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SUTURELESS GLUEFREE TECHNIQUE FOR PTERYGIUM EXCISION: BETTER COSMESIS AND EARLY REHABILITATION

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ABSTRACT
Purpose to compare the efficiency and safety of Sutures, Fibrin Glue and Sutureless-Gluefree Technique for Conjunctival Autografting in Pterygium Excision Surgery. In this prospective interventional study, 150 eyes from 150 patients with primary pterygium were included for conjunctival autograft surgery. Patients were randomly divided into three groups: group I (50 eyes) underwent CAG with suture, group II (50 eyes) underwent CAG with fibrin glue and group III (50 eyes) with patient's own blood coagulum as adhesive. Three months follow up was done. The patients were closely followed up for a period of 3 months for graft stability, sub graft hemorrhage, graft inflammation, recurrence or any other complication. Patients were also enquired for subjective symptoms like pain, watering, foreign body sensation, and itching. The cosmesis and rehabilitation were better and faster in Group III patients. Grafts were stable in the three techniques, the difference in the three groups were not significant. For sub-graft hemorrhage no significant differences were observed. Post-operative inflammation was seen maximum in suture group and minimum in SGF group at day 1 ($p<0.001$), day 2 ($p<0.001$) and day 7 ($p<0.001$). At 1 month ($p=0.122$) and 3 month ($p=1.000$) follow up visit also, inflammation was minimum in Group III also, though the differences was not statistically significant. Post-operative patient subjective symptoms were minimum in group III. The differences among the groups were significant upto 7 day follow up, thereafter they were not statistically significant. 2 patients in Group I (4.3%) and 1 in Group II (2.1%) had recurrence. Statistically, the difference among groups was not significant ($p=0.357$). Sutureless and gluefree limbal conjunctival autografting following pterygium excision has better cosmesis, faster surgical and more comfortable patient rehabilitation time and is a safe, and economical option for the management of primary pterygium requiring surgical intervention.

INTRODUCTION

Pterygium is a Greek word meaning wing of a butterfly. Pterygium is a fleshy, triangular shaped growth of bulbar conjunctival epithelium and hypertrophied subconjunctival connective tissue encroaching onto the cornea. It is a degenerative condition of the subconjunctival tissues which proliferate as a vascularized granulation tissue to invade the cornea, destroying the superficial layers of the stroma and the Bowman's membrane, the whole being covered by conjunctival epithelium. The first ever documentation of pterygium was done by the great surgeon of ancient India, Sushruta (3000 BC) who called it as 'Armans' [1].In India, it is called 'nakhoona' in Hindi, due to its resemblance to a nail in its shape.The prevalence rate of primary pterygium varies from 0.7 to 31% in various populations around the world [2, 3]. Pterygium is more frequent in areas with more ultraviolet radiation, in hot, dry, dusty, windy, and smoky environments. There is also a hereditary factor [4].

Risk of pterygium is higher in people who work outdoor in an environment with high surface reflectance of ultraviolet light compared with those who work indoor. The use of hats and sunglasses is protective [5]. Pterygium is perhaps the most obvious of the ophthalmohelioses (sun-related eye condition) and can blunt sight in various ways [6]. There are several reviews dealing with the etiology of pterygium and yet a satisfactory explanation remains elusive.

Coroneo has suggested that the anterior segment peripheral focusing effect causes the UV- B light to be preferentially focused at the nasal limbus and nasal cornea [6]. This may account for why pterygium usually occur nasally [7].

In the past, the pathogenesis of pterygium was thought to be related to disturbance of the tear film spread. New theories include the possibility of damage to limbal stem cells by ultraviolet light and by activation of matrix metalloproteinases (MMP) [8]. Ultraviolet light is widely accepted to be the single most important etiologic factor in its causation [9]. Chiang *et al* noted the presence of cyclooxygenase -2 in pterygial tissue and suggested its role in pterygium formation [10].

