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COMPARISON OF THE SURGICAL OUTCOME AND COST EFFECTIVENESS OF AUTOLOGOUS BLOOD WITH ELECTROCAUTERY PEN AND FIBRIN GLUE IN THE LIMBAL CONJUNCTIVAL AUTOGRAFTING FOR THE TREATMENT OF PRIMARY PTERYGIUM

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ABSTRACT

Introduction: There are various techniques available for securing limbal conjunctival auto graft in the treatment of primary pterygium. purpose of this study to compare the surgical outcome and cost effectiveness of a new technique autologous blood with electrocautery pen and current standard of fibrin glue.

Materials and methods: This retrospective study was carried out in 76 patients presented with primary pterygia who underwent pterygium surgery using autologous blood with ecp (36 eyes) and fibrin glue (40 eyes). all patients were followed up post operatively on 1st day, 7th day and 6th month. during follow up, patients were assessed for graft displacement or loss and comfort. cost of the surgery was also compared.

Results: No intraoperative complications occurred in either group. out of 36 patients, 4 graft dislodgements occurred in autologous blood with ecp group on the immediate post-operative day. while none in fibrin glue group. during the 6 months follow-up, 6 eyes in group 1 (16.7%) and 1 eye in group 2 (2.5%) developed recurrence.

Conclusion: Autologous blood with ecp in conjunctival autografting is as effective as fibrin glue in terms of graft adherence and post-operative patient comfort. however, this method is 3 times cost effective than the commercially available fibrin glue.

Key words- Autologous blood with ECP, fibrin glue, pterygium, conjunctival autograft

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INTRODUCTION

‘Pterygium’ (from the Greek pterygos, “little wing”) is a wing shaped fibrovascular growth of the subconjunctival tissue on to the cornea. It is seen more frequently in tropical and subtropical areas due to exposure to Ultraviolet (UV-B) sunlight. Previously it was thought that main histopathological change in primary pterygium is elastodysplasia and elastodystrophy of sub epithelial connective tissue¹. A leading theory proposes that the increased prevalence of pterygium among people in equatorial regions is due to the damaging effects of ultraviolet radiation, specifically UV-B radiation. The working hypothesis is that this radiation causes

mutations in the p53 tumor suppressor gene, thus facilitating the abnormal proliferation of limbal epithelium². A unique feature of pterygium epithelial cell is its positive immunohistochemical staining for different types of metalloproteinase that are absent in normal conjunctival, limbal or corneal cells³. Because Early pterygia are usually asymptomatic, there has been little research on their natural history and treatment, commonly considered them as insignificant problem until the lesion encroach the cornea. The surgery is indicated for (1) Cosmetic Reason (2) Involvement of visual axis (3) Induced Astigmatism. Historically, pterygium and its management were first described in 1000 BC by

Susruta⁴. Many studies have been done about pathogenesis and treatment of pterygium. Starting with bare sclera technique (D'Ombra 1948), antimetabolic agents (Meacham 1962), amniotic membrane transplantation (Panzardi 1964) and autologous conjunctival transplantation (Kenyon 1985) are important developments in this era⁵. The bare sclera technique which was popular from 1960 to the early 1980s has been abandoned due to the unacceptable recurrence rate, often as high as 60%–80%⁶. To prevent recurrence, adjunctive therapies are considered which reduce recurrence rate significantly. These include application of Mitomycin C, radiotherapy, conjunctival or limbal conjunctival autograft (CAG), and amniotic membrane graft⁷. However, since 3 decades CAG has been the modality in standard care in pterygium surgery. Traditionally, Pterygium surgery with CAG used sutures to secure the autograft in place. The use of fibrin glue for this purpose was popularized by Koranyi et al in 2004⁸. Replacing the sutures with adhesives decreased the operating time, improved post-operative comfort. But the major problem with fibrin glue is the cost and potential risk of transmitted infection (Human immunodeficiency virus, Parvovirus B19, Hepatitis)¹⁰.

Fibrin is a biologic glue. It is absorbable and easy to use. Fibrin glue can be stored at room temperature. It is a blood derivative product. It mimics the last step of the coagulation cascade¹¹. Studies comparing fibrin glue and sutures have found that the grafts secured with fibrin glue are as stable with significantly less inflammation and, consequently, less recurrence, compared to sutures^{12 13}. Cost of fibrin glue is about equal to the cost of 5 sutures¹⁴. The use of patient's own blood eliminates risk of disease transmission and the chance of autoimmune reactions or allergic mishaps, thereby avoiding the cost of glue, the burden of its preparation and suspicion of its sterilization status. Aim of this study is to compare the surgical outcome and cost effectiveness of the technique of conjunctival autografting using autologous blood with ECP and fibrin glue. Two techniques were compared in terms of post-operative comfort, graft adherence as well as the cost of surgery.

