

Outcomes of autologous blood conjunctival graft for pterygium surgery at Mbarara University and Referral Hospital Eye Centre and Ruharo Eye Centre

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ABSTRACT

Background: Pterygium management in its advanced stages needs surgery and conjunctival grafting to minimize recurrences. Traditionally, conjunctival grafts were being sutured. Newer techniques such as attachment of the graft with autologous blood are becoming prevalent and outcomes are comparable to other methods of grafting. A few autologous blood coagulum grafts had been performed in Mbarara University and Referral Hospital Eye Centre (MURHEC) and the outcomes were not well known.

Objective: The study determined the average duration of surgery using autologous blood conjunctival grafts, stability of the graft and associated discomfort post operatively.

Methods: A case series study with 19 eyes that received sutureless autologous blood coagulum grafts on the bare sclera was conducted. Surgery duration was timed from time of speculum insertion to speculum removal. Patients were assessed on days 1 and 14 for discomfort and graft stability.

Results: Nineteen eyes received autologous blood coagulum grafts following their pterygium excision. The mean age of participants was 37 (20-55) years. The average duration for the surgery was 31 (25-40) minutes. Thirteen (68.4%) eyes had their grafts adherent on all corners on their first post-operative day. By the 14th day post operatively, 94.4% had their grafts well secured. One (5.3%) eye had graft displaced on 3 sides and it was reattached with sutures. Five participants (27.8%) had minimal graft dehiscence nasally which later closed.

Conclusion: Autologous blood coagulum takes a shorter duration, has stable grafts and with minimal post-operative discomfort. The procedure is equally effective in securing the graft however some patients may have medial dehiscence.

Key words: Autologous Blood Conjunctival grafts (ABC), Pterygium, Graft stability, Outcomes

INTRODUCTION

Pterygium prevalence increases geographically towards the equator between Latitude 40°N and 40°S. The association is even greater in people exposed to outdoor environments¹. Pterygium is initially asymptomatic and later as it advances, it is associated with cosmetic disfigurement, itching, recurrent inflammation, visual impairment, diplopia from motility restriction, and difficult to wear contact lens. Lesions larger than 3.5mm onto the cornea are likely to be associated with greater than one Diopter astigmatism, tear film instability, and can grow to obliterate the pupil. These effects warrant the excision of the pterygium to eliminate the induced symptoms. Conjunctival growth excision with grafting minimizes this risk of recurrence^{2,3}.

Use of sutures which is commonly used is technically difficult with a long learning curve, prolonged surgery duration, pronounced post-operative discomfort,

expensive sutures, increased hospital visits most associated with suture irritation. One Vicryl suture costs around 34 US\$ and it is used on a single person. Fibrin glue is costly, approximately 14 US\$ per patient and not readily availability in most centers⁴. Autologous Blood Coagulum (ABC) grafting is not commonly used despite its low cost, simple learning curve, short surgery duration, better post-operative comfort and there is insufficient data on its outcomes to support its extensive use as a preferred method.

Autologous blood coagulum grafting is a simple procedure that can be done by any ophthalmic surgeon including ophthalmic clinical officers. It is easy to learn and there is no experience and technical skills needed unlike use of sutures. This study sought to introduce the use of autologous blood coagulum to secure a conjunctival autograft for routine pterygium operations and we wanted to describe the surgical outcomes at MURHEC and Ruharo Eye Centre.

MATERIALS AND METHODS

Ethical considerations

Approvals were sought from the Departments of Ophthalmology (MUST), Faculty Research and Ethics Committee (MUST), Institutional Ethical Review Committee of Mbarara University of Science and Technology (Ref MUREC 11/12-20). All participants consented. All data generated from both hard copy consents and participants' results were stored in key and lock.

Study design and setting

This was a hospital-based case-series study conducted in two specialized ophthalmology hospitals. Mbarara University and Referral Hospital Eye Centre (MURHEC) and Ruharo Eye Centre (REC) are specialized eye hospitals in South-Western Uganda. They are both located in Mbarara Municipality about 5km apart.

Data collection

The study enrolled 19 eyes from 17 adult participants who were eligible that underwent pterygium surgery and received autologous blood conjunctival grafting at MURHEC and Ruharo Eye Centre in the months of December 2020 to May 2021. Pregnant women, suspicious lesions of malignancy, infected eyes, temporal pterygium and those with recurrent pterygia were not included in the study.

