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Original research

Comparison of free conjunctival autograft versus amniotic membrane transplantation for pterygium surgery

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Abstract

Purpose: To compare the recurrence rate and surgical outcomes of amniotic membrane transplantation (AMT) and free conjunctival autograft (CAT) for pterygium surgery.
Methods: In this prospective study, 60 patients with primary pterygium were randomly assigned to two groups of CAT or AMT and were compared in terms of recurrence rate, mean healing time of corneal epithelial defects, the mean level of inflammation, and complications.
Results: The mean ± SD age of patients was 48.98 ± 9.8 years (range, 27–71 years). 73.3% were men, and 26.7% were women. The groups did not differ with respect to demographic characteristics ($P > 0.05$). Patients were followed for an average of 12.6 ± 1.3 months. The recurrence rates were 6.7% and 3.3% in the AMT and CAT groups, respectively ($P > 0.05$). Comparison of mean inflammation score showed higher inflammation in the AMT group in the first, third, and sixth postoperative month ($P < 0.05$). Mean healing times of corneal epithelial defects were 2.5 ± 0.572 and 2.67 ± 0.479 days in the CAT and AMT groups, respectively ($P = 0.173$).
Conclusions: No significant complication was observed during or after both surgical methods. No statistically significant difference was seen in visual acuity changes and epithelial healing in CAT and AMT groups, but more inflammation and recurrence rate were seen in AMT group.

Keywords: Pterygium surgery; Conjunctival autograft; Amniotic membrane transplantation

Introduction

Pterygium is a common ocular surface disease that is a wing-shaped fibrovascular growth from the conjunctiva onto the cornea and can affect one or both eye(s) on one or both (nasal/temporal) sides of the eye.[1] Ultraviolet light, which is believed to cause pterygium may induce chronic inflammatory cells in the conjunctiva or damage limbal stem cells. Chronic inflammatory cells were shown to be present in pterygium samples, thus chronic inflammation may contribute to pterygium occurrence.[2]

The incidence of pterygium is twice in men compared to women, and its incidence increases with age.[1] It may impair visual acuity, thus, surgical procedure has been suggested since 1940 as the treatment of choice for pterygium.[3] but the high recurrence rate remains the major problem of pterygium surgery,[4] which may be provoked by inflammation that may activate the remaining pterygial body fibroblasts and evolve into an invasive phenotype of the disease.[5–7]

Different surgical approaches have been suggested for treatment of pterygium since the primary technique (bare sclera technique) is associated with a recurrence rate of 37–90%.[8] Intraoperative administration of 0.02% mitomycin C (MMC) is suggested as an efficient method to reduce the recurrence rate but is associated with several postsurgical complications.[9] Several adjunctive measures have also been

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suggested for the closure of the defect, caused by the excision of pterygium. Free conjunctival autograft (CAT) is a quick and safe procedure, where the resected conjunctiva is transplanted to the excised area,[10] it has gained attention in recent decades and is established to have a low recurrence rate.[11] Amniotic membrane transplantation (AMT) is another suggested procedure with improved surgical results, including reduced scarring, inflammation, and vascularization, resulting from its biological properties.[12,13] Also, AMT is suggested to cause rapid pain relief that is regarded as an important benefit for it.[13]

Several studies have compared the recurrence rate of AMT with CAT and most of them have reported a higher recurrence rate in AMT than CAT,[14−16] whereas other studies have reported equal recurrence rates for the two procedures.[17−20] Thus, it is still required that further studies investigate the different aspects of pterygium surgery in order to suggest one procedure as the method of choice. Accordingly, we aimed to compare the recurrence rate and surgical outcomes of CAT and AMT.

Methods

In this prospective study, patients with primary pterygium (>3 mm on a horizontal axis of the cornea) who referred for surgery to Amir-Al-Momenin Hospital, Rasht, Guilan province, Iran, from August 2014 until September 2015 were recruited. Recurrent cases of pterygium and pseudo-pterygium were not included into the study.

