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Pterygium Treatment with Limbal-Conjunctival Autograft Transplantation

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A B S T R A C T

The objective of this pilot study was to examine the usefulness of limbal autograft transplantation (LCAT) in the treatment of recurrent pterygium. Eleven eyes with advanced recurrent pterygium underwent LCAT. All eyes were previously treated at least two times either by simple excision (10) or conjunctival rotation autograft (1). In two eyes (18.18%) symblepharon was present at the time of surgery, therefore LCAT was combined with amniotic membrane transplantation. Limbal-conjunctival autograft was taken from supero-lateral part of the same eye and transferred to the area where pterygium was excised. No intraoperative complications occurred. In ten eyes (90.9%) no pterygium recurrence was recorded during the follow-up time, and one (9.1%) recurrence was recorded after 5 months. In two eyes with combined symblepharon formation remission of both pterygium and symblepharon growth was obtained. LCAT proved to be a promising and safe procedure in recurrent pterygium treatment.

Introduction

Pterygium is caused by fibrovascular overgrowth or extension of connective tissue from the bulbar conjunctiva onto the cornea. As pterygium advances, it may induce irregular astigmatism and cause decrease in visual acuity. When vision is affected or the symptoms become more bothersome, excision of the pterygium is indicated. Recurrence rate after primary excision rises up to 50%. Various adjunctive treatment modalities have been applied in order to reduce the recurrence rate. Beta radiation has been used effectively to reduce the rate of recurrence but this procedure has many complications such as cataract formation, corneal and stromal thinning, ulceration and keratitis sicca[1]. Both mitomycin-C and conjunctival autografts have recently become popular as adjuncts in preventing the recurrence of pterygium[2]. Argon laser can also be used to prevent recurrence of

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pterygium. Laser burns (50-μm spot size) are made in the limbus in four parallel rows, with care taken to treat all neovascular fronds[1]. Conjunctival autograft transplantation, popularized by Kenyon et al in 1985, is another very effective method in managing pterygia to prevent recurrences[3]. The conjunctiva from the uninvolved or the same eye is used to cover the defect caused by the pterygium excision. The common problem after all these procedures is pterygium recurrence. Recurrence rate increases when mentioned surgical techniques for primary pterygium are applied for the second time.

Recently, limbal-conjunctival autograft transplantation has been used in recurrent pterygium treatment. The limbal zone is the rim of cornea approximately 0.5 mm wide that abuts against the sclera[4]. In order to understand ocular surface disorders, Noel Rice emphasized the importance of limbal stem cells that are vital for normal corneal epithelial regeneration[5]. Recently, it has been proposed that limbal stem cells play an important role in the pathogenesis of pterygium[6,7].

Patients and Methods

Eleven eyes of eleven patients with advanced recurrent pterygium underwent limbal-conjunctival autograft transplantation (LCAT) after pterygium excision. Patients were operated in a period between November 1999 and July 2000 by the same surgeon. The mean age of patients was 48 (range 35 to 60). Six patients were men and five were women. Ten eyes were previously operated at least two (up to 8) times by simple excision and one eye by conjunctival rotation autograft. Pterygium growth over the cornea was 3 mm or more (Table 1).

A retrobulbar block with lidocaine 2% was used in all cases. Pterygium was completely resected from the cornea and the body of the pterygium was dissected

TABLE 1
PATIENTS' PREOPERATIVE STATUS

Patient No.	Age (yrs)	Previous surgery (No. of times)	Pterygium size (mm)	Eye movements	Preoperative BCVA*
1	35	Excision (2)	3 × 4	Normal	0.3
2	58	Excision (3)	3.5 × 4	Normal	0.4
3	40	Excision (2)	3 × 3	Normal	0.5
4	43	Excision (2)	4.5 × 5.5	Normal	0.3
5	52	Excision (2)	4 × 4.5	Normal	0.2
6	47	Excision (3)	5 × 4.5	Normal	0.3
7	39	Conjunctival rotation autograft (1)	5 × 5	Normal	0.2
8	60	Excision (8)	6 × 5	Restricted (symblepharon)	0.03
9	49	Excision (3)	5 × 5	Normal	0.2
10	50	Excision (4)	5.5 × 4	Normal	0.2
11	55	Excision (6)	6 × 3.5	Restricted (symblepharon)	0.1

* BCVA – Best corrected visual acuity

and excised by conjunctival scissors. The abnormal scarring tissue on the corneal surface was polished. Cautery was used to control bleeding. A limbal-conjunctival autograft was taken from the superolateral side of the same eye and transferred to the area where pterygium was excised. Autografts contained 0.5 mm of limbal area and 5–10 mm of adjacent bulbar conjunctiva depending on pterygium size. The conjunctival graft was sutured to the recipient bed with an interrupted 8–0 Vicryl and limbal part of the graft was secured with two 10–0 nylon sutures.

