] reported such as a recurrence rate was similar (p = 0.585) with use of autologous blood across other groups (FG and Suture) in a study group of 90 patients.

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In contrast to these result, Sophie Boucher et al [16] reported recurrence of 20% in a study group of 20 patients and concluded that conjunctival autograft fixation with autologous blood resulted a higher recurrence rate compared with fixation with fibrin glue. Sirisha G et al (2016) reported recurrence rate of 2% with autologous blood in a study group of 50 patients over 6 month follow up period. Dasgupta et al [10] reported recurrence rate of 2% at 3½ months follow-up in a study with use of autologous blood and the reason could be attributed to the inadvertent inclusion of tenon in the graft or because of the aggravated tissue response related to patient's younger age, rather than because of the surgical method.

In present study 40% cases showed no evidence of graft retraction on 1st post-operative in 1st (AB) group and 64% cases showed in 2nd (FG) group, and on follow up. However, 52% patient showed retraction at nasal side of the graft bed and 8% patients showed retraction at nasal and superior side of graft bed on 1st post-operative day in 1st (AB) study group and in 2nd (FG) study group, 24% patient showed retraction at nasal side and 12% patients showed retraction at nasal and superior side of graft bed on 1st post-operative day due to conjunctival chemosis and were resolved with conservative treatment. However, the difference was not found to be statistically significant (P = 0.1247; Chi square test) in both study groups. The retraction in these patients didn't increase on follow up period and there was no evidence of retraction and graft displacement at the end of 3rd months in both study groups.

Singh PK et al [14] were found graft displacement and graft retraction were more common in patients with grafting with autologous blood (10%) than in those with grafting with the glue. However, the difference was not found to be statistically significant (P = 0.3185). These complications were associated with larger grafts. Elwan S. A. M. [12] was found early graft retraction with exposure of scleral bed occurred in 6 eyes (12%) in group (AB) and in 6 eyes (6%) in group (suture) within the first postoperative week due to conjunctival chemosis and were resolved with conservative treatment. Rathi G et al (2015) were found graft loss occurred in one eye in the immediate postoperative day. It was one of their initial cases and occurred during dressing probably due to forceful jet of fluid during cleaning.Kurian A et al (2015) were found 3.13% total graft dislodgement in Group I (AB) requiring regrafting from another site or reattachment with glue and In Group II(FG), 2.04% had graft dislodgement on the first postoperative day requiring regrafting from another site.

Kulthe et al [9] were found medial edge recession of the graft was seen 1.2% and 2.5% had lost graft on the first postoperative day and Dasgupta et al [10] were found partially displaced graft was noticed in 2% at the first postoperative day with using of autologous blood in their studies and this could be because patients accidentally rubbed the operated eye.

In present study, all the 50 cases complained of pain on first post op day. Objective assessment of pain varied on a score of 1-5. In 1st (AB) study group, of the 25 cases operated, 32% cases showed no subconjunctival haemorrhage on graft bed and 44% cases showed grade 1 and 24% cases showed grade 2 subconjunctival haemorrhage. In 2nd (FG) study group, 84% cases showed no subconjunctival haemorrhage on graft bed and 8% cases showed grade 1. 8% cases showed grade 2. However, the difference was found to be statistically significant (P = 0.0009; Chi square test) in between both study groups.

Elwan S.A.M. [12] experienced conjunctival chemosis occurred in 16% in group 1(AB) and in 6% in group 2(Suture). Most cases of conjunctival chemosis resolved gradually within the first post-operative week. Conjunctival chemosis occurred in the study, using interrupted 10/0 nylon suture in group 2 which allowed for any fluid build up to escape through the intervening spaces rather than precipitating a minimal reaction.Rathi G. et al (2015) were found sign of inflammation like chemosis, 4% in cases which was probably due to noncompliance of patients for topical medication. Sirisha G. et al (2016) reported 90 % patients had no complications which had the conjunctival autograft fixated with autologous blood. This procedure had excellent outcome. It was cost effective and safe for the patients.

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The potential risks associated with the use of fibrin glue and suture related problems are avoided in this technique. Mittal K et al [17] were found median score of graft inflammation was significantly more for group 2nd (FG) than group 1st (AB) during the first week ($P<0.05$; Wilcoxon rank-sum test). Autologous blood may be used as an effective alternative with lesser postoperative inflammation in comparison to glue-assisted autograft fixation.

Advantage of comparative study

Like all the previous study this study was an attempt to assess the recurrence of pterygium after application of autologous blood and fibrin glue. However, in this study other outcome measured like graft stability and post-operative complications with use of autologous blood and fibrin glue were also studied.

Disadvantage of present study

Our study had several limitations. It was non-randomized and consisted of a small study population and a short follow-up period of 3 months.

Conclusion

In conclusion, results of pterygium surgery in both groups were having same results. There was no significant difference in recurrence rate after surgery. However, three months follow up period was short to define the recurrence rate. So a larger follow up studies were needed to confirm the same. The autologous conjunctival graft surgery is safe and cost effective surgery. The risk of transmission of infection is there with fibrin group but autologous blood group is free of this risk factors. The cost of fibrin group is higher in comparison with autologous blood group. Although sharing of the injection by many patients may bring down the cost in fibrin group.

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