

EFFICACY OF AUTOLOGOUS BLOOD CLOT IN PRIMARY PTERYGIUM EXCISION COMPARED WITH SUTURE TECHNIQUE

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Abstract

Background : To assess the efficacy of pterygium excision and conjunctival autograft surgery among patients underwent autologous blood clot or using sutures (10-0 monofilament nylon).

Materials and methods: A randomized controlled trial was done at Department of Ophthalmology, Chittagong Medical College Hospital, with a study period from February 2017 to November 2018 was conducted with 60 eyes from 60 patients having primary nasal pterygium. They were selected according to inclusion and exclusion criteria and randomized into two groups for conjunctival autograft. Group A (30) was treated with autologous blood clot and Group B (30) was treated with sutures (10-0 monofilament nylon). All surgeries were performed by a single surgeon at single center. Standard examinations were performed preoperatively and postoperatively, preoperative and postoperative outcomes were evaluated and compared statistically where follow up was done at 1 day, 7 days, 1-month, 3-month, and 6-month post operation. The main outcome variables were postoperative discomfort, graft stability and complications.

Results: This study included 60 patients (60 eyes) with a mean age of 46.77±7.04 (SD) (Range 33 to 58 years) in Group A (30) and 46.17±7.53 (SD) (Range 22 to 58 years) in Group B (30). In Group A, male was 22 (73.3%) and female was 8 (26.7%) where Group B contained male 20 (66.7%) and female 10 (33.3%). Follow-up at 1st and 7th post operation days showed marked discomfort in Group B (Mean rank 41.82 and 40.62) compared

to Group A (Mean rank 19.18 and 20.38) respectively ($p < 0.001$). At 1st post operation day there were 3 (10%) graft retraction in Group A only. Within 6 months follow-up, all grafts were stable and there was only 1 (3.3%) granuloma in Group B.

Conclusion: In primary pterygium excision, autologous blood clot showed excellent post-operative outcomes with much comfort, more stable as well as fewer complications. So, it appears to be an effective means to treat primary pterygium surgically.

Key words

Pterygium; Conjunctival autograft; Autologous blood clot.

Introduction

Pterygium is a common ocular surface disease in human being that is attributed to chronic Ultraviolet-B (UV-B) exposure^{1,2}. It results from the migration of the abnormal limbal basal epithelial stem cells (Pterygium cells) in Bowman's Layer (BL) causes the dissolution of this layer and whole being covered by conjunctival epithelium³. Prevalence rate of the pterygium varies from 0.3% to 37.46% in different parts of the world⁴.

Cosmetic disfigurement, recurrent inflammation, visual impairment from motility restriction and difficulty to wear contact lens are the main indications of surgery (i.e. pterygium excision)⁵. Surgical excision of the pterygium is the standard treatment. But despite advances in surgical techniques, results of the pterygium surgery are often compromised by post-operative recurrence, which is the leading cause of surgical failure in significant number of cases^{6,7}.

Current surgical methods to prevent recurrence include conjunctival flap, conjunctival rotational autograft, Amniotic Membrane Graft (AMG) or free Conjunctival Autograft (CAG) or Limbal Conjunctival Autograft (LCAG). All of these techniques involve the use of surgical adjuncts (e.g. suture, commercial fibrin glue, intra- or post-operative 0.02% Mitomycin C [MMC])^{8,9}.

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Conjunctival autografts using sutures are “the gold standard” and the grafts are stable here. But this technique increases the operation time, post-operative discomfort and is sometimes associated with chronic inflammation and granuloma formation¹⁰.

More recently, the use of commercial fibrin glue for suture-free conjunctival autografts has made significant inroads as it reduces the surgical time and patients report less postoperative pain and discomfort. However, the glue itself is more expensive than sutures and thus increases the total cost of the surgery.

Latest approach is fixation of the graft with autologous blood, a technique also known as “Suture Free and Glue Free (SFGF) CAG”, after pterygium excision. In this study, patient’s own blood was used for graft adherence and compared the technique with that of the sutured conjunctival autografting for primary pterygium excision in terms of postoperative discomfort, graft stability and complication.

To assess the clinical outcome of autologous blood clot and sutures techniques in primary pterygium excision.

