Amniotic Membrane Transplantation for Primary Pterygium Surgery

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Purpose: To evaluate the outcomes of primary pterygium excision with adjunctive amniotic membrane transplantation.

Methods: In an interventional case series, consecutive patients with primary pterygia underwent surgical excision with transplantation of preserved amniotic membrane onto bare sclera. Patients were followed for at least 12 months and the results were evaluated in terms of recurrent pterygium growth and complications.

Results: Fifty eyes of 50 consecutive patients including 27 male and 23 female subjects with mean age of 43.36±10.88 years were operated. The pterygia extended onto the corneas for 4.69±1.2 (range 3 to 7) mm. Only one eye (2%) demonstrated recurrent pterygium growth which responded to subconjunctival mitomycin C injection. Another eye (2%) developed amniotic membrane retraction which eventually required a second transplantation leading to complete resolution.

Conclusion: Primary pterygium excision with amniotic membrane transplantation is a safe and effective surgical technique with low recurrence rate.

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INTRODUCTION

A pterygium is a fibrovascular growth of actinically damaged conjunctiva extending across the limbus and invading the cornea. It is a common external eye condition, affecting different populations especially in tropical and subtropical regions with a reported prevalence of 2% to 7% worldwide.[1] The primary indication for surgical removal of a pterygium is decreased visual acuity, which can be the result of encroachment of the lesion onto the visual axis, induced irregular astigmatism, or breakup of precorneal tear film. Other indications for surgical intervention include discomfort and irritation unresponsive to conservative therapy, restricted ocular motility, difficulty with contact lens wear, anticipated keratorefractive surgery and unacceptable appearance.[2]

Major adjuncts for prevention of pterygium recurrence are application of antimetabolites and conjunctival or limbal autografts. Although many other therapeutic modalities have been proposed, further studies on their efficacy and safety are required.[3] Recently, preserved human amniotic membrane has been advocated for the management of many ocular surface disorders, such as persistent corneal epithelial defects, ocular surface reconstruction for conjunctival neoplasms or scarring, chemical or thermal burns, advanced ocular cicatricial pemphigoid, Stevens-Johnson syndrome, corneal scarring

following excimer laser photoablation, prevention of trabeculectomy failure, and coverage of conjunctival defects after pterygium excision.[4] The purpose of the current study is to determine the outcomes of primary pterygium excision with adjunctive amniotic membrane transplantation in terms of recurrence of the lesion and complications.

METHODS

This interventional case series was conducted from September 2006 to March 2007 and included a consecutive series of patients with primary pterygia extending at least 3 mm into the cornea. The patients were interviewed and medical data were reviewed in detail. Individuals with major systemic conditions such as diabetes mellitus or collagen vascular disease, pregnant women and monocular patients were excluded. A complete ophthalmologic examination including measurement of visual acuity, slitlamp biomicroscopy, intraocular pressure measurement and funduscopy was performed to rule out dry eye, cicatricial pemphigoid, glaucoma or vitreoretinal disease. All patients had minimum follow up of 12 months at the time of data analysis. The study was performed following the guidelines for experimental investigation in human subjects and was approved by the Institutional Review Board (IRB) and Ethics Committee at Shiraz University of Medical Sciences. Informed consent was obtained from all subjects.

Surgical Procedure

Pterygium Excision

All procedures were performed by a single surgeon under subconjunctival anesthesia with 4% lignocaine (Xylocaine) containing 1:10,000 adrenaline (epinephrine) in most patients. Peribulbar anesthesia was reserved for patients with limited cooperation. The head of the pterygium was first separated at the limbus and dissected towards the central cornea with a pair of spring scissors. After excising the head and most of the body, Tenon and subconjunctival fibrovascular tissue were separated from the overlying conjunctiva, undermined and excised extensively upward and downward towards the fornices and medially towards but not reaching the caruncle; caution was taken not to damage the medial rectus. Cautery was gently applied to bleeding vessels. The conjunctiva above and below the pterygium was trimmed to create a rectangular area of bare sclera of approximately 5x7 to 6x8 mm. Residual fibrovascular tissue over the cornea was detached using toothed forceps or by gentle scraping with a #15 surgical blade.

Amniotic Membrane Transplantation

The area of bare scleral was covered with amniotic membrane, which was oriented with the basement membrane side up. The amniotic membrane was sutured through the episcleral tissue to the edge of the conjunctiva along the bare sclera border with seven to eight interrupted 8-0 Vicryl sutures and the eye was patched.

Follow-up

Postoperatively, chloramphenicol and betamethasone eye drops were administered 4 times daily and if there was excessive irritation from the stitches, lubricants were also prescribed. Patients were examined 1 day, 1 week and 1 month postoperatively. Thereafter, the eye drops were changed to 0.1% fluorometholone 4 times daily which was decreased to twice daily 1 month later. Patients were followed monthly up to 1 year. Complications such as pyogenic granuloma, inclusion cysts, epithelial defects, dellen formation and excessive photophobia were recorded. Recurrence was defined as any fibrovascular growth of conjunctival tissue extending more than 1.5 mm across the limbus.