In two eyes (18.18%) symblepharon was present at the time of surgery; therefore LCAT was combined with amniotic membrane transplantation. In these eyes, besides pterygium removal, all the symblepharons were released. Contracted subconjunctival scarred tissue was dissected from the conjunctiva and sclera. Defected tissue was replaced with adequate piece of amniotic membrane. Another large amniotic membrane was placed over the entire cornea and sutured to the recipient conjunctiva with interrupted 10–0 nylon sutures. Sutures were removed after amniotic membrane resorption. Postoperative therapy included antibiotic (tobramycin) and corticosteroid drops (dexamethason-neomycin) in all eyes. Patients were examined every day during the first postoperative week, on postoperative days 14, 28 and every month thereafter. The follow-up period ranged from 3 to 7 months (mean 5.9).

Preparation and storage of human amniotic membrane

Amniotic membrane is obtained under sterile conditions after elective cesarean delivery from a seronegative donor (HIV, HBV, and HCV negative). Under laminar-flow placenta is first washed free of blood clots with balanced saline solution containing 50 μg/ml of penicillin, 50 μg/ml of streptomycin, 100 μg/ml of neomycin and 2.5 μg/ml of amphotericin B. Amniotic membrane is separated from the rest of the chorion and rinsed again with the balanced saline solution containing antibiotics. The membrane is then flattened onto a nitrocellulose paper (3 × 4 cm), with the epithelium/basement membrane surface up, and sutured with the nonresorptive nylon. Amniotic membrane is stored in a sterile vial containing tissue culture (InOsol) and glycerol at a ratio of 1: 1 at – 80 °C. Before use, amniotic membrane is defrosted by warming the vial at the room temperature for 10 minutes.

Results

No intraoperative complications occurred. During the first postoperative week patients had mild symptoms of slight ocular pain, foreign body sensation, lacrimation and photophobia. Two conjunctival grafts (18.18%) showed significant edema in the first few postoperative days, but finally disappeared without excessive scar formation. Donor area healed without any complications. In 10 eyes (90.9%) no pterygium recurrence was recorded during the follow-up. In one eye (9.1%) pterygium recurrence was recorded after 5 months. In two eyes with pterygium and symblepharon formation, normal eye movements and pterygium remission were achieved. No visual acuity loss was noted. Best-corrected visual acuity (BCVA) improved in 10 eyes (90.9%) while in one eye (9.1%) it remained unchanged. BCVA improved three Snellen lines in 4 eyes (36.36%), two in 4 eyes (36.36%) and one in 2 eyes (18.18%) (Table 2).

Discussion

Pterygium is a worldwide degenerative corneal disease with a multifactorial etiology. Its incidence is higher in tropical and subtropical countries where prolon-

TABLE 2
PATIENTS' POSTOPERATIVE STATUS

Patient No.	Treatment	Follow-up (months)	Postoperative BCVA***	Recurrance	Postoperative eye movements
1	LCAT*	3	0.5	No	Normal
2	LCAT	6	0.6	No	Normal
3	LCAT	7	0.8	No	Normal
4	LCAT	6	0.4	No	Normal
5	LCAT	5	0.4	No	Normal
6	LCAT	7	0.6	No	Normal
7	LCAT	5	0.5	No	Normal
8	LCAT + AMT**	7	0.3	No	Normal
9	LCAT	6	0.4	No	Normal
10	LCAT	6	0.2	Yes	Normal
11	LCAT + AMT	7	0.2	No	Normal

* LCAT- Limbal-conjunctival autograft transplantation
** AMT- Amniotic membrane transplantation
*** BCVA-Best corrected visual acuity

ged exposure to intense solar radiation is common. According to some recently published data the initial biologic event in pterygium pathogenesis is limbal stem cells alteration due to chronic ultraviolet light exposure[5–8].

Although many surgical approaches have been developed, the main problem of pterygium treatment is the recurrence rate, which has been estimated as high as 30 to 70%[9]. The increased rate of pterygium recurrence has been recorded in younger patients[10,11]. Recurrent pterygium is more difficult to control, and various treatment modalities have been proposed, including radiotherapy, antimetabolite or antineoplastic drugs, conjunctival or limbal autografts[9,12]. Limbal autografts have been used in treating corneal diseases with stem cells deficiency, such as chemical or thermal burns, aniridia, the Stevens-Johnson syndrome, ocular pemphigoid, conjunctival squamous cell carcinoma, recurrent or advanced pterygia and contact lens associated ocular surface abnormality. Limbal autografts have been used successfully to correct limbal dysfunction, acting as a barrier against conjunctival invasion of the cornea and supplying stem cells of the corneal epithelium[13–16].