Coroneo *et al* concluded in their study that pterygium can be considered to be a proliferative, invasive lesion with focal limbal failure associated with excessive UV exposure [11]. It is characterized by chronic inflammation and angiogenesis with resultant connective tissue remodeling. This is in contrast to the traditional notion of pterygium being considered as purely degenerative process. Pterygia warrant treatment when they become cosmetically bothersome, encroach upon the visual axis, induce significant astigmatism, causes persistent irritation or causes diplopia due to interference in ocular movement.

Conjunctival autografting is generally regarded as the procedure of choice for the treatment of primary and recurrent pterygium. There are different methods of autografting, but none of the technique had an extremely low rate of recurrence and other surgical complications and provided a consistently excellent result.

We conducted this prospective interventional study to evaluate the outcome of sutureless gluefree limbal conjunctival autografting for primary pterygium.

MATERIAL AND METHODS

This prospective Study was conducted at Dr. Mohan Lal Memorial Gandhi Eye Hospital, Aligarh. Permission for this study was obtained from the ethical committee of the hospital. Informed consent was taken from the patients in their own language in a prescribed bilingual format. 150 patients who fulfilled the inclusion criteria were selected from those attending out patient department presented with primary pterygium.

Inclusion criteria: Age (20 to 75 years), Patients with primary pterygium

Exclusion criteria: Patients with history of any previous ocular surgery, patients with eyelid disease, or anterior segment pathology like conjunctivitis, symblepheron, keratitis, corneal degeneration, corneal dystrophy and anterior uveitis, patients with history of ocular trauma six months back, patients on aspirin or other anticoagulants, mentally retarded patients, or uncooperative patient.

A detailed history was taken and thorough ophthalmic examination was done.

The patients were randomized into three groups. Group I involves conjunctival autografting with sutures, group II involves conjunctival autografting with fibrin glue and Group III involves conjunctival autografting with patient's autoblood.

Surgical technique

All the procedure were performed by one surgeon to ensure similarity in the procedure, thereby eliminating intersurgeon variability. Pterygium excision was performed after administration of peribulbar anaesthesia. The local blocks consisted of a 6:4 mixture of 2% lignocaine with 1:20,000 epinephrine and 0.5% bupivacaine. Under aseptic precautions, after insertion of a lid speculum, the head of the pterygium was separated from the cornea and dissected towards the limbus. The body was trimmed up to 4 mm away from the limbus. Subconjunctival fibrous tissue was removed as much as possible taking care not to damage the underlying muscle sheath. Hemostasis was achieved by pressure application at the bleeding site. Residual fibrovascular tissue on the surface of the cornea was removed with a toothed forceps. The dimensions of the bare sclera were measured with vernier caliper. A free conjunctival graft was harvested from supero-limbal bulbar conjunctiva taking care not to include Tenon tissue under the graft. The donor graft should be of 1mm larger in length and width in comparison to the bare sclera. The entire graft was excised from its limbal attachment with Vannas scissors, with care taken to maintain the epithelium side up and the limbal edge toward the limbus. The donor graft was placed on the top of cornea, it helps in unfurling the donor graft and maintaining the proper orientation. The graft was kept moist.

Group I: Conjunctival Autograft with Sutures

The graft was approximated to the recipient conjunctival edge with 4 or 5 interrupted 8-0 vicryl sutures. Care was taken to maintain proper orientation with the epithelial side up and the limbal edge towards the limbus.

Group II: Conjunctival Autograft with Fibrin Adhesive

Preparation of Fibrin Glue

Fibrin glue is a blood derived product that consists of two components: fibrinogen and thrombin, both prepared by processing plasma. When mixed and fibrinogen is activated by thrombin, an adhesive fibrin network is formed. It can be prepared at a blood transfusion center or from patients own blood or obtained

as a commercially available preparation. Reliseal (Reliance Life Sciences Pvt. Ltd., Mumbai, India) is a commercially available fibrin adhesive. It was prepared according to the manufacturer's directions.

The two components of fibrin glue can either be applied simultaneously with Reliseal applicator or sequentially. 1 drop of fibrin glue was applied over the bare sclera in the recipient bed and spread out with the cannula. The graft was immediately placed in the correct orientation onto the bare sclera and gently smoothed. Thereafter, the edges of the graft were cautiously apposed to the edges of the recipient conjunctiva by forceps for 30 seconds for firm adhesion.