MATERIAL AND METHODS

The study was conducted in Al-Salama Eye hospital, Kerala, which is an associate institution of MES medical college Perinthalmanna. Institutional ethic committee approval was attained. Seventy six eyes of 76 patients with primary pterygium who were operated between Jan 2014 and Jan 2015 were included in the study. Patient data was collected from Hospital EMR data base. Patients irrespective of age and sex presenting with primary pterygia were included in the study. Patients with recurrent pterygia, Previous Glaucoma filtration surgeries, History of Previous Cataract surgery, refractive surgery in same eye and patients on regular anticoagulants were excluded. Visual acuity, Slit lamp Examination, funduscopy and tonometry- non contact tonometer were performed in all cases. Patients were grouped into two: Those who underwent surgery using autologous blood with ECP (ABECP) as Group 1 and those used fibrin glue (FG) as Group 2.

Operative Procedure: Hematological examination such as Hemoglobin (Hb), Bleeding Time (BT) and clotting time (CT) was performed in each patient. All cases were operated using surgical microscope under aseptic conditions and managed as outpatient basis. Single surgeon performed all the surgeries under local anesthesia. Peribulbar anesthesia was given with 2% Lidocaine and 0.5% Bupivacaine in 1:1. Surgical site and eye lashes were cleaned with 10% povidone iodine and a sterile drape was put in place. A universal lid speculum was placed. Pterygium head was dissected from the cornea with a surgical blade. Fibrovascular tissue located under the conjunctiva was carefully dissected and removed. The size of the bare sclera bed was measured with calliper. Superior conjunctival area selected as donor area. Donor conjunctiva was carefully dissected from the Tenon. The graft harvested was 15-20% larger than the recipient. Fixation of Donor graft: GROUP 1 (ABECP) Small amount of autologous blood (patient's own blood from limbal vessel) left on the scleral bed and limbal side of the graft was placed on the limbus of the host sclera bed. Graft was spread well and four corners were cauterized with Electro cautery Pen. Donor area was dissected and conjunctiva approximated to limbus. GROUP 2 (FG) Limbal side of the graft was placed on the limbus of the host sclera bed.

Fibrin glue was used to secure the graft. Scleral bed was dried with cellulose sponge; one drop of glue was put on the sclera bed. Limbal graft was placed on the scleral bed and positioned. No intraoperative complications occurred in either group. Post operatively topical Moxifloxacin, dexamethasone and lubricant drops were given. Steroid drops were tapered gradually over a period of 4 weeks. Pressure patching was applied in both groups for 24 hrs. All the patients were examined on 1st day, 7th day and 6 months after surgery. On each follow-up a complete ocular evaluation was carried out with special attention to graft adherence. Surgical outcome measures were graft displacement, graft loss, pain, lacrimation and foreign body sensation. Statistical analysis was done with SPSS version 18. The comparison between 2 groups was done with chi-square test.

RESULTS

This study was carried out on 76 patients with primary pterygia who attended our OPD, Al salama Eye Hospital, Kerala over a period of 1 year. During the study following observations were made. Total Seventy six eyes of 76 patients were included in the study. 36 eyes were included in group 1. Nineteen patients were male (52.8%) and seventeen patients were female (47.2%). The mean age was 48.44 +/- 11.04 Years. Of 36 eyes the pterygium was present in 21 right eyes (58.3%) and 15 left eyes (41.7%). 40 eyes were included in group 2. Thirty patients were male (75%) and ten patients were female (25%). The mean age was 44.05 +/- 8.48 years. The pterygium was present in 23 right eyes (57.5%) and 17 left eyes (42.5%). Table 1 summarises the main surgical outcomes and their comparison between the two groups. There were four graft dislodgements (11.1%) in Autologous Blood group in the immediate post-operative day. Of which 3 eyes required reattachment with glue and the other required regrafting and fixation with glue due to graft loss. It may probably due to vigorous rubbing of the eye. Whilst none occurred in fibrin glue group. The rest of the eyes showed good apposition of graft on the first day which was maintained at 1st week. On 6th month follow up, 6 recurrences (16.7%) were noticed in Group 1 and one (2.5%) in group 2. When two groups were compared with chi square test; recurrence rate was found significantly higher in group 1 than

that in group 2 ($P < 0.05$). No other complications, such as graft necrosis, symblepharon, scleral necrosis, excessive bleeding, or pannus formation, occurred in either group. In addition, no adverse effects from the fibrin glue application were observed. Table 2 summarises the symptoms between group 1 and 2 on post op day 1. Post-operative comfort was assessed by their symptoms of pain, lacrimation and Foreign Body sensation on immediate post operative day. All the symptoms were resolved on 7th day post op follow up. When compared with chi square test, there was no statistically significant difference in two groups. It was found that cost of the surgery using Autologous Blood with ECP is 3 times less than that of commercially available Fibrin glue.

