A COMPARATIVE STUDY OF POSTOPERATIVE OUTCOME AFTER PTERYGIUM EXCISION USING AUTOLOGOUS BLOOD AND SUTURES

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ABSTRACT

BACKGROUND

Pterygium is a degenerative and hyperplastic condition of conjunctiva. In this, subconjunctival tissue proliferates as vascularised granulation tissue, thus invading the cornea and destroying the superficial stroma and Bowman's membrane. It varies from small asymptomatic lesion to large, rapidly growing lesion, thus leading to impairment of vision. Pterygium occurs more frequently between 30 degrees latitude north and south of the equator called as "pterygium belt." The most challenging situation after pterygium excision is the recurrence of the pterygium. Many techniques had been used, but none of them is universally accepted due to variable recurrence rate.

The aim of the study is to compare the two modalities of treatment in pterygium excision with postoperative outcomes.

MATERIALS AND METHODS

A comparative study was conducted from July 2016 to August 2017 in the Department of Ophthalmology, People’s College of Medical Sciences and Research Centre, Bhopal (M.P.). Total 50 patients with primary nasal pterygium of grade 2 or more were enrolled from eye outpatient department. The patients were randomly divided into two groups for pterygium excision with conjunctival autografting using either autologous blood (group A) or sutures (group B). Two groups were compared for postoperative discomfort, recurrence and graft displacement.

RESULTS

Out of 50 patients, 28 were in group A and 22 were in group B. Maximum numbers of patients were involved in outdoor activities. In comparison to autologous blood technique, postoperative discomfort was more in suture group after pterygium excision. In group A, the graft displacement was found in 2 (7.1%) patients, whereas in group B, there was no graft displacement seen. While in group B2 (9.1%) patients had granuloma formation. The recurrence of pterygium was high (22.7%) in group A (3.6%). There was a significant correlation between rate of recurrence and type of surgery (P value <0.05).

CONCLUSION

Fixing of graft after pterygium excision by autologous blood is a better, cost-effective technique and associated with less complications when compared with graft fixation by sutures. Thus, this study has been conducted to compare the two different techniques of pterygium surgery.

KEYWORDS

Pterygium, Autologous Blood, Sutures, Recurrence, Graft Displacement.


BACKGROUND

Pterygium is a degenerative and hyperplastic condition of subconjunctival tissue. It proliferates as vascularised granulation tissue invading cornea, thus destroying the superficial layers of stroma and Bowman's membrane most often present on the nasal side.¹ It may vary from small, atrophic inactive asymptomatic lesions or with minimal symptoms such as redness and foreign body sensation initially to large, aggressive, rapidly growing fibrovascular lesions resulting in impairment of vision. Vision impairment can be due to covering of pupillary area of the cornea or by altering the curvature of the cornea due to fibrosis resulting in "with the rule astigmatism."
A pterygium is divided in 3 parts- The cap, the head and the body.  

The cap- It is a flat zone on the cornea consisting of fibroblasts that invades and destroy Bowman’s membrane.  

The head- A vascular area that lies behind the cap and is firmly attached to the cornea.  

The body- A mobile area of the bulbar conjunctiva that can be easily dissected from the underlying tissue.  

There is iron deposition on the basal layer of the corneal epithelium anterior to cap of pterygium known as Stocker's line is a characteristic sign for chronic pterygium.

Grades of Pterygium-  
Grade 0- Posterior to limbus.  
Grade 1- Involvement to the limbus.  
Grade 2- Just on the limbus.  
Grade 3- Between the limbus and pupillary margin.  
Grade 4- Central to the pupillary margin.  

Pterygium occur more frequently between 30 degrees latitude north and south of the equator called as “pterygium belt” where there is warm, dry, dusty climate with more exposure to ultraviolet radiation.3 It is more common in young adult males than females, agricultural workers or those who are doing outdoor work in dusty and warm climate.5 Some theories have also been proposed by few researchers that mutation of chromosome 17 on gene PS5 can also be one of the predisposing factor.6 Ultraviolet Rays (UVR) induced elastoid degeneration of subepithelial connective tissue,7 genetic trauma and consequent altered cytokine expression8 plays role in pathogenesis of pterygium. Mathur8 and Ishioka9 found an association between pterygium and a shortened tear breakup time and Schirmer’s test in the case-control studies. Reports suggest Vascular Endothelial Growth Factor (VEGF) is highly expressed in new vessels in pterygium tissue compared with normal conjunctiva (Marcovich, Morad et al, 2002). Therefore, angiogenesis is likely to play a role in pterygium (Marcovich, Morad et al, 2002; Aspiotis, Tsanou et al, 2007).  

