Original Article

Use of amniotic membrane ameliorating postoperative discomfort in pterygium surgery

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Abstract

Purpose: To report the results of using human amniotic membrane (AM) as a bandage at the end of pterygium surgery to diminish its uncomfortable postoperative symptoms.

Materials and Methods: Observational, descriptive retrospective study in which patients with bilateral primary nasal pterygia were operated on with a conjunctival-limbal autograft with conventional suturing, one eye receiving an AM bandage at the end of surgery and the other not.

Results: There were 20 eyes of 10 patients, five men, and five women, with a mean age of 28.7 ± 6.4 years; general postoperative symptoms (pain, burning sensation, and tearing) and foreign body sensation were statistically lower in the AM group at the 4th, 8th, and 12th postoperative day ($P < 0.05$).

Conclusions: AM as a bandage at the end of pterygium surgery reduces the uncomfortable postoperative symptoms typical of such surgery.

Keywords: Amniotic membrane, pain, pterygium

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INTRODUCTION

Pterygium surgery has advanced enormously during the last decades, evolving from simple resections - the bare sclera - with recurrence rates >60%[1] to conjunctival-limbal autografts (CLAG) with lower recurrence rates, even lower than 2%.[2-5] Initially reports were centered on reducing the recurrence rate, moving on from bare sclera to sliding conjunctival grafts;[6] then free conjunctival autografts[7] and finally to free CLAG.[8-11]

During this time, several adjuvant techniques have been proposed such Beta-Radiation,[12,13] topical mitomycin C (MMC),[14-16] and 5-Fluorouracil (5-FU),[12,17] among others, with variable results, finally proving the free CLAG as the best technique, providing an adequate anatomic and functional reconstruction of the ocular surface, reported by different groups worldwide.[12,18-21]

During the last decade, focus has centered on ameliorating the noisome postoperative symptoms during the early postoperative period of this surgery. Such symptoms have several causes: Tissue cut and resection, corneal-limbal smoothing, hemostasis, and sutures.[22]

In this regard, several techniques have been tried, such as graft fixation with tissue adhesive[23-25] or cautery,[26]

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different suturing materials,[27-29] therapeutic contact lenses,[30-32] peribulbar morphine,[33] autologous serum,[34] lidocaine gel,[35] and peribulbar Bupivacaine[36] among others, with variable results, that in the best of cases variably diminish these symptoms mainly during the first 24 postoperative hours.

Nowadays, some groups consider fibrin glue and CLAG as a gold standard in pterygium surgery, being faster and with lesser immediate postoperative pain, not only because of the absence of sutures but also because the glue itself serves as a temporary bandage over the surgical wound. However, regarding recurrences, it has not shown better results than conventional suturing techniques, and in many third-world countries, the cost of tissue adhesive makes it harder to be used.

In our institution, the CLAG is used as the standard technique for pterygium surgery, finding the noisome postoperative discomfort mentioned above; we have tried several techniques to diminish such symptoms, such as commercial and autologous adhesive, fixation by cautery, and postoperative soft contact lens placement. Even though symptoms are more or less ameliorated, this surgery is still very uncomfortable for patients.[37]

The use of amniotic membrane (AM) as a postoperative symptom and pain reliever has not been considered in the literature. The purpose of this study is to present our results regarding the striking decrease in unpleasant postoperative symptoms in pterygium surgery with the sutured conventional CLAG technique and a novel usage for AM by temporarily covering the surgical area at the end of surgery with glycerin-preserved human AM using it as both: A mechanical and chemical bandage.

MATERIALS AND METHODS

A retrospective descriptive study with data from operated patients with the technique mentioned above.

Sample

We included ten patients with bilateral primary nasal pterygium to whom the experimental nature of the procedure was explained and who understood and accepted it.

This study was accepted by the ethics committee of Universidad CES and adhered to the Helsinki protocol principles.