A questionnaire was administered to collect data and full eye examinations performed on all participants. A pre-tested structured questionnaire was used to collect data.

Examinations included visual acuity using a Snellen's projection chart, the anterior and posterior segment examination was performed using a slit lamp and 90 D lenses. Pterygium was graded depending on the extent of corneal involvement. Grade I - crossing the limbus, Grade II - midway between limbus and pupil, Grade III - reaching up to pupillary margin, Grade IV - crossing pupillary margin⁵. Sections of the questionnaire were filled both preoperatively, intraoperatively for surgery duration and any intraoperative complications were documented. Postoperatively, the participants were reviewed in the clinic on day 1 and at 2 weeks later, following a routine follow-up procedure for extraocular surgery. At each visit, the VA was taken, full eye examination done. Stability of the graft and post-operative discomfort were assessed. Graft stability diagnosis was based on attachment of the graft onto scleral bed and conjunctival edges.

Surgical technique

The procedures were done by the same investigator under an operating microscope using the same technique. Sterile conditions following standard operating procedures were followed on all cases. All surgeries were performed under local anaesthesia using a 2% lignocaine given either retrobulbar or peribulbar. All procedures were done under the supervision of a specialist ophthalmologist. The surgeon (investigator) had undergone training and supervision from the ophthalmologists with experience in the method and had the required competence and experience to perform the procedure. A speculum was inserted and maintained in place to enhance exposure for the entire length of the surgery.

Sub-conjunctival and sub-ptyerygial 0.25ml lignocaine solution was injected. The neck of the pterygium was then lifted up with the help of fine-toothed forceps. The body of the pterygium was dissected 4mm from the limbus, down to the bare sclera, and reflected over the cornea. The pterygium head and cap were avulsed using dissection forceps by maintaining consistent fine traction followed by careful crescent blade excision of corneal remnants. Only the thickened portions of the conjunctiva and the immediate adjacent and subjacent Tenon's capsule showing tortuous vasculature were excised. Care was taken to avoid conjunctival plica excision and extensive dissection of tenons. Haemostasis was allowed to occur spontaneously without the use of cautery. In case of excessive bleeding by a vessel, fine glass rod cautery was applied carefully to avoid extensive burnt area. Saline flushes were not used. Cotton buds were used to remove the excess haemorrhage. The cornea was kept moist by applying saline-soaked cotton buds throughout the procedure. If enough blood was not available to provide autologous fibrin, small perforating veins and capillaries were purposely fractured (though seldom required) to encourage a thin layer of fresh blood to cover the bare sclera. The size of the bare sclera defect (mm) was measured with Castroviejo calipers.

0.25ml of lignocaine was injected subconjunctival on the donor site. Careful dissection between donor graft conjunctiva and Tenon's layer was done while fashioning the 0.1mm oversized conjunctivo-limbal graft from the superotemporal bulbar conjunctiva. The limbal edge of the graft was carefully positioned at the host limbal tissue edge. No attempt was made to directly close the full extent of the excision wound, allowed natural graft positioning without tension.

The scleral bed was being viewed through the transparent conjunctiva and to ensure residual bleeding does not relift the graft, small central haemorrhages were given tamponade with direct compression using non-

toothed forceps muscle hook or non-irrigating Vectis until haemostasis was achieved, usually within 8–10 minutes. The stabilisation of the graft was tested with a cotton bud centrally and on each free edge to ensure firm adherence to the sclera. This was similar to a method used by other studies^{1,6-8}.

Ocular chloramphenicol ointment was applied in minimal amounts to cover the cornea on the half away from the graft before the eyes were covered with a cotton gauze pad and secured with plaster. The dressing was removed the following day after 24hrs without replacement for initial examination.

Surgical time was noted from the time of speculum insertion up to the speculum removal. Time was recorded in minutes. No assistant was used to eliminate a confounder on duration of surgery.

Post operatively, all eyes were treated with dexamethasone/gentamicin combined eyedrops 4 hourly a day for 2 weeks and prednisolone acetate 1% drops continued for a further 4 weeks. Patients also applied

HPMC 3 times a day in the operated eyes. Patients were reviewed on day 1 and day 14. For the one participant whose graft did not adhere to the recipient site intra operatively, the graft was sutured and this participant was dropped from the study.