The prevalence of pterygium varies from 0.3% to 37.46% in different parts of the world.10 The prevalence rate of pterygium varies widely with altitude, age, gender, occupation and socioeconomic status.

Nowadays, stationary pterygium of grade 1 to 2 is managed conservatively by NSAIDs and ocular lubricants as these may reduce recurrent inflammation and later are given for tear film instability. For pterygium of grade 2 or more, surgical excision is the mainstay for treatment.11 The main reason for surgical excision is cosmetic and for visual purposes, but the prevention of recurrence is the biggest challenge of pterygium surgery. The recurrence rate after surgical excision of pterygium varies according to type of surgery done. Recurrence rate after simple excision has been reported to be 25% to 45%.12 Due to the high recurrence rate, various surgical modalities have been tried, which include simple excisions, bare sclera technique, amniotic membrane transplantation and conjunctival autografting. Bare sclera technique is associated with recurrence rates around 38.9%.13 Adjuvant measures such as beta-irradiation, thiopeta, 5-fluorouracil and mitomycin-C reduce recurrence rates, but are associated with other complications. In recent years best approach to surgery was focused on sutures and fibrin glue to fix the conjunctival graft. Former requires good surgical skill and is associated with high postoperative suture-related discomfort. Because of its biological and biodegradable properties, fibrin-based adhesives maybe used under a superficial covering layer (conjunctiva, amniotic membrane, etc.) without inducing inflammation. High cost of fibrin glue, risk of transmission of prior disease and risk of anaphylaxis in susceptible individuals are the major limiting factors in this mode of treatment.14 Therefore, a new method for graft fixation on recipient site by patient’s own blood reduces sutures or glue-related complications. So, present study was done to compare the postoperative outcomes and efficacy of both the surgical modalities.

MATERIALS AND METHODS  
A comparative study had been conducted from July 2016 to August 2017 in Department of Ophthalmology, People’s College of Medical Sciences and Research Centre, Bhopal, Madhya Pradesh.

Inclusion Criteria  
1. Patient age more than 18 years.  
2. Both male and female.  
3. Patient with primary pterygium.  
4. Those who are willing for surgery.

Exclusion Criteria  
1. Patient age less than 18 years.  
2. Pseudopterygium (trauma, chemical injuries and amniotic membrane grafting).  
3. Ocular surface disorders (ocular cicatricial pemphigoid, Stevens-Johnson syndrome and symblepharon).  
4. Ocular infections.  
5. Patients with any coagulation disorder.  
6. Those who are not willing for surgery.

Fifty patients those came to eye OPD with primary pterygium of grade 2 or more were enrolled for the study. Informed consent was taken from all the patients. Complete history was noted (ocular and systemic), detailed ocular examination was done including vision, refraction, keratometry, fundus and slit-lamp examination. All the patients had undergone routine blood and urine investigations and coagulation profile. Patients were randomly divided into two groups and undergone pterygium excision with conjunctival autografting by autologous blood (group A) or by 10-0 Vicryl suture (group B).  

Surgery was performed under peribulbar anaesthesia (lignocaine 2% and bupivacaine 0.25%), eye was painted, draped and eye speculum was placed. Pterygium was excised from the cornea and limbus with blunt dissection. The exposed area of the sclera was measured with the help of Castroviejo’s caliper and then the conjunctival graft of the
same size was taken from the superior bulbar conjunctiva near limbus and placed on the site with epithelial side up. In group A, autologous serum bed was formed over the sclera by oozing vessels of the excised pterygium and active bleeding at the graft site was avoided by applying pressure with cotton buds. Then, the graft was placed over the serum bed over the sclera and spread with the help of plain forceps. Gentle pressure was applied for 3-5 minutes and then wait for 7-10 minutes for proper placement of the graft. In group B, graft was placed and secured with 10-0 absorbable Vicryl suture. Six interrupted sutures were applied. In both the groups, eyes were patched with antibiotic drops. Patch was removed after 48 hours in group A and after 24 hours in group B postoperatively. Followup was done on 1st, 7th, 15th, 30th and 90th postoperative day. Slit-lamp examination was done on every postoperative followup visit to look for recurrence or any other graft-related complication.