Table 1: Comparison of surgical outcome in both groups

Complication	Group 1 (n= 36)	Group 2 (n=40)	p-Value
Total graft dislodgement	4(11.1%)	0	0.030
% of success	88.9%	100%	
Total Recurrence	6(16.7%)	1(2.5%)	0.033
% of success	83.3%	97.5%	

Table 2: Comparison of symptoms between group 1 and 2 on Post operative day 1

Groups	Pain	Lacrimation	FB sensation
Group 1 (n=36)	3(8.3%)	1(2.8%)	3(8.3%)
Group 2 (n=40)	1(2.5%)	1(2.5%)	2(5%)
p-Value	0.255	0.940	0.558

DISCUSSION

Compared with other pterygium excision techniques, such as bare sclera excision, primary closure, and amniotic membrane grafts, the conjunctival autograft approach is associated with lower recurrence rates and fewer complications¹⁵⁻¹⁷. Although it is effective in securing conjunctival autografts, the use of suture material requires surgical skill and is associated with several disadvantages, including prolonged operative time, postoperative discomfort, inflammation, infections, suture abscesses, and buttonholes^{18 19}. Fibrin glue is an alternative to sutures for conjunctival autograft attachment and has been found to reduce operative time, complications,

and postoperative discomfort. Although generally considered safe, fibrin glue is made from human plasma and carries the risk of transmitting infectious agents such as parvovirus and prions²⁰. In addition, anaphylactic reactions have been reported after the use of tissue adhesive agents²¹. Generating fibrin sealant from autologous blood may eliminate the current risks associated with pooled plasma²². Time taken to procure the fibrin may be a drawback for its use in day-care pterygium surgery. CryoSeal System (CSS; Thermogenesis, USA) provides an automated system that enables simultaneous extraction of concentrated fibrinogen-rich cryoprecipitate and thrombin from autologous plasma²³. The process takes about 1 hour to complete the freeze/thaw cycles—markedly less than the traditional blood bank procedures, but expensive specialised equipment is needed.

Commercially available fibrin glue can be substituted by patient's own blood (Autologous Blood) from surgical site. It can eliminate the risk of disease transmission and the chance of autoimmune reactions. In a study Kurian A, et al found that autologous blood appears equally efficient as fibrin glue application for graft adherence in pterygium surgery. Of the 194 eyes, on the first postoperative day 3 eyes in autologous blood group (AB) (3.13%) had total graft dislodgement requiring regrafting from another site or reattachment with glue. In Fibrin glue group (FG) 2 eyes (2.04%) had graft dislodgement on the first postoperative day. During the 1-year follow-up, 6 eyes in AB group (6.25%) and 8 eyes in FG Group (8.16%) developed recurrence. The feasibility of adherence of the graft without glue simplifies and increases the cost-effectiveness of the technique. They concluded that, in terms of recurrence also, autologous blood is not inferior to fibrin glue in pterygium surgery and has the potential to replace fibrin glue in future²⁴. A study by Sophie Boucher, et al in a retrospective study of 40 eyes concluded that conjunctival autograft fixation using autologous blood is a potential alternative to fibrin glue. In contrast to other studies, they demonstrated a higher rate of graft instability in the Autologous Blood group. Graft loss occurred in 6 patients in the Autologous Blood group, compared with none in the Fibrin Glue group. Postoperatively, pterygium recurrence occurred in 4 patients in the

Autologous Blood group and 1 patient in the Fibrin Glue group²⁵. Compared to other studies we have used a new technique of cauterization of donor graft with Electro Cautery Pen after applying the autologous blood. We had four graft dislodgements on the immediate post operative day. There was no significant difference in patient comfort level between two groups. Six patients developed Pterygium recurrence after 6 months follow up in group 1 and only one in group 2.

CONCLUSION

Autologous blood with ECP in conjunctival autografting is as effective as fibrin glue in terms of graft adherence and post-operative patient comfort. However, this method is 3 times cost effective than the commercially available fibrin glue. Further prospective studies with this new technique may be needed to compare the recurrence in long term follow ups.

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