Materials and methods

The study protocol was designed as randomized control trial. It was adhered to the tenets of the Declaration of Helsinki. Patients attended into the Department of Ophthalmology, Chittagong Medical College Hospital, who were diagnosed as case of primary pterygium were the study population. The study period was from February 2017 to November 2018. Initially patients were selected according to the inclusion criteria then random sampling done and divided into two groups, Group-A was patients with autologous blood technique and Group-B was patients with suture technique. 30 patients with inclusion criteria were selected as sample in each arm after auditing and calculation.

All samples were evaluated clinically by history, physical and ocular examination according to routine examination performed before and after surgery.

Preliminary investigations (Blood sugar level, electrocardiogram) were done in each and every patient. Surgeries were performed by single experienced surgeon, always using the same equipment, technique and materials for each groups.

After taking informed written consent from patient, standard surgical technique were performed with peribulbar anaesthesia and total surgery time was recorded.

The pterygium head was separated from the cornea by blunt dissection with use of a corneal forceps. Then adhesion between the pterygium and the sclera was sharply incised at the limbus. Only the thickened and keratinised portions of the conjunctiva and the underlying Tenon’s capsule were excised. The wound bed was scraped to clean cornea and sclera and minimal cauterization done for bleeding vessels.

A free conjunctival graft, 1-2mm larger than the size of the nasal conjunctival defect was prepared at the superotemporal limbus of the same eye. Care was taken to include as little as possible of Tenon’s tissue on the graft. The graft was slid carefully to the nasal side with the limbal edge facing towards the wound. When autologous blood was used, haemostasis was allowed to occur spontaneously without use of cautery to provide autologous fibrin to glue the conjunctival autograft with the bare scleral bed. The graft was held in position for around 5 minutes by application of gentle pressure over the graft with fine non-toothed forceps (Mcpherson forceps). Bandage contact lens applied and patching done after surgery.

When operating patients in the suture group, the graft was placed with the epithelium side up onto a bare sclera by same technique. The graft was anchored to the sclera at the limbus and the corners were sutured with 10-0 monofilament nylon. First two limbal corners were sutured into the episclera and then the posterior corners of the graft were sutured to the bulbar conjunctiva. After operation, careful removal of the speculum and draping done without touching the graft.

Patients were examined on the slitlamp post-operatively. From 1st post-operative day, patients are treated with prophylactic antibiotic drop (Moxifloxacin) four times daily for 2 weeks, steroid eye drop (Fluorometholone) four times daily for 2 weeks as well as topical artificial tear drops 6 times daily for 1 month.

The patch removed next day morning. Follow up were done on day 1, day 7 and 1-month, 3-month and 6-month after operation. 10-0 monofilaments removed at 7th post-operation days.

Operational definition

Patient comfort scale: To get an accurate data, subjective assessment of patient comfort was analyzed by Kurian et al¹¹.

Table I : Patient comfort scale.

Comfort Scale	Clinical characteristics
0	No complaints
1	Mild lacrimation, irritation
2	Severe lacrimation, redness, foreign body sensation
3	Inability to open the eyes

Inclusion criteria: All patients of grade-1, 2 or 3 pterygia, Age: 33 to 58 years, Primary nasal pterygium, Patients from both sexes, Patients willing to participate in this study.

Graft stability: Graft adherence at day 1 and 1 week post-operatively and can be assessed as properly placed, displaced or lost¹².

Graft retraction: Retraction of the graft from either the conjunctival or limbal side for at least 1 mm¹².

Granuloma formation: As a suture-related complication anytime post-operatively.

Results

Table II shows the age distribution of the study patients. It was observed that more patients belonged to age groups of 41-50 years 13 (43.3%) in Group-A and 51-58 years 11 (36.7%) in Group-B. Mean age of patients was 46.77±7.04 years for Group-A and 46.17±7.53 years for Group-B with ranged from 33 to 58 years. But it was not statistically significant (p=0.751).

Table II : Distribution of study patients by age (n=60).

Age (Years)	Groups		t-value	p value*
	Group-A	Group-B		
33-40	6 (20.0)	9 (30.0)		
41-50	13 (43.3)	10 (33.3)	0.3188	0.751 ^{ns}
51-58	11 (36.7)	11 (36.7)		
Total	30 (100.0)	30 (100.0)		
Mean ± SD	46.77 ± 7.04	46.17 ± 7.53		

ns= not significant.?

Figure within parentheses indicates in percentage.

*t-test was done to measure the level of significance.

