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Results of Conjunctival Autograft Transplantation Combined with Amniotic Membrane Transplantation Surgery in Recurrent Pterygium Cases

Tekrarlayan Pterjiyumlu Olgularda Konjonktival Otogreft Transplantasyonu ile Kombine Amniyotik Membran Transplantasyonu Cerrahisi Sonuçları

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ABSTRACT

Aim: To evaluate the results of conjunctival autograft transplantation (CAT) combined with amniotic membrane transplantation (AMT) surgery in recurrent pterygium cases.
Methods: This is a retrospective interventional case series involving patients admitted to our clinic with recurrent pterygium. Patients' examination and postoperative findings were taken through standard slit-lamp microscope examinations. Fourteen eyes of 14 patients were included in the study. All cases were treated with excision, followed by CAT combined with AMT. Corneal recurrence was evaluated as the main result. Fibrovascular proliferation greater than 1 mm on the cornea was accepted as recurrence after surgery.
Results: The mean age of patients was 56.4 ± 7.5 (range: 40 – 65) years. During the mean follow-up period of 24.9 ± 10.7 (range: 12 – 50) months, pterygium and symblepharon recurred in only one eye (7.1%) after 4 months.
Conclusion: In this study, it was seen that acceptable results were obtain and low recurrence rates could be achieved with the combination of CAT and AMT for the treatment of recurrent pterygium.

Key words: Pterygium, conjunctival diseases, amnion, cornea

ÖZ

Amaç: Tekrarlayan pterjiumlu olguların tedavisinde konjonktival otogreft transplantasyonu (KOT) ile kombine amniyotik membran transplantasyonu (AMT) sonuçlarını değerlendirmek
Metot: Bu çalışma kliniğimize tekrarlayan pterjium ile başvuran hastaları içeren retrospektif girişimsel bir vaka serisidir. Hastaların muayeneleri ve postoperatif bulgular standart yarık lamba mikroskopi ile yapıldı. Çalışmaya 14 hastanın 14 gözü alındı. Tüm olgularda pterjium eksizyonunu takiben KOT ile kombine AMT yapıldı. Ana sonuç olarak korneal nüks değerlendirildi. Kornea üzerinde 1 mm'den fazla fibrovasküler proliferasyon ameliyat sonrası rekürrens olarak kabul edildi.
Bulgular: Hastaların ortalama yaşı 56.4 ± 7.5 (aralık: 40- 65) yıldı. Ortalama 24.9 ± 10.7 (aralık: 12- 50) aylık takip süresi sonunda sadece bir gözde (% 7.1) 4 ay sonra pterjium ve symblepharon tekrarladı.
Sonuç: Bu çalışmada, tekrarlayan pterjium tedavisi için KOT ve AMT kombinasyonu ile kabul edilebilir sonuçlar alındığı ve düşük nüks oranları sağlanabileceği görüldü.

Anahtar kelimeler: Pterjium, konjonktival hastalıklar, amnion, cornea

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INTRODUCTION

A pterygium is a fibrovascular degeneration of the bulbar conjunctiva with progressive involvement of the cornea. The lesion occurs more frequently at the nasal limbus than the temporal and has a characteristic wing like appearance [1]. Over the years, several surgical techniques have been introduced to treat pterygium, but none have achieved complete success in efficacy and safety. Recurrence of the condition remains a major problem; there is still ongoing debate regarding the “ideal” pterygium surgery. Factors associated with recurrence include the age of the patient, the fleshiness of the pterygium, and the patient’s exposure to ultraviolet radiation [2-5].

Recurrent pterygium treatment is challenging. It is often resistant to conventional surgeries. Although various surgical approaches have been advocated, recurrence is still common, with an incidence ranging up to 55%. Treatment of recurrent pterygium is also more difficult than treatment of primary pterygium because recurrent pterygium is often accompanied by increased conjunctival inflammation and accelerated corneal involvement. Subconjunctival fibrosis is frequently seen in recurrent pterygium as well and sometimes results in restriction of eye movement or the formation of symblepharons [6]. Therefore, it is extremely important that the safest and most effective procedures for recurrent pterygium patients be determined at the beginning of treatment.