Group III: Conjunctival Autograft with Autoblood

In Sutureless-Gluefree group, the bare sclera was allowed to bleed, if no blood was available to provide autologous fibrin, small perforating veins and capillaries were purposely punctured to encourage a thin layer of blood to cover the scleral bed. The conjunctival autograft was then applied over the bare sclera and allowed to adhere spontaneously over it. Care was taken to maintain the orientation of the juxtalimbal border toward the cornea and to prevent graft rollover. The free graft was held in position, until firm setting of the autologous fibrin had occurred. Care was taken to ensure that excessive and prolonged bleeding did not displace the graft, and residual active hemorrhage visible under the surface were tamponaded with direct compression using a blunt instrument like the iris repositor.

Surgery time was monitored and noted from the insertion of the lid speculum to the removal of lid speculum.

A simple pad and bandage was used. The bandage was opened on the first postoperative day. Patients were advised not to rub their eyes or indulge in contact sports for a few days. Postoperative therapy included 1% prednisolone acetate eye drops and 0.5% moxifloxacin eye drops every 4 hours in the first week, tapered gradually over 1 month.

All subjects were seen at 1 day, 2 day, 1 week, 1 month and 3 months postoperatively. During each postoperative visit, history regarding pain, itching, watering and foreign body sensation was taken and slit-lamp examination was performed. Patients were graded on the degree of graft stability, subgraft hemorrhage, graft inflammation and subjective symptoms using a 5 point scale. Recurrence was defined as any regrowth of fibrovascular exceeding 1mm onto the cornea. Other complications like diplopia, symblepheron, dellen formation, granuloma formation were also looked for.

Statistical analysis

Data was tabulated and statistically analyzed.

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 15.0. Chi-square test was used for comparison of categorical data, Kruskall-Wallis H and Mann Whitney U tests were used to compare the ordinal data. Analysis of variance followed by Independent samples 't' test was used to compare the continuous data. The data has been represented as frequencies and percentages and mean and standard deviation.

A "p" value less than 0.05 indicated a statistically significant association.

RESULTS

Age of patients ranged from 21 to 70 years. Mean age of patients in Groups I, II and III was 41.64±14.30, 38.22±10.81 and 38.44±12.74 years respectively. Statistically, there was no significant difference in mean age of patients in different groups (p=0.324).

With respect to gender, majority of patients in Group II were male (n=28; 56%) whereas majority of patients in Group III were females (n=31; 62%). In contrast, in Group I, both the genders were evenly distributed (n=25; 50%). Despite these proportional differences, the difference among groups was not significant (p=0.185).

Time taken for procedure ranged from 10 to 25 min. Mean time taken was minimum in Group III (14.68±2.27 min) and maximum in Group I (19.12±3.47 min). Mean time taken was 15.50±2.38 min in Group II. It was observed that both Groups II and III took significantly lesser time as compared to Group I ($p<0.001$), however, the difference between Groups II and III was not significant statistically (p=0.081).

No grafts were lost in the three groups. No significant differences were observed for graft stability and sub-graft hemorrhage. On day 1 and day 2, graft edema occurred in 4 (8%) cases of Group II only, thus showing a significant difference among groups (p=0.016).

Patient discomfort including pain, irritation, watering and foreign body sensation were lesser in Group II and Group III in comparison to Group I from day 1 to day 7 follow up, which were statistically significant. After 1 week the difference among the group were not statistically significant.

1 patient in Group III developed granuloma at 1 month, attributable to finger nail trauma, required surgical intervention.

None of the pterygium recurred in SGF Group in comparison to 2 recurrence in Suture group (4.3%) and 1 in Fibrin Glue Group (2.1%) in our 3 month follow up period, however, the difference in complication rates among groups was not significant statistically (p=0.761).

No other complications like symblepheron formation, motility restriction, dellen formation, infection or anaphylaxis were noted.