RESULTS

Fifty eyes with primary pterygia of 50 consecutive patients including 27 male and 23

female subjects with mean age of 43.36±10.88 (range: 23-67) years were operated. Twenty-one (42%) patients had occupations with considerable exposure to actinic damage. Preoperative refractive errors consisted of spherical component from -0.75 to +3.25 D (mean of +1.2 D) and cylindrical component from -1.00 to +3.50 (mean of -0.3 D). The extent of pterygium invasion beyond the limbus ranged from 3 to 7 mm (mean 4.69±1.2 mm).

On the first postoperative day, all patients had corneal epithelial defects. By one week, all epithelial defects healed completely and there was no conjunctival staining with fluorescein. None of the patients had any significant change in intraocular pressure any time during the follow–up period. Preoperatively, best-corrected visual acuity for most patients was between 20/30 to 20/60 (0.33±0.01 logMAR). Two or more lines of visual improvement occurred in 5 patients, visual improvement was less than 2 lines in 28 patients. No significant change in BCVA was seen in the remainding cases.

The recurrence rate was 2% (1 of 50 cases) over a minimum follow-up period of 12 months. Subconjunctival mitomycin C (0.1 ml of a 0.15 mg/ml preparation) was injected for this single patient, the fibrovascular growth became atrophic and no further recurrence was noted during the follow-up period.

Trace anterior chamber reaction was seen in one (2%) patient on the first postoperative examination. One patient (2%) developed corneal dellen with mild thinning which responded to medical therapy and resolved completely. Another patient (2%) developed amniotic membrane retraction and complained of progressive photophobia, pain and foreign body sensation which did not respond to medical therapy and finally required a second amniotic membrane transplantation leading to complete resolution.

DISCUSSION

A pterygium is a multifactorial degenerative corneal disorder. Different procedures have been proposed for treatment of this condition; the main complication common to all is recurrent disease which is more difficult to control.[2] It is believed that surgical trauma and postoperative inflammation activate subconjunctival fibroblast and vascular proliferation, and deposition of extracellular matrix proteins, all of which contribute to recurrence of the lesion.[5]

One strategy for decreasing pterygium recurrence is the use of conjunctival autografts. Kenyon et al reported a recurrence rate of 5.3% after pterygium excision with a conjunctival autograft.[6] In a randomized clinical trial, Lewallen[7] reported a 40% recurrence rate with the bare sclera technique versus 7% with conjunctival autografts. Intraoperative application of mitomycin C to the scleral bed is another strategy which has gained increasing acceptance but entails several complications.[8,9]

Nakamura et al[10] reported that sterilized freeze-dried amniotic membrane demonstrates excellent biocompatibility on the human ocular surface. This biomaterial may be considered as an alternative to conjunctival grafting in the treatment of pterygia. As a natural basement membrane, amniotic membrane contains various matrix proteins which facilitate the adhesion, migration and differentiation of epithelial cells and prevent their apoptosis. Promotion of conjunctival epithelial wound healing, suppression of fibroblasts and reduced extracellular matrix production are thought to be the major mechanisms by which amniotic membrane transplantation inhibits recurrence of pterygia.[11]

The recurrence rate after amniotic membrane transplantation (AMT) was initially reported to be 10.9% for primary and 37.5% for secondary pterygia, which was much higher than recurrence rates of conjunctival autografts.[12] These values were reduced to 3% and 9.5% respectively, after modifying the surgical technique,[13] which compared favorably with the results of conjunctival autografts[11] and were superior to that of the bare sclera technique.[14] In our study, the recurrence rate following amniotic membrane graft for primary pterygium excision was 2% over a 12-month follow-up period . In a study by Fallah et al,[15] conjunctival

limbal autograft with AMT appeared to be more effective than intraoperative MMC with AMT for treatment of recurrent pterygia. Ma et al[16] showed that amniotic membrane graft alone is effective adjunctive treatment for recurrent pterygia and the addition of intraoperative mitomycin C did not further reduce recurrence rates.

To date, there has been no report of sight threatening complications following amniotic membrane transplantation. Minor complications such as conjunctival epithelial inclusion cyst formation, caused by embedded conjunctival epithelium, occur more frequently with conjunctival autografts as compared to AMT. However, amniotic membrane contamination remains a potential risk which cannot be overlooked.[2,3]

The low recurrence rate and favorable safety profile of pterygium excision with AMT in the current study attest to the efficacy of this treatment modality and compare favorably with previous reports on mitomycin-C augmented pterygium excision. We believe that the low recurrence rate was due to removal of sufficient conjunctiva and subconjunctival fibrovascular tissue, especially adjacent to the limbus. Coverage of a larger area by amniotic membrane in turn may promote the proliferation and differentiation of residual normal limbal epithelial cells, which may in turn have an inhibitory effect on fibrovascular ingrowth.[17] The major limitation of this study is the lack of a control group. We prefer AMT over conjunctival autografts because of faster healing time, less discomfort and acceptable recurrence rate, and believe that amniotic membrane transplantation is an appropriate treatment modality for the surgical management of primary pterygia. This may be particularly advantageous for patients with glaucoma who require intact conjunctiva for future glaucoma procedures.

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