The protocol of the study was approved by the Ethics Committee of Guilan University of Medical Sciences, Rasht, Guilan, Iran. Before recruitment, the design and objectives of the study were explained to them, and written informed consent was obtained. Principles of the Declaration of Helsinki were met throughout each step of the study.

In this consecutive case series, the patients referred to the Cornea Clinic were recruited into the study during a 6-month period ($N = 60$) and were randomly assigned (simple randomization, according to random number table) to two surgical methods: CAT or AMT. The diagnosis and surgical procedures were performed by one ophthalmologist (M.A).

For AMT, the speculum was used to expose the surgical field. Local anesthesia was performed by 2% lidocaine. The pterygium was disconnected from cornea by the blade and pterygium's body, the surrounding tenon capsule and 0.5−1 mm of the free side of the pterygium was separated from the conjunctiva and uncovered sclera, and the bleeding was controlled with light cautery. An applicator containing 0.02% MMC was kept in connection with the tissue for 90 s. Cornea and limbus were observed not to be in contact with MMC. Then the eye surface was rinsed with 100 mL saline. The amniotic graft was used as a basement membrane side up in the defect site, which was sutured by Nylon 10.0 to episclera, and the surrounding conjunctival tissue continuously. In addition, fibrin glue was not used in this study.

For CAT, the speculum was used to expose the surgical field. Local anesthesia was performed by 2% lidocaine, and the pterygium was disconnected from the cornea by the blade and pterygium's body, the surrounding tenon capsule, and 0.5−1 mm of the free side of the pterygium was separated from the conjunctiva and uncovered sclera. The bleeding was controlled with light cautery. An applicator containing 0.02% MMC was kept in connection with the tissue for 90 s. Cornea and limbus were observed not to be in contact with MMC. Then the eye surface was rinsed with 100 mL saline. Lidocaine 2% was used to disconnect conjunctiva from the surrounding tenon capsule at 12 o'clock. The free graft was placed in the scleral bed and sutured with Nylon 10.0 to episclera and the surrounding conjunctival tissue.

The day after surgery, all patients received topical steroid, betamethasone 0.1% (Betasonate, Sina Darou, Tehran, Iran) and antibiotic, chloramphenicol 0.5% (Chlobiotic, Sina Darou, Tehran, Iran) that were prescribed to be used for two weeks. Then Fluorometholone 0.1% (Fluocort, Sina Darou, Tehran, Iran) was used and tapered in 3 months.

In addition to demographic characteristics (age and sex) before surgery, the best corrected visual acuity (BCVA), slit-lamp examination and the size of pterygium were recorded. Follow-up visits were performed on day one, every day till one week, every week till one month, and the 3rd, 6th, 9th, and 12th months after surgery. In each visit, BCVA and slit-lamp examination was done. Inflammation at months 1, 3, and 6 months after surgery was recorded. Required healing time for the corneal epithelial defect, recurrence, size and time of recurrence, and possible complications including granulation tissue, tenon cyst, graft necrosis, Dellen formation, and scleral thinning were also recorded and compared between groups.

The inflammation was clinically graded according to hyperemia in the site of pterygium excision site as follows: 0 = none, 1 = mild, 2 = moderate, and 3 = severe.[18] Recurrence of pterygium was defined as an encroachment of fibrovascular connective tissue across the limbus and onto the cornea for any distance in the position of the previous lesion during the follow-up period. BCVA was calculated by logarithm of the minimum angle of resolution (logMAR) using the Snellen chart.

Statistical analysis

For the statistical analysis, the statistical software SPSS version 17.0 for Windows was used. Descriptive analysis included mean ± standard deviation (SD) for quantitative variables and frequency (percentage) for categorical variables. The normality of data distribution was tested by Kolmogorov−Smirnov test. Quantitative binary variables between the groups were compared using Independent Samples *T*-test or Mann−Whitney-*U* test, according to the normality of data distribution. Qualitative variables were, on the other hand, compared using chi-square test or Fisher's exact test. Mean inflammations in different postoperative months were compared using repeated measures ANOVA. *P* values less than 0.05 were considered statistically significant. Power analysis was done with PASS software.

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