RESULTS
Fifty patients were enrolled in the study after taking informed consent and fulfilling the inclusion criteria. They were randomly distributed in study for pterygium excision with conjunctival autograft by autologous blood (group A) and sutures (group B). 28 patients were enrolled in autologous blood group (group A), 22 patients in suture group (group B). The mean age of study participants in group A, i.e. autologous blood group was 49.6 ± 9.4 years, and that in group B, i.e. suture group was 52.9 ± 3.9 years.

Table 1. Distribution According to Gender in Both the Groups

<table>
<thead>
<tr>
<th>Gender</th>
<th>Group A (Autologous Blood) (%)</th>
<th>Group B (Suture Group) (%)</th>
<th>Total (%)</th>
<th>Chi-Square Test</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>18 (64.2)</td>
<td>14 (63.6)</td>
<td>32 (64)</td>
<td>0.0023</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Female</td>
<td>10 (35.8)</td>
<td>8 (36.4)</td>
<td>18 (36)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1 show that majority (64%) of patients in both the groups was males and rest (36%) was females. It was not statistically significant (P value >0.05).

Table 2. Distribution of Study Participants According to Occupation in Two Groups

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Group A (Autologous Blood) (%)</th>
<th>Group B (Suture Group) (%)</th>
<th>Chi-Square Test</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor activities</td>
<td>19 (67.8)</td>
<td>14 (63.6)</td>
<td>0.57</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Computer work</td>
<td>7 (25)</td>
<td>5 (22.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housewife</td>
<td>2 (7.2)</td>
<td>3 (13.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 shows distribution of study patients according to occupation. 67.8% and 63.6% of study participants in group A and group B respectively were involved in outdoor activities followed by 25% (group A) and 22.8% (group B) involved in computer work. It was not statistically significant (P value >0.05).

Table 3. Distribution According to Grade of Pterygium in Both Groups

<table>
<thead>
<tr>
<th>Grade</th>
<th>Group A (Autologous Blood) (%)</th>
<th>Group B (Suture Group) (%)</th>
<th>Chi-Square Test</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6 (21.4)</td>
<td>5 (22.7)</td>
<td>1.05</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>3</td>
<td>12 (42.9)</td>
<td>12 (54.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>10 (35.7)</td>
<td>5 (22.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The above table/figure shows 21.4%, 42.9% and 35.7% participants in group A had grade 2, grade 3 and grade 4 pterygium respectively, while 22.7%, 54.6% and 22.7% patients had grade 2, grade 3 and grade 4 pterygium in group B.
Table 4- It shows postoperative discomfort in both the groups on follow up visits. On first day, 3.6%, 60.7% and 35.7% participants in group A had no mild and moderate discomfort, respectively. While 31.8% and 68.2% participants in group B had moderate and severe discomfort. On postoperative day 7, 75% of study participants in group A had mild discomfort, while in group B, 68.2% participants had moderate discomfort. Mild discomfort was reported beyond 1st week of follow up more in suture group as compared to autologous group.

Table 5. Distribution According to Complications in Both the Groups

Table 6. Distribution According to Recurrence in Both Groups

DISCUSSION
The main challenging situation after pterygium excision is the recurrence of the pterygium that can be indicated by fibrovascular growth across the limbus onto the cornea. Many surgical techniques have been tried, but none of them had been universally accepted because of the varying recurrence rates. Various surgical techniques for the management of pterygium include:

- The bare sclera technique involves excision of the head and body of the pterygium leaving the bare scleral bed for reepithelialisation. It is associated with high recurrence rates between 30% to 70%. Rate of recurrence has been found to be reduced by adjunctive treatment with mitomycin C, but it has been associated with complications like scleral melting, necrotising scleritis, iridocyclitis, cataract, glaucoma and scleral calcification.
- Conjunctival autografting after pterygium excision had been introduced, which is associated with lower recurrence rates (2% to 9%) and relatively few sight-threatening complications. In this procedure, conjunctival autograft is taken usually from the superotemporal bulbar conjunctiva and sutured over the exposed scleral bed after excision of the pterygium.
- Amnion membrane grafting has also been used to prevent pterygium recurrence. Amniotic membrane provides its beneficial effect by inhibiting inflammation, fibrosis and by promoting epithelialisation. Unfortunately, recurrence rates vary widely among the studies that exist somewhere between 2.6-10.7% for primary pterygium and as high as 37.5% for recurrent pterygia. The only advantage of this technique over the conjunctival autograft is the preservation of bulbar conjunctiva. Amniotic membrane is typically placed over the bare sclera with the basement membrane facing up and the stroma facing down. Some recent studies also advocated the use of fibrin glue to adhere the amniotic membrane graft. Fibrin glue has also been used in conjunctival autograft.