Although the pathogenesis of pterygium is still unclear, according to some authors, destruction of limbal stem cells can result in pterygium formation[6,7]. For this reason LCAT can be recommended as an ideal surgical technique for treating either primary or recurrent pterygium. Using this technique some complications occurring when using radiation or mitomycin C can be avoided. These may include scleral ulceration and necrosis, secondary glaucoma, corneal perforation, cataract formation, iritis and irreversible damage to basal epithelial and limbal stem cells[17]. Possible complications of LCAT are transient graft edema, corneoscleral dellen, graft retraction, epithelial inclusion cysts, Tenon's granulomas, necrosis or retraction of the graft, and pseudopterygium formation on the donor site[18,19].

Another significant problem with recurrent pterygium after multiple surger-

ies is conjunctival fornix shortening or symblepharon. To treat this complicated disorder, it is necessary to reconstruct the limbal barrier as well as to suppress the subconjunctival fibrosis[16]. Suppression of subconjunctival fibrosis is very important since in those cases patients show limited ocular movements. However, this cannot be achieved by conjunctival graft alone. For this reason, in two of our patients with pterygium and symblepharon formation the LCAT was combined with amniotic membrane transplantation and remission of both pterygium and symblepharon was achieved. In those cases amniotic membrane transplantation appears to be effective in restoring ocular motility. The transplanted amniotic membrane is covered by conjunctival epithelium and it serves as a new substrate for proper epithelialization. It can be used to cover areas of almost any size[3,16].

According to some published data[20–23], the use of limbal reconstruction in pterygium treatment reduces the recurrence rate but it still does not completely eliminate it. There is a large variability of recurrence rates in different studies. Starc and collaborators[24] treated 40 eyes with primary and 18 eyes with recurrent pterygium using LACT. The postoperative follow-up ranged from 2 to 26 months with an average of 13 months. The overall recurrence rate was 31% (22.5% in primary and 50% in recurrent pterygium). On the other hand, Shimazaki and coworkers[23] treated eleven patients with recurrent and 16 with advanced pterygium using this surgical technique. The average follow-up period was 10.5 months and the only slight recurrence was noted in 2 eyes (7.4%). Even in these instances invasion of subconjunctival tissue was limited to less than 1 mm and there was no need for additional surgery. The reasons for this disproportion in treatment results are unclear but possibly reflect differences in definition of recurrence, surgical technique and expertise, and patients' demographics.

Our study included eleven patients with advanced recurrent pterygium. All cases were severe, with a minimum of two recurrences. Particularly challenging were two patients with pterygium and symblepharon who were both treated with LCAT and amniotic membrane transplantation. During the follow-up, pterygium recurrence occurred after 5 months in only one eye (9.1%).

Thus, irrespective of the limited number of cases included in the study, we are of the opinion that LCAT is a safe and promising treatment for recurrent pterygium. The inclusion of limbal tissue in conjunctival autografts following pterygium excision appears to be essential for ensuring the low recurrence rates. As previously reported, almost all recurrences are seen by the end of the first postoperative year[10,11,24]. Longer follow-up period and larger number of patients is needed to determine the real efficacy of this surgical technique.

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LIMBALNA AUTOTRANSPLANTACIJA U TERAPIJI PTERIGIJA

S A Ž E T A K

Cilj ove pilot studije bio je istražiti korisnost limbalne autotransplantacije u terapiji recidivirajućeg pterigija. Limbalna autotransplantacija napravljena je u 11 očiju s uznapredovalim recidivirajućim pterigijem. Sve oči prethodno su liječene najmanje dva puta jednostavnom ekscizijom (10) ili konjunktivalnim rotirajućim autotransplantatom (1). U vrijeme operacije simblefaron je bio prisutan u dva oka (18.8%) pa je limbalna autotransplantacija kombinirana s transplantacijom amnijske membrane. Limbalno-konjunktivalni autotransplantat uziman je iz superolateralnog dijela oka i premješten u područje gdje je isjecan pterigij. Intraoperativne komplikacije nisu zabilježene. Za vrijeme praćenja pacijenata u deset očiju (90.9%) nije zabilježeno recidiviranje pterigija, dok je u jednom oku (9.1%) recidiviranje zabilježeno 5 mjeseci postoperativno. U dva oka s kombiniranom simblefaronskom formacijom zabilježena je remisija i pterigija i simblefarona. Limbalna autotransplantacija predstavlja obećavajući i siguran postupak u terapiji recidivirajućeg pterigija.