For grafts that were displaced post-operatively, they were taken back for suturing. Amethocaine drops were used for anaesthesia, and patients were allowed home to continue care. No eye patching was necessary. They received dexamethasone/gentamicin combined eye drops 6 times a day for 2 weeks and prednisolone acetate 1% eye drops for a further 4 weeks. Sutures were removed after 7 days or 14 days depending on the patient's convenience to come earlier.

Data analysis

Data from 19 eyes was analysed manually for frequencies. Surgery duration was analysed for the mean.

RESULTS

Objective one: Duration of surgery

A total of 19 eyes from 17 patients were enrolled in the study, 18 from MURHEC and 1 from Ruharo eye centre.

Table 1: Time taken in minutes to perform entire procedure

Time taken (minutes)	Frequency
<30	6
≥30	13
Total	19

The average duration for the surgery was 31 (25-40) minutes from the time of speculum insertion until speculum removal.

Objective two: Stability of the graft

Table 2: Status of the graft on day 1 and day 14 post operatively

Status of graft	Day 1	Day 14
Adherent all 4 corners	13 (68.4%)	17 (94.4%)
Displaced 1 side	5 (26.3%)	1 (5.6%)
Displaced 2 sides	0 (0.0%)	0 (0.0%)
Displaced 3 sides	1 (5.3%)	0 (0.0%)
Graft lost	0 (0.0%)	0 (0.0%)
Total	19 (100%)	18 (100%)

Thirteen patients (68.4%) had their grafts adherent on all corners on their first post-operative day. Up to 94.4% had their grafts well secured by 14th day post operatively and beyond.

Objective three: Post-operative discomfort**Table 3:** The presenting symptoms on day 1 and day 14 post operatively

Nature of abnormal sensation	Day 1	Day 14
Foreign Body (FB) sensation	13 (41.9)	6 (19.4%)
Itching	3 (9.7%)	3 (9.7%)
None	3 (9.7%)	20 (64.5)
Pain	6 (19.4%)	1 (3.2%)
Tearing	5 (16.1)	0 (0.0%)
Red	1 (3.2%)	0 (0.0%)
Photosensitivity	0 (0.0%)	1 (3.2%)
Total	31 (100%)	31 (100%)

Foreign body sensation was experienced by 13 (41.9%) patients and was the commonest symptom on day1 and had halved by day14. Six (19.4%) patients reported pain as their symptom on day 1.

Table 4: Level of pain perceived by participants

Pain scale	Day 1	Day 14
None = no pain at all	0 (0.0%)	14 (77.8%)
Very mild= has pain but easily tolerated	12 (63.2%)	3 (16.7%)
Mild = has pain causing some discomfort	5 (26.3%)	0 (0.0%)
Moderate = has pain causing discomfort that interferes with usual activity or sleep	2 (10.5%)	1 (5.6%)
Severe = has pain that completely interferes with usual activity or sleep	0 (0.0%)	0 (0.0%)
Total	19 (100%)	18 (100%)

Twelve (63.2%) patients had very mild pain on day 1 post-operatively and of these, only 3 (16.7%) still had mild pain at the 14th post-operatively.

DISCUSSION

To prevent the recurrence of pterygium, many surgical techniques have been developed. The “ideal” pterygium management is still an ongoing debate because there is no technique regarded as a gold standard and no single method of surgery has proved as superior. In this study, 19 eyes were enrolled for autologous blood coagulum conjunctival grafts with primary nasal pterygia ranging from grades 1 to 3.

Surgical time

In this study, the average duration for the surgery timed from speculum insertion to speculum removal upon completion of the procedure was 31 (25-40) minutes. Autologous blood grafting takes a shorter duration compared to suturing since it avoids the tedious process of suturing under a microscope with instruments. On the other hand, suturing needs skill of good hand coordination and it has long learning curve, complex to learn and one has poor outcomes initially. Suturing and autologous blood coagulum grafting share similar procedural steps initially but suturing takes additional time performing the

skillful procedure using instruments under a narrow field of view of the microscope. This effect of extended time with suturing is even felt more when the person suturing is not experienced where it may take more than 90 minutes. Autologous blood grafting saves time further and costs in the long run because there will be no repeated visits to the clinic and time spent removing sutures. This study duration was comparable to 28 minutes observed in another study⁹. It was significantly shorter than 44.8 minutes observed by Kumar and Singh, 2019²⁰. Pterygium surgery with the use of sutures took an averagely longer than 40 minutes as reported in some studies. In different studies in different years, there was a significant difference between sutured group and the autologous blood group in terms of surgical time^{10,11}. A report done in the year 2018 showed suture surgery took an average of 33.73 min¹². Although it was averaging our time, it is associated with extra costs and longer learning curves.