Table 1. Scoring Of Variables

Outcome Variables	Scoring				
	Grade 0	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**
Graft stability	All four sides of the graft margin are well apposed	Gaping/displacement of one side of the graft bed junction	Gaping/displacement of two sides of the graft bed junction	Gaping/displacement of three sides of the graft bed junction	Graft completely displaced from the bed
Subgraft hemorrhage	None	< 25% of the size of the graft	< 50% of the size of the graft	< 75% of the size of the graft	Hemorrhage .involving the entire graft
Inflammation	No dilated corkscrew vessel in the graft	1 dilated corkscrew vessel crossing the graft bed margin	2 dilated corkscrew vessels crossing the graft bed margin	3 dilated corkscrew vessels crossing the graft bed margin	≥3 dilated corkscrew vessels crossing the graft bed margin
Pain	None	Very mild, but easily tolerated	Mild, causing some discomfort	Moderate, that interferes with usual activity or sleep	Severe, that completely interferes with usual activity or sleep
Itching	None	Very mild, but easily tolerated	Mild, causing some discomfort	Moderate, that interferes with usual activity or sleep	Severe, that completely interferes with usual activity or sleep
Watering	None	Very mild, but easily tolerated	Mild, causing some discomfort	Moderate, that interferes with usual activity or sleep	Severe, that completely interferes with usual activity or sleep
FB sensation	None	Very mild, but easily tolerated	Mild, causing some discomfort	Moderate, that interferes with usual activity or sleep	Severe, that completely interferes with usual activity or sleep

Table 2. First Follow Up Evaluation (Day 1)

SN	Parameter	Group I (n=50)		Group II (n=50)		Group III (n=50)		Statistical significance (Kruskal Wallis test)	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**H**	**P**
1.	Graft stability	0.15	0.42	0.23	0.47	0.38	0.71	2.926	0.232
2.	Subgraft hemorrhage	0.70	0.74	0.66	0.75	0.44	0.54	3.126	0.210
3.	Inflammation	2.84	0.71	2.04	0.90	1.70	0.99	37.96	<0.001
4.	Pain	1.46	0.89	0.60	0.64	0.52	0.54	35.68	<0.001
5.	Itching	0.12	0.33	0.11	0.32	0.00	0.00	6.48	0.039
6.	Watering	0.58	1.03	0.58	0.64	0.24	0.48	8.03	0.018
7.	FB sensation	0.92	0.90	0.44	0.58	0.34	0.52	14.81	0.001

Table 3. Second Follow Up Evaluation (Day 2)

SN	Parameter	Group I (n=50)		Group II (n=50)		Group III (n=50)		Statistical significance (Kruskal Wallis test)	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**H**	**P**
1.	Graft stability	0.10	0.30	0.18	0.39	0.28	0.45	5.321	0.070
2.	Subgraft hemorrhage	0.70	0.74	0.66	0.75	0.44	0.54	3.126	0.210
3.	Inflammation	3.26	0.72	1.96	0.81	1.60	0.93	65.42	<0.001
4.	Pain	1.46	0.89	0.60	0.64	0.52	0.54	35.68	<0.001
5.	Itching	0.34	0.52	0.18	0.39	0.00	0.00	18.50	<0.001
6.	Watering	0.86	1.11	0.88	0.72	0.36	0.53	12.33	0.002
7.	FB sensation	1.46	0.89	0.60	0.64	0.52	0.54	35.68	<0.001

Table 4. Third Follow Up Evaluation (Day 7)

SN	Parameter	Group I (n=50)		Group II (n=50)		Group III (n=50)		Statistical significance (Kruskal Wallis test)	
		Mean	SD	Mean	SD	Mean	SD	H	P
1.	Graft stability	0.10	0.30	0.16	0.37	0.26	0.66	1.462	0.235
2.	Subgraft hemorrhage	0.16	0.37	0.08	0.27	0.26	0.66	1.460	0.234
3.	Inflammation	3.20	0.83	1.60	1.05	1.12	0.94	65.41	<0.001
4.	Pain	0.86	0.73	0.34	0.52	0.26	0.53	14.76	<0.001
5.	Itching	0.48	0.65	0.32	0.59	0.02	0.14	10.45	<0.001
6.	Watering	1.06	1.02	1.00	0.70	0.24	0.43	18.30	<0.001
7.	FB sensation	1.76	0.80	0.60	0.57	0.44	0.54	62.08	<0.001