Surgical technique

Each patient's eyes were operated upon: One with AM and the other not, with a 2 weeks' interval, so that each patient served as his control. All patients were operated by one surgeon (LFM) using the same surgical technique consisting of complete removal of the anomalous tissue with a 15° disposable knife and Wescott scissors, corneal-limbal smoothening with a high-speed diamond drill, and a CLAG sutured with 7 10-0 Nylon sutures, finalizing by closure of the graft donor site with 2 10-0 Nylon sutures.[2] Upon finishing surgery, the surgical area was covered with glycerin preserved human AM, epithelial side up, secured with 4 10-0 nylon amniotic-conjunctival sutures on its corners (GROUP A); this membrane covered the corneal de-epithelized area, and the CLAG with its seven anchoring sutures [Video 1].

Upon finishing surgery, the contralateral eye's surgical area was not covered with an AM (Group B).

Postoperative management

Eyes were left patched for 24 h, after which they were uncovered, and started using fluorometholone drops 5 times per day, preservative-free artificial tears five times per day and dexamethasone + moxifloxacin ointment every night, for 2 weeks; after this, the liberal use of preservative-free artificial tears was left to the patient's choice.

The AM (Group A) was removed on the fourth postoperative day at the slit lamp, and all the CLAG sutures were removed at the 12th postoperative day (Group A and B).

The diagnosis of pterygium was confirmed by pathology in all cases.

Follow up

Postoperative discomfort was evaluated using an analogous score and was divided into two categories: Pain, burning sensation, and tearing, classified as general symptoms, and foreign body sensation, produced mainly by the suturing material.

Patients were given a form with a graphic pain score graded 0–5 to evaluate separately the magnitude of the general symptoms and foreign body sensation, were 0 is no uncomfortable symptoms or foreign body sensation at all, and five is incapacitating symptoms or foreign body sensation. This form was filled on the 4th, 8th, and 12th postoperative days. This form is used in every pterygium surgery at our institution. Thereby information and data bias were controlled.

Data collection and statistical analysis

Due to the descriptive nature of this study, an analysis of every patient's medical record was made, recording the

required variables as the dependent variable was considered the presence or not of AM. Nondependent variables were general symptoms and foreign body sensation at the 4th, 8th, and 12th postoperative days.

Categorical variables are presented both in percentage and absolute value, and numerical variables are presented in media and standard deviation, based on the normal distribution according to the Shapiro–Wilk Test.

Furthermore, a bivariate analysis was performed with the U-Test of Mann–Whitney for independent samples and the Chi-square Test looking for probable associations.

We considered acceptable values an alpha of 0.05, a potency of 80%, and a confidence of 95%.

Data were tabulated on Microsoft Excel v 16.37 and analysis was performed using IBM. Chicago, Illinois, USA. v 21.00 for IOS.

RESULTS

We operated on 20 eyes of 10 patients, five men and five women, with a mean age of 28.7 ± 6.4 years In 50% of cases, AM was placed on the first operated eye, and in the other 50% in the secondly operated eye.

The diagnosis of pterygium was confirmed by pathology in all cases.

Results of general symptoms and foreign body sensation gradation are shown in Table 1.

Postoperative general symptoms (pain, burning sensation, and tearing) were statistically lower in Group A, compared to Group B, in all measurements, even up to the 12th postoperative day control ($P < 0.05$).

Postoperative foreign body sensation, mainly caused by sutures, was also statistically lower in Group A, compared to Group B, at all times, up to the 12th postoperative day ($P < 0.05$).

Overall, patients in GROUP A had quieter eyes, with less hyperemia, and less CLAG and palpebral edema [Figure 1], compared to eyes in GROUP B [Figure 2].

DISCUSSION

Pterygium surgery is performed worldwide. Cameron[38] described what is known as the "pterygium belt" limited at ± 35° North and South of the Equatorial line as a zone of greater incidence due to environmental factors.

This surgery has been performed for centuries. The initial challenge was to achieve a good anatomical and functional reconstruction with low recurrences.