Surgical procedures for the treatment of recurrent pterygium included lamellar keratoplasty, conjunctival autograft, limbal autograft, amniotic membrane transplantation (AMT), and lamellar scleroplasty [7]. Of these treatment methods, free conjunctival autograft to cover the bare sclera reduces recurrence and has been accepted worldwide. AMT, however, has also become increasingly widespread in recent years as a treatment of pterygium. The amniotic membrane has antifibrotic and anti-inflammatory properties and reduces proliferation of subconjunctival fibrovascular tissues, thus reducing pterygium recurrence. In addition, amniotic membrane is easy to obtain, and does not cause any anatomical changes in the patient’s other tissues [8,9].

Drawing on previous research and literature, in this study we examined the surgical results of conjunctival autograft transplantation (CAT) combined with AMT surgery in patients with recurrent pterygium.

MATERIAL AND METHOD

Study Design and Participants

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and was approved by the ethics committee (25/01/2018, Istanbul Medipol University Ethics Committee, document no; 10840098-604.01.01-E-2703). A retrospective chart review was made. Fourteen eyes with recurrent pterygium were evaluated in 14 patients. All eyes were treated with excision, followed by CAT combined with AMT (Figures 1, 2, and 3). The AMT applied preserved human amniotic membrane taken from a tissue bank. Patients with follow-up times of less than 12 months, those with glaucoma, vitreoretinal disorders, pseudopterygium, connective tissue disorders, systemic vasculitis, diabetes mellitus, patients with primary pterygium and early recurrent pterygium (horizontal length from limbus < 4 mm), were excluded from the study. Routine ophthalmic examinations were performed before and after surgery. The horizontal length of pterygium invasion on the cornea was recorded using slit-lamp microscopy. The main outcome measurement was recurrence rate after surgery (fibrovascular proliferation greater than 1 mm on the cornea was accepted as pterygium recurrence). The number of previous surgeries, symblepharon formation, graft rejection and complications during the intraoperative period were noted for each patient. Graft rejection was defined as the occurrence of cellular infiltration and epithelial defect on the graft area, without an infectious focus.

Surgical Technique

All surgeries were performed by a single surgeon (CT) under general anesthesia. The pterygium borders to be expelled were first marked with tissue pellets. Next, the pterygium head was superficially incised with a crescent blade, starting from the intact epithelial border on the corneal surface. The pterygium and fibrovascular tissues were then excised using conjunctival scissors

and forceps. On the corneal surface where the pterygium was excised, a round low-rotation (average of 200–250 rpm) drill (diamond burr) with abundant irrigation was used, and smooth ocular surface formation was achieved. Next, the bare sclera was measured with a caliper, and a conjunctival autograft of the same size was harvested from the upper conjunctival region and attached to the sclera. The amniotic membrane was then cut to the appropriate size to cover the surgical zone and placed with the epithelial side up to cover the conjunctival autograft, also extending the area of cornea. The procedure was completed by suturing (8-0 vicryl) the amniotic membrane to the conjunctival fornixes.

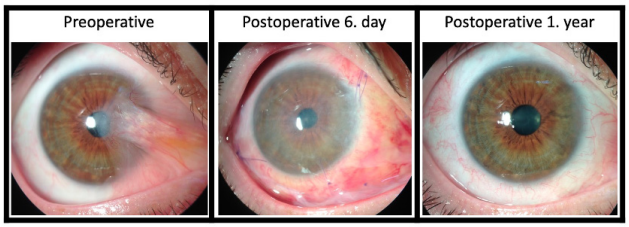

Figure 1. Preoperative right eye photograph of our 48-year-old female patient who had recurrence and had previously operated for pterygium four times in other centers. Significant movement limitation and symblepharon developed in the eye. It is also seen that the pterygium tissue covers the optic axis and pupillary area (left). On the 6th postoperative day, the entire surface is covered with amnion membrane and the conjunctival autograft under the amnion membrane is seen to be quite healthy (middle). Postoperative 1st year view of the eye (right).

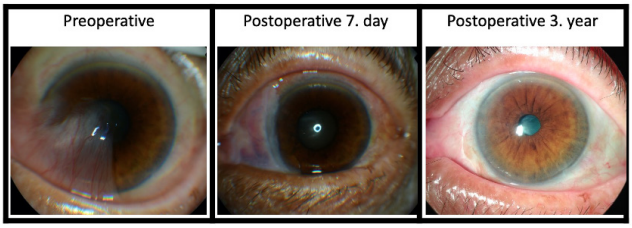

Figure 2. Preoperative left eye photograph of a 65-year-old female patient. The patient had been operated twice in another center due to pterygium and recurrence developed. There are two-headed pterygium, symblepharon and eye movement restriction, which cover the pupillary area and optic axis in the cornea (left). On the 7th postoperative day, the surgical surface is covered with the amniotic membrane and the conjunctival autograft under the amnion membrane is seen to be healthy (middle). Postoperative 3rd year view of the eye (right).