Recent Modalities Include-
Fibrin Glue- It has been used as an alternative to sutures for securing conjunctival autograft. It significantly reduces the operating time and also associated with less postoperative discomfort with success rates that are comparable to sutured grafts. Cases performed with fibrin glue heal with minimal inflammation. The immediate adherence of the graft and less postoperative inflammation has been proposed as advantages with this approach. The major concerns with this technique include the cost and the potential risk of transmitted infection like HIV, hepatitis B or
C or prion-mediated disease, but there are no such reported infections.

**Autologous Serum**: Patient’s own blood is used as a bioadhesive in pterygium surgery and the recurrence rate was found to be similar to fibrin glue. It is more cost effective with no risk of transmission of infections. The drawback of this technique is that the complications regarding graft displacement and graft retraction are more common than in patients with fibrin glue.19

In our study, the surgical techniques for pterygium excision were compared. Group A included pterygium excision with conjunctival autograft via autologous blood and group B included pterygium excision with conjunctival autograft using sutures. The mean age of patients in our study in group A was 49.6 ± 9.4 years, whereas mean age in group B was 52.9 ± 3.9 years, while in a study conducted by Sangole AM et al in 2016. The mean age in patient’s own blood group was 49.21 years and in 10-0 nylon group was 47.54 years.20 Jiao W et al in 2014 found that prevalence of pterygium increases with age, which was comparable to our study.21

Many previous studies suggest that the prevalence of pterygium was higher in males than females. Kumar P et al conducted a study and found higher prevalence of pterygium in females (62%),15 while in our study, 64% of patients were males and 36% were females.

In present study, most of the patients were involved in outdoor activities in both the group (67.8% and 63.6% in group A and B, respectively). Similar results were found by Chavan WM et al in 2015 in a study conducted in Maharashtra. They found that in relation to occupation, maximum (82%) patients were farm labours as compared to other persons having indoor activities. This maybe because farm labours are more exposed to sunlight and dust and other atmospheric irritating agents.22

Maximum number of patients encountered in our study belonged to grade III (42.9% in group A and 54.6% in group B) and grade IV pterygium (35.7% in group A and 22.7% in group B). Grade IV pterygium has a significant impact on vision. P value was calculated and found to be nonsignificant in our study. In a study conducted by Maheshwari S et al in 2003, maximum number of patients belonged to grade II and III pterygium (89.19%).17

In our study, recurrence rate was higher in suture group patients (22.7%) as compared to autologous group (3.6%). Whereas, in a study conducted by Elwan S et al in 2014, the rate of recurrence in suture group was found to be 8% and that in autologous group was 6%.23

In present study, we have compared different postoperative outcomes in patients who had grafts secured with autologous blood (28 patients) and sutures (22 patients). Postoperative discomfort (day 1 in both groups) was greater in patients treated with sutures (severe 61.2%) in comparison to autologous blood (mild 60.7% and moderate 35.7%). Mild discomfort was reported beyond first week of follow-up more in suture group. Similar findings were documented by Kumar P et al in which postoperative discomfort (day 1 in group B and in day 2 group A) was greater in patients treated with sutures (moderate 50%, severe 23.52%) in comparison to autologous blood (moderate 13.33%, severe 10%). Most of patients in both groups did not report discomfort beyond first week of follow up.15

Complications like graft displacement is a drawback associated with conjunctival autograft with autologous blood. We reported more cases of graft displacement in autologous blood group patients (7.1%) as compared to suture group. It is considered that graft usually displaces due to undue rubbing of operated eye due to foreign body sensation. Kumar P et al found that graft was displaced in 3.33% patients in autologous group. In our study, granuloma formation was found in 9.1% patients in suture group, which was recorded in 3% patients in suture group in a study conducted by Elwan S et al.15

**CONCLUSION**

In our study, conjunctival graft with autologous blood was found to have better results in terms of postoperative discomfort and recurrence when compared with suturing group, though the graft displacement remains a problematic situation with autologous blood group. But, overall incidences of suture-related discomfort and complications were less. Thus, considering cost effectiveness, less postoperative discomfort and no risk of viral disease transmission, pterygium excision with autologous blood maybe a preferable surgical method for treatment of pterygium. As it has many advantages over sutures like less operative time, less postoperative discomfort, less chance of adverse reaction caused by the use of foreign material, cost effective and less likely to recur. Thus, from this study, we arrived at the conclusion that conjunctival autografting by patient’s own blood is more effective as compared to suture group.

**REFERENCES**