Stability of graft

The majority of the patients had their grafts adherent on all corners on their first post-operative day. Up to 94.4% had their grafts well secured by the 14th day post operatively

and beyond. This showed that autologous blood facilitates adherence of the graft on the scleral bed.

Using autologous blood coagulum conjunctival grafts creates even tension across the whole graft interface and there is no direct tension on the free graft edges as with sutures. This minimizes the stimulus for subconjunctival scar tissue formation⁶. A few millimeters of dehiscence was initially seen in 26.3% that later was covered by conjunctival growth by 14th day. Owing to the fact that the graft is not tethered at its edges and when contraction ensues during the healing process, there may be small graft dehiscence of about half a millimeter in some individuals. This is usually well tolerated and does not need further intervention. It is assumed that harvesting a graft that is slightly larger than the area to be grafted by about half a millimeter will cater for this. This was thought to be due to under-perfusion of the scleral bed¹⁴. Similar studies had noted dehiscence^{5,15}. This study observed closer rates to those observed by Ghazal *et al.*, 2018¹⁴, who noted a 33% gap between the graft and conjunctiva. In this study, patients did not lose grafts possibly because we instructed and encouraged our participants not to rub their eyes and also we used a smaller sample size. This finding is in contrast to what was observed in other studies^{3,16,17} who observed graft loss. The graft loss and dehiscence was attributed to vigorous eye rubbing.

Post-operative discomfort

This study observed foreign body sensation as the commonest symptom on day 1 which had halved by day 14. The initial feeling could be attributed to the edematous graft, raw cut surfaces both on the donor site and recipient site and unevenness of the different conjunctival surfaces. The fast resolution of this symptom is due to resolution of the edema, growth of the graft to cover the edges and healing of the donor site. It could also be due to the effect of medication which favours resolution of the inflammation. By day 14 post operatively, most (73.7%) participants had no symptoms. Such similar observations were seen in studies by Bhatia *et al.*, 2017². In studies that compared suturing to autologous blood grafts, there was a statistically significant difference in the two groups about scores of the postoperative foreign body sensation, pain, epiphora¹⁸. Many other studies that compared autologous grafts and sutures showed that sutures were associated with prolonged post-operative patient discomfort^{10,19}.

Limitations of the study

- (i) The study population and follow-up time were relatively small in our study.
- (ii) No blinding technique was used in the analysis of postoperative discomfort and pain, this was subjectively assessed by the operating surgeon.

CONCLUSIONS

- (i) The average surgery duration using autologous blood grafts was 31 minutes, shorter than other studies have shown with suturing.
- (ii) The grafts in this study were stable, there were slight dehiscences in some grafts which were well tolerated and eventually covered the defect. The cosmesis was better than the initial presentation.
- (iii) Patients experienced less post-operative discomfort related to autologous *in situ* blood coagulum grafts. There were no adverse events observed with the use of autologous blood grafts, the procedure was relatively safe.

RECOMMENDATIONS

- (i) This technique should be used for grafting after pterygium surgery because it saves time and it is cost effective. It is suitable for grafts which have a reduced surface area. Large areas for grafting were not studied.
- (ii) Care should be taken to harvest slightly larger grafts (1mm) to cater for graft contraction that happens post operatively.
- (iii) An adequate explanation should be given to the patient post-operatively to avoid rubbing the eyes while using these techniques. We did not lose grafts because we encouraged our patients not to rub eyes.

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Competing interests: The authors declare that they have no competing interests

Ethical approval: This study was approved by the Mbarara University Research Ethics Committee (MUST REC).

Informed consent: We confirm that all eligible participants or their caregivers provided consent to participate in this study and that the study obtained approval from the Mbarara University Research Ethics Committee

Consent for publication: All authors consented to have this work published including photos.

Availability of data: The datasets used during the current study are available from the corresponding author on reasonable request.

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