Postoperatively, all patients received netilmicin eye drops three times a day for 2 weeks, dexamethasone eye drops three times a day for 1 month, and artificial tear drops four times a day for 1 month. In cases with apparent inflammation after 1 month, a steroid regimen was continued based on sufficient disappearance of inflammation, as determined by slit-lamp findings. Sutures and amniotic membrane residues were removed at the postoperative follow-ups, when the amniotic membrane began to dissolve and peel off (mean 8.9 ± 1.3 days). Patients were followed up at 1st, 3rd, 7th, 15th days, and 1st month after surgery. After the 1st months visits were scheduled for every 3 months. All data here are means ± standard deviations.

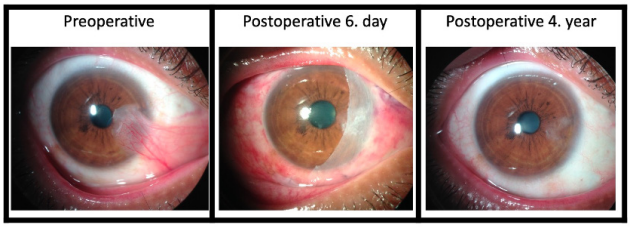

Figure 3. Preoperative right eye photograph of a 53-year-old male patient who had been operated five times for pterygium in other centers. There is a highly vascularized recurrent pterygium formation (left). On the 6th postoperative day, the surgical surface is covered with the amniotic membrane and the conjunctival autograft under the amnion membrane is seen to be healthy (middle). Postoperative 4th year view of the eye (right).

RESULTS

The mean age of patients was 56.4 ± 7.5 (range: 40 - 65) years. The cases included in the study consisted of 8 (57.1%) female and 6 (42.9%) male patients. The mean number of previous surgeries for pterygium was 2.1 ± 1.2 (range: 1– 5). The mean horizontal pterygium length was 4.5 ± 0.7 (range: 4 – 6) mm. In all eyes, the epithelial defects of the corneal and conjunctival areas had recovered within 2 weeks. Preoperative and postoperative slit-lamp views in representative eyes are shown in figures 1, 2, and 3. During the mean follow-up period of 24.9 ± 10.7 (range: 12 – 50) months, pterygium and symblepharon recurred in only one eye (7.1%) after 4 months. There were no intraoperative complications. Amniotic membrane rejection was not observed in any patient, nor were any serious side effects due to the medication. A mildly increased intraocular pressure (29 mm Hg) was observed on the 9th postoperative day in a 40-year-old male patient. In this case, dexamethasone eye drops were stopped and loteprednol etabonate eye drop was prescribed instead. Following this adjustment, intraocular pressure normalized. The patient continued with loteprednol etabonate for 1 months. The mean

Table 1. Demographic and clinical data of all patients.

Patient no	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Gender	F	F	M	F	M	F	M	M	F	F	F	M	F	M
Age (years)	48	58	62	63	59	65	57	53	44	59	62	63	57	40
Previous surgeries number	4	3	2	1	3	2	1	5	1	3	2	1	1	1
Length of pterygium (mm)	6	5	4	4	5	6	4	5	4	5	4	4	4	4
Symblepharon	+	+	-	-	+	+	-	-	-	+	-	-	-	-
Restriction of movement	+	-	-	-	-	+	-	-	-	+	-	-	-	-
Follow-up period (month)	18	34	15	22	25	41	21	50	17	15	29	23	27	12
Epithelial healing (day)	7	6	6	7	7	8	5	6	5	7	5	5	6	7
Preoperative CDVA	0.1	0.3	0.4	0.2	0.4	0.1	0.6	0.4	0.5	0.1	0.7	0.5	0.4	0.9
Postoperative CDVA	0.4	0.5	0.5	0.4	0.5	0.4	0.7	0.6	0.6	0.1	1	0.7	0.6	0.9
AM peel off time (day)	10	7	8	9	7	9	7	10	11	10	9	8	9	11
Recurrence	-	-	-	-	-	-	-	-	-	+	-	-	-	-

CDVA; Corrected distance visual acuity (Snellen decimal system), AM; Amniotic membrane.

corrected distance visual acuity (CDVA) before surgery was 0.4 ± 0.23 (Snellen decimal system). Postoperative CDVA increased in 12 patients. Postoperative mean CDVA was 0.56 ± 0.22. Table 1 summarizes the data of all patients.