Table 5. Fourth Follow Up Evaluation (1 month)

SN	Parameter	Group I (n=49)		Group II (n=48)		Group III (n=50)		Statistical significance (Kruskal Wallis test)	
		Mean	SD	Mean	SD	Mean	SD	H	P
1.	Graft stability	0.00	0.00	0.02	0.14	0.10	0.58	2.021	0.364
2.	Subgraft hemorrhage	0.10	0.30	0.16	0.37	0.26	0.66	1.462	0.235
3.	Inflammation	0.74	0.75	0.52	0.50	0.50	0.79	4.20	0.122
4.	Pain	0.70	0.74	0.66	0.75	0.44	0.54	3.126	0.210
5.	Itching	0.26	0.66	0.16	0.30	0.10	0.30	1.462	0.235
6.	Watering	0.28	0.45	0.18	0.39	0.10	0.30	5.321	0.070
7.	FB sensation	0.38	0.71	0.23	0.47	0.15	0.42	2.926	0.232

Table 6. Final Follow Up Evaluation (3 months)

SN	Parameter	Group I (n=47)		Group II (n=48)		Group III (n=46)		Statistical significance (Kruskal Wallis test)	
		Mean	SD	Mean	SD	Mean	SD	H	P
1.	Graft stability	0.00	0.00	0.00	0.00	0.00	0.00	0	1.000
2.	Subgraft hemorrhage	0.00	0.00	0.00	0.00	0.00	0.00	0	1.000
3.	Inflammation	0.00	0.00	0.00	0.00	0.00	0.00	0	1.000
4.	Pain	0.00	0.00	0.00	0.00	0.00	0.00	0	1.000
5.	Itching	0.10	0.58	0.02	0.14	0.00	0.00	2.021	0.364
6.	Watering	0.02	0.14	0.00	0.00	0.00	0.00	1.958	0.376
7.	FB sensation	0.04	0.20	0.04	0.20	0.02	0.15	0.399	0.819

DISCUSSION

Pterygium is more frequent in areas with more ultraviolet radiation, in hot, dry, dusty, windy, and smoky environments. There is also a hereditary factor.

Pterygium occurs at highest prevalence and most severely in tropical areas near the equator and to a lesser and milder degree in cooler climates. Outdoor work in situations with high light reflectivity, including from sand and water increases the chances of pterygium development.

Damage to the limbal stem cells by UV light and by activation of MMP are considered to play crucial role in the pathogenesis of pterygium.

Due to the extremely high rate of recurrence, frequency of problems relating to healing, and complications of adjunctive treatments that attempt to lower the recurrence rate, current indications for surgery for pterygium are understandably conservative.

If there would have been a surgical procedure that had an extremely low rate of recurrence and other surgical complications and provided a consistently excellent result, the indications for surgery could be much more liberal.

There have been many attempts to optomise pterygium surgery, its related complication and recurrence.

Conjunctival autografting is generally regarded as the procedure of choice for the treatment of primary and recurrent pterygium. The use of conjunctival autograft gained popularity in the 1980s following the landmark study by Kenyon *et al* in 1985 [12]. It has the significant benefit of reducing the recurrence rate to 5% to 15%; however, it is significantly more difficult and time consuming than simple excision.

The conjunctival autograft can be fixed by 3 techniques which are suturing, fibrin gluing and using patient's autoblood.

As there is little data available on the use of autoblood in pterygium autografting, in the present study we compared the three techniques of autograft fixation

which are using sutures, using fibrin glue and using autoblood fixation.