Table III shows the sex distribution of study patients. It was observed that 22 (73.3%) in Group-A and 20 (66.7%) in Group-B patients were male, where 8 (26.7%) in Group-A and 10 (33.3%) in Group-B were female. But it was not statistically significant in this study (p=0.573).

Table III : Distribution of study patients by sex (n=60).

Gender	Groups		Chi-square value	p value*
	Group-A	Group-B		
Male	22 (73.3)	20 (66.7)	0.3175	0.573 ^{ns}
Female	8 (26.7)	10 (33.3)		
Total	30 (100.0)	30 (100.0)		

ns= not significant.

Figure within parentheses indicates in percentage.

*Chi-square test was done to measure the level of significance.

Figure 1 show post-operative comfort during different follow-up period of both Groups. At 1st and 7th post operation days, Group-A showed statistically significant comfort than Group-B. From 1 month and thereafter up to 6 months follow-up, there was Scale 0 response in both arms.

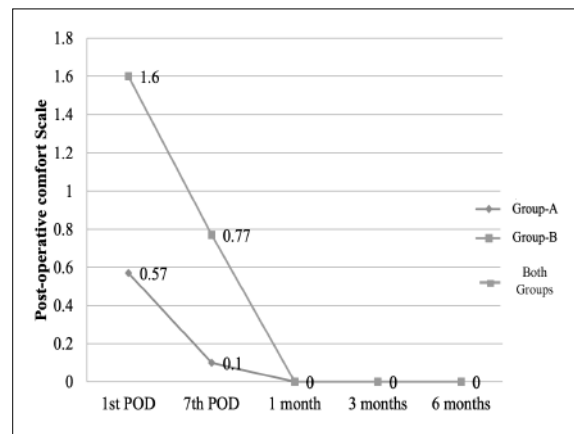


Fig 1 : Line chart of post-operative comfort scale during different follow-up period of both Groups (POD = Post Operation Day).

Distribution of study patients by recurrence of pterygium. There was 1 (3.3%) recurrence in Group-B only and no recurrence in Group-A within 6 months of follow-up post-operatively. But it was not statistically significant (p=0.999).

Table IV shows distribution of study patients by graft retraction. There was 3 (10%) graft retraction in Arm-A only within 6 months of follow-up post-operatively. But it was not statistically significant (p=0.237).

Table IV : Distribution of study patients by graft retraction (n=60).

Graft retraction	Groups		p value*
	Groups -A	Group-B	
Yes	3 (10.0)	0 (0.0)	0.237 ^{ns}
No	27 (90.0)	30 (100.0)	
Total	30 (100.0)	30 (100.0)	

ns= not significant.

Figure within parentheses indicates in percentage.

*Fisher's Exact test was done to measure the level of significance.

Table V shows distribution of study patients by granuloma formation. There was 1 (3.3%) granuloma formed in Group-B only within 6 months of follow-up post-operatively. But it was not statistically significant (p=0.999).

Table V : Distribution of study patients by granuloma formation (n=60).

Granuloma formation	Groups		p value*
	Group-A	Group-B	
Yes	0 (0.0)	1 (3.3)	0.999 ^{ns}
No	30 (100.0)	29 (96.7)	
Total	30 (100.0)	30 (100.0)	

ns= not significant.

Figure within parentheses indicates in percentage.

*Fisher's Exact test was done to measure the level of significance.

Statistical analyses were carried out by using the IBM® SPSS® Statistics version 25 for Windows (International Business Machine Corp, Armonk, NY, USA). The mean values were calculated for continuous variables. The quantitative observations were indicated by frequencies and percentages. Chi-square test and Fisher's exact test were used to analyze the categorical variables. t-test and Mann-Whitney U test were used for continuous variables. p values of <0.05 was considered as statistically significant. The findings have been summarized in graphical format and tables with explanatory notes as appropriated.

Discussion

During the past decade, the debate over the best approach to pterygium surgery has centered on whether surgeons should use suture or fibrin glue

to affix the conjunctival graft. Different approaches have merits and demerits in terms of factors like surgical time, comfort, postoperative complications, recurrence and stability. Autologous blood during pterygium excision can be used as tissue adhesive for conjunctival autografting despite suture or fibrin glue, which is not antigenic for the patients. The aim of this study was to evaluate the graft stability, post-operative discomfort and complications in conjunctival auto grafting following primary pterygium excision between autologous blood clot and suture techniques.