Recurrence rate improved with new techniques, as follows: Bare sclera >60%,[1] sliding conjunctival graft 4% to 16.6%,[6] free conjunctival autograft 8%-10%,[7] and finally, CLAG first described by Jose Barraquer MD[8] and nowadays deemed the procedure of choice with results confirmed worldwide of recurrence rates as low as 1.8%.[2,9,11,39-41] During these years several additional techniques have been proposed to lower the recurrence rate but not reaching consistently similar results to the CLAG, such as AM graft,[42] or even with deleterious effects such as Beta radiation therapy,[12,13] or intra or postoperative MMC application.[15-17]

However, a problem that has persisted thru all these years is the severe postoperative pain and discomfort in these patients.

In this regard, several adjuvant therapies have been proposed, such as:

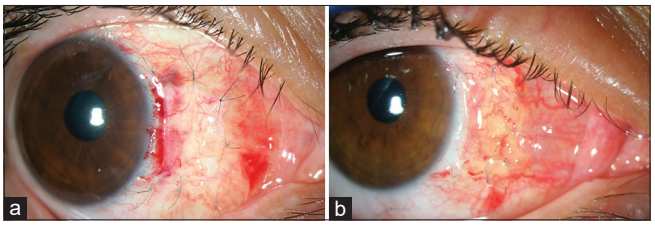

Figure 1: (a) Typical 4th day postop aspect of a Group A eye. (b) Typical 8th day postop aspect of a Group A eye

Table 1: Postoperative discomfort comparison

Postoperative discomfort	Group A (amniotic membrane)		Group B (no amniotic membrane)		*P**
	Mean (SD)	Median (ICR)	Mean (SD)	Median (ICR)	
General symptoms (first 4 days)	1.3±0.4	1.0 (1.0-1.5)	4.5±0.4	4.5 (4.0-5.0)	<0.05
Foreign body sensation (first 4 days)	1.1±0.2	1.0 (1.0-1.0)	4.9±0.2	5.0 (4.5-5.0)	<0.05
General symptoms (8 days postoperative)	1.0±0.0	1.0 (1.0-1.0)	2.9±0.5	3.0 (2.5-3.0)	<0.05
Foreign body sensation (8 days postoperative)	1.4±0.2	1.5 (1.0-1.5)	2.9±0.5	3.0 (2.5-3.0)	<0.05
General symptoms (12 days postoperative)	1.0±0.0	1.0 (1.0-1.0)	2.2±0.2	2.0 (2.0-2.5)	<0.05
Foreign body sensation (12 days postoperative)	1.1±0.2	1.0 (1.0-1.0)	2.4±0.4	2.3 (2.0-2.5)	<0.05

*Mann-Whitney-U. SD: Standard deviation, IQR: inter quantile range

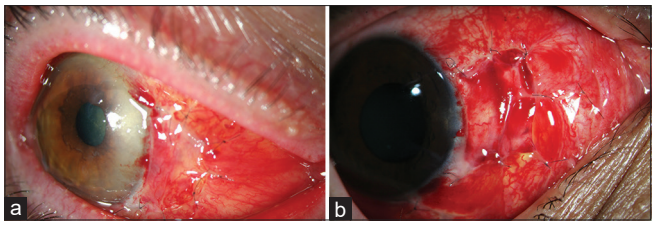

Figure 2: (a) Typical 4th day postop aspect of a Group B eye. (b) Typical 8th day postop aspect of a Group B eye