The most common method of autograft fixation is suturing, but it requires more surgical expertise, technical ability and surgical time to secure the graft with sutures. Sutures do not actively participate in wound healing and may cause additional trauma to the injury site and adjacent tissue. Also, infectious agent might enter along the suture tract, or the sutures might act as the nidus of the inflammation itself.

Singh PK *et al* found graft displacement and graft retraction were more common in patients with grafting with autologous blood than in those with grafting with the glue [13]. In our study, for graft stability the differences in three groups were not significant.

Srinivasan S *et al* found no significant difference in the subgraft hemorrhage between suture and fibrin glue group [14]. In our study, the differences in three groups for subgraft hemorrhage were not significant.

No grafts were lost in all the three groups.

Mitra S *et al* reported graft edema in 9 cases (47.3%) following pterygium excision with conjunctival autografting with autoblood [15]. In our study, on day 1 and day 2, graft edema occurred in 4 (8%) cases of Group II only, thus showing a significant difference among groups (p=0.016).

In our study, Group III showed better cosmesis, faster and more comfortable patient rehabilitation. Patient discomfort including pain, irritation, watering and foreign body sensation were minimum in Group III in comparison to Group I and Group II at day 1 to day 7 follow up, which were statistically significant (p<0.001). After 1 week the difference among the group were not statistically significant (p=0.678).

KPS Malik *et al* reported recurrence in 1 case (2.5%) at 6 months after pterygium excision with conjunctival autografting with autologous blood [16]. Singh PK reported equal rate of recurrences in grafting with fibrin glue (10%) and the grafting with autologous blood (10%) [13]. De Wit D *et at* reported no recurrence in their study [17]. Foroutan A *et al* reported recurrence in 2 cases (13.33%) out of 13 who underwent pterygium excision with conjunctival autograft using autologous fibrin glue [18]. However, in our study none of the pterygium recurred in SGF Group in comparison to 2 recurrences in Suture Group (4.3%) and 1 recurrence in Fibrin Glue Group (2.1%) in our 3 month follow up period, however the difference was not significant statistically (p=0.761).

Singh PK *et al* reported in their study that none of the patient developed corneal ulcer, scleral melting, dellen, hypersensitivity to fibrin adhesive, and symblepheron formation [13]. Similarly KPS Malik *et al* [16] reported in their study that none of the patients developed corneal ulcer, conjunctivitis, dellen, symblepheron formation, injury to medial rectus, or corneal perforation. In our study, only one case developed granuloma which was attributable to finger nail trauma. It required intervention. No other complications like symblepheron formation, motility restriction, dellen formation, infection or anaphylaxis were noted.

In the light of our present study, the sutureless-gluefree procedure for attaching conjunctival autograft following pterygium excision was found to be simpler, cheaper and much more safer than suturing and gluing procedures. The potential complication of suture and glue such as inflammation, granuloma, infection, anaphylaxis can be avoided, moreover the cost of glue, its preparation, risk of improper sterilization, less availability, short life of few hours after preparation, risk of transmission of infections, requirement of pooling of multiple patients may be avoided by adoption of autologous blood as a sealant in place of fibrin glue.

Conjunctival graft fixation with autoblood is superior over other techniques in respect to better cosmesis, faster surgical and more comfortable patient rehabilitation time, reduced post operative inflammation which may be resulting in reduced recurrence rate. The technique is cheap and also free of dependency of any preparation, potential risk of anaphylactic reaction and transmission of other diseases.

Review of literature

Pterygium is a greek word. In India it is called 'Nakhoona' due to its resemblance to the nail in its shape. It is a fleshy, triangular shaped growth of bulbar conjunctiva and hypertrophied subconjunctival connective tissue encroaching onto the cornea.

Nakaishi H *et al* reported pterygium to be associated with corneal and conjunctival microtrauma from exposure to sunlight (especially ultraviolet radiation) **[**19]. Particulate material such as smoke, sand or dust particles is also speculated to be the possible pathogenic factor for pterygium as well as pinguecula. Pterygium is more frequent in areas with more ultraviolet radiation, in hot, dry, windy, dusty and smoky environments.