In this study, mean age of patients was 46.77±7.04 years for Group-A and 46.17±7.53 years for Group-B with ranged from 33 to 58 years (Table II). Different researchers found the mean age of 42.5±4.4, 42.8, 53.61±14.269, and 53.6±1.8 years^{13,10,14,15}. Variation in mean age group may be due to exposure of different outdoor activity pattern as well as, degenerative changes in conjunctiva with aging.

This study showed, out of 60 patients 42 were males and 18 were females (Table III). Some studies showed male predominance and some shows female predominance^{16,8,17}. Pterygium is usually seen more often in men than women¹⁸. The difference may be related to outdoor activities of patients that make them prone to develop pterygium.

When considering comfort scale, at 1st post operation day, 13 (43.3%) patients showed Scale 0 response in Group-A, where's Group-B showed Scale 2 response in 16 (53.3%) patients. At 7th post operation days, 28 (93.3%) patients showed Scale 0 response in Group-A, but 23 (76.7%) in Group-B showed Scale 1 response. Mean rank was statistically significant in both Groups (p<0.001). From 1 month and thereafter up to 6 months follow-up, there was Scale 0 response in both arms (Fig 1). According to Javadekar et al post-operative discomfort was significantly lower in autologous blood group than suture group (p<0.001) on 1st and 7th post operation days¹⁴. Various studies found post-operative discomfort and pain is significantly higher in suture group (p=0.0058)^{17,4}.

In this study, there were 3(10%) graft retraction in Group-A only within 6 months of follow-up post operatively (p=0.237) (Table IV). Malik et al showed 7.5% graft retraction after pterygium excision¹⁰.

Kurian et al showed 8.16% graft retraction with autologous blood². Graft retraction can occur if graft is smaller than the bare sclera and meticulous dissection of the subepithelial graft tissue is not performed properly.

Graft stability is a major concern after pterygium excision and stability is usually ensured within the first 24 hours. In this study there was no graft displacement. Rathi et al showed 1% graft loss following autologous blood clot technique¹³. Kumar et al showed 3.33% graft displacement following autologous blood clot¹⁷. Graft displacement may be due to inadequate excision of pterygium or leaving too much Tenon's tissue on the graft. Meticulous dissection of Tenon's capsule and slight pressure over the graft with iris retractor for few minutes to adhere with bare sclera can ensure graft stability in autologous blood clot technique and these were followed in this study.

This study showed 1 (3.3%) granuloma formation in Group-B only within 6 months of post-operative follow-up (Table V). Kumar et al also showed 1 (2.94%) suture-related granuloma following pterygium excision¹⁷. Suture materials can initiate an aggressive local inflammatory response in some patients due to host-immune response and ultimately may present with granuloma.

After careful analysis, it is clear that autologous blood clot is a better option following primary pterygium excision with significantly post-operative patient comfort and less complications.

Limitations

Although optimum care had been tried in every step of the study, still some limitations are pointed out:

- i) 10% loss to follow-up was not included in the final sample size calculation for each Group.
- ii) The study population was selected from only one hospital in Chattogram; so that it may not reflect the real picture of the country.

Conclusion

Autologous blood clot technique resulted in significantly less post-operative discomfort and shorter surgery time (table not shown) than using sutures. Duration of the procedure varies widely with the skill of the surgeon, procedure chosen, availability of the proper instruments, expert assistant and operation theatre staffs and patient cooperation. Furthermore, this technique resulted in no recurrence. So, autologous blood clot technique is a safe and effective method.

In Bangladesh, poor, rural populations are affected mostly, who do not attend the ophthalmologists timely. As a consequence, there are more chances of developing post-operative complications and operation failure. So from all these geographic and socioeconomic perspectives, pterygium excision and conjunctival autograft with autologous blood clot technique will be much rational for our country in terms of cost-effectiveness, safety, less complications as well as much more comfortable.

Recommendations

To make the finding more representative, sample size and study period should be reasonably increased. So, further large-scale studies involving multiple centers on the same issue are recommended to obtain more accurate and dependable outcomes.

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Contribution of authors

TT – Conception, design, interpretation of data, manuscript writing & final approval.

MII – Acquisition of data, interpretation, analysis of data, critical revision & final approval.

Disclosure

All authors declared no conflict of interest.

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