- Peribulbar Morphine[33] decreased postoperative pain in the first 24 h only, and secondary effects such as nausea
- Subtenon's Bupivacaine,[36] decreased postoperative pain in the first 36 h
- Therapeutic soft contact lens, resulting in variable improvement in the postoperative pain in the first 48 h in some reports[32,43] but not in others[33]
- Commercial or autologous tissue adhesive;[25,44-50] most reports a decrease in pain and discomfort scores, but still with some symptoms during the early postoperative days; adhesive cost is high and has some risk of graft dislocation[51] and rarely a graft loss[29]
- Autologous serum;[52] reporting low uncomfortable claims during the early postoperative period compared to sutures, but with dislodgement and graft loss incidence of up to 10%
- Electrocautery graft fixation; lesser symptoms than sutures or tissue adhesive,[24,37] but considerable discomfort during the early postoperative period
- Different eye drops during the postop such as cyclopentolate,[53] Nepafenac[54] or autologous serum[34] with improvement in postoperative symptoms during the first 2–3 days, but with inherent disadvantages such as the nuisance of prolonged cycloplegia, or the risk of corneal melting using nepafenac in a de-epithelialized cornea
- Compared to conventional nylon sutures, different suturing materials such as polyglactin, have no symptoms of improvement.[46,55]

The common denominator to all these measures has been a slight amelioration of early postoperative symptoms, never lasting longer than 3 days.

In our group, we have worked for years to ameliorate the bothersome postoperative symptoms of our pterygium surgery patients and, even though we have seen some early (up to 3 days) postoperative symptoms amelioration. However, this relief does not extend beyond 3 days, and our patients regularly complain of pain, foreign body sensation, epiphora and lid edema with the different therapies tried.

AM is avascular, antiangiogenic, does not express histocompatibility antigens, has antibacterial properties, and is a known source of Interleukins1 and 10 (IL-1, IL-10) and metalloproteinase Tissue Inhibitor 1, 2, and 4 among other factors, which makes it not only a mechanical but also a biochemical bandage.[56-60]

Keeping all that in mind, we decided to place the AM as a bandage over the surgical area, covering the corneal de-epithelialized area and the CLAG and its sutures. Looking forward to ameliorating their postoperative symptoms in two ways: Mechanically by avoiding the eyelid friction over the surgical area, and biochemically by taking advantage of the biochemical properties of the AM to have a quieter and less inflamed ocular surface overall; suturing the AM in place did not take more than a few minutes of extra surgical time.

We opted to leave it on for only 4 days because those are the most uncomfortable days, because its aspect is cosmetically unpleasant and because we wanted to remove it before it began to disintegrate. Leaving it on for 4 days proved to be very effective, providing almost complete relief of the described general symptoms and foreign body sensation never seen before in our hands with all the other techniques tried, clearly reaching a statistically significant relevance between groups in the questionnaires filled at not only 4 days but also 8 and 12 postoperative days [Table 1].

Despite being removed on the fourth postoperative day, Group A eyes were quieter, and CLAG's with less edema than Group B patients, a difference that persisted until the 12th postoperative day when graft sutures were removed in both groups.

AM effects persisted after its removal as if the lesser inflammation obtained during the first 4 days helped to have a remaining postoperative period more accessible for these eyes.

Glycerin preserved AM is cheap and widely available in our country, its cost is considerably lower than the tissue adhesive, which is considerably expensive for the general public in our country; furthermore, the AM is provided by the public health system, while the tissue adhesive is not, so patients must pay for it. Moreover, in Colombia, we do not have access to AM in contact lens nor cryopreserved as other countries do, so we cannot comment on these variations.

We did not have any immediate complications regarding CLAG displacement or retraction under the AM or even

the AM itself being dislodged, although the latter could certainly happen if one of its suture knots is broken; we do not expect this technique to modify our recurrence rate, but only time will tell.

A limitation of this study is that this technique was not directly compared to other discomfort amelioration methods, but our past published experience[37] has shown some different pain scores using the same visual pain grading system.

In our hands, AM was an effective coadjutant for ameliorating uncomfortable symptoms and foreign body sensation after pterygium surgery. We were pleasantly surprised by the overall well-being of these patients, independent of their personality, as each patient served as its own control, and we contemplate that AM may be considered as a routine adjuvant for pterygium surgery.

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Conflicts of interest
There are no conflicts of interest.

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