According to Corneo MT pterygium is perhaps the most obvious of the ophthalmohelioses (sun related blindness) and can blunt sight in several different ways **[**6]. There is a strong protective element in the wearing of regular sunglasses or a hat, as suggested by Mackenzie *et al* [5]**.** According to Rim THT *et al* education to avoid excessive sun exposure would be helpful in reducing disease risk [20].

Surgical removal is the treatment of the choice. The simple excision ("bare sclera") method of pterygium removal has the advantage of brevity. This technique, however, has an unacceptably high recurrence rate of 60% to 80%. Tan D.T. *et al* reported 61% recurrence rate in cases of bare sclera excision [21].

Amniotic membrane transplant has been proposed as a treatment option for pterygium. Solomon A *et al* did an interventional case series on 54 eyes of 54 patients to evaluate the outcome and recurrence rate after primary and

recurrent pterygia removal combined with amniotic membrane transplantation and concluded that it is an effective and safe procedure for pterygium surgery, with a relatively low recurrence rate for both primary and recurrent pterygia [22]. It can be a useful alternative to conjunctival autograft when a large conjunctival defect has to be covered such as in primary double head pterygia and in large recurrent pterygia.

Conjunctival autograft transplantation was first described as a treatment for pterygium by Kenyon KR *et al* in 1985. They performed this technique on 57 eyes of 54 patients. The pterygia were primary in 16 eyes and recurrent in 41. The mean follow up of 2 years detected three (5.3%) recurrences after autograft transplantation [12]. There are various techniques for attaching the conjunctival autograft to the bed. Traditionally, sutures were used before the emergence of commercially available fibrin glue. Many studies have come, preferring the use of fibrin glue over sutures. However, the most recent approach is attaching the conjunctival autograft with patient's own blood coagulum.

More surgical expertise, technical ability and surgical time are needed to secure the graft with sutures. Sridhar MS *et al* demonstrated that sutures do not actively participate in wound healing and may cause additional trauma to the injury site and adjacent tissue [23]. Also, infectious agent might enter along the suture tract, or the sutures might act as the nidus of the inflammation itself. Loose or broken sutures require removal and, hence, additional working time.

Sutureless graft fixation with use of fibrin glue as tissue adhesive in pterygium surgery has recently gained popularity since the work of Koryani *et al* in 2004 [4].

Srinivasan S *et al* compared the degree of conjunctival autograft inflammation, subconjunctival hemorrhage and graft stability following the use of sutures or fibrin glue during pterygium surgery. They conducted the prospective clinical trial on 40 eyes of the 40 patients having primary pterygium. They concluded that conjunctival grafts secured with fibrin glue during pterygium surgery not only are as stable as those secured with sutures, but also produce significantly less inflammation [14]. De Wit D *et al* described a simple method of achieving conjunctival autograft adherence during pterygium surgery avoiding potential complications associated with the use of fibrin glue or sutures. A total of 15 eyes underwent sutureless and glue-free autologous conjunctival graft post-pterygium excision. Mean follow up time was 9.2 months. They concluded that sutureless and glue-free technique for pterygium surgery may prevent potential adverse reaction encountered with the use of foreign materials [17].

Sharma and Moore *et al* reported 4 cases using autologous fibrin glue for pterygium surgery. In their study, they showed well positioned grafts an all 4 cases after 6 week follow up [24].

Malik KPS *et al* did a prospective interventional case series to study the efficacy of sutureless and glue free limbal conjunctival autograft for primary pterygium surgery. They carried out study on 40 eyes with primary nasal pterygium requiring surgical excision [16].

Dulani N *et al* analysed the efficacy of blood oozed during pterygium excision as tissue adhesive to secure conjunctival autografts. 59 eyes from 59 patients with primary pterygium were recruited. They concluded that blood oozed during pterygium excision may provide novel approach for securing conjunctival autograft [25].

CONCLUSION

Sutureless and gluefree limbal conjunctival autografting following pterygium excision has better cosmesis, faster surgical and more comfortable patient rehabilitation time and is a safer and economical option for the management of primary pterygium requiring surgical intervention.

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CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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