DISCUSSION

Over the years, several surgical techniques have been developed to treat pterygium, but none have achieved complete success in safety and efficiency. The ideal surgical treatment of pterygium is still discussed today. The technique of bare sclera excision has been abandoned due to unacceptably high recurrence rates (30–70%). For years, the most effective treatment method has been tried to be found. Within these treatment methods, the use of free conjunctival autograft to cover the bare sclera reduces recurrence and has accepted worldwide [8,9].

The clinical behaviour of primary and recurrent pterygium is quite different. Recurrent pterygium exhibits a more aggressive fibrovascular growth pattern than primary pterygium. Surgery is therefore more difficult in recurrent pterygium patients; symblepharon formation and motility restriction often occur due to conjunctival inflammation, as well as corneal scarring and limbal stem-cell deficiency. Surgery management strategies must include management of the recurrence itself, such as controlling inflammation and complications from previous surgeries [8].

Several studies in the literature discuss the management of recurrent pterygium. Miyai et al. [7] reported successful treatments with limbal allograft, preserved amniotic membrane transplantation, and intraoperative mitomycin C. In their study, 12 patients with recurrent pterygium had undergone intraoperative MMC after pterygium excision. Limbal allograft was then successfully applied to close the limbal tissue defect, and AMT to close the scleral tissue defect. Pterygium did not recur in any of the patients involved in this study. Symblepharon reappeared in only 3 eyes, while diplopia recurred in 2 eyes. Shimazaki et al. [6] reported 27 recurrent pterygium cases who were treated with AMT, combined with either limbal autograft transplantation (LAT, n = 15) or CAT (n = 12). They observed acceptable results, with pterygium recurring in only 4 patients. Ono et al. [10] evaluated the efficacy and safety of preserved limbal allograft transplantation, combined with AMT, on 84 eyes in 80 recurrent pterygium cases. They observed 10 recurrences (11.9%) in their series but did not observe any major complications or graft rejection. They posited that preserved limbal allograft, together with AMT, is a safe and effective procedure for recurrent pterygium treatment. Yao et al. [11] studied 7 multi-recurrent pterygium cases with symblepharon and motility restriction. After using CAT combined with AMT and intraoperative MMC 0.02% on the bare sclera for 5 minutes, they observed recurrence in only 1 patient, and less severe pterygium than the patient had exhibited before surgery. They concluded that this combination method could successfully restore ocular surface integrity and prevent recurrence in patients with multi-recurrent pterygium with symblepharon. Fallah et al. [12] also reported that CAT combined with AMT was an effective and safe surgical method for recurrent

pterygium treatment. Finally, Sangwan et al. [13] performed CAT, combined with AMT and intraoperative application of MMC (0.04% for 3 minutes), to treat 2 advanced recurrent pterygium cases. They observed acceptable results in their cases.

Although we used similar treatment combinations as other studies, our surgical method differed in several ways. In other studies, the amniotic membrane was usually transplanted under CAT or adjacent to the CAT to cover the exposed large bare sclera. On the other hand, we applied AMT to our patients in a way to cover the entire surgical area after CAT was applied to the area where the pterygium was excised. Our main theoretical reason for choosing AMT on CAT was that when AMT is applied under CAT, the amniotic membrane may act as a barrier between CAT and sclera and may impair graft feeding, resulting in graft necrosis and hypersensitivity to the amniotic membrane. It may also be more difficult to remove the AMT from under the CAT in rejection situations. In addition, when AMT is used over CAT, it can prevent symblepharon and conjunctival adhesions from occurring after surgery. Finally, AMT has an antifibrotic and anti-inflammatory effect on the ocular surface. It is also possible to reduce postoperative irritation and pain by closing the CAT sutures with AMT; we sutured the amniotic membrane into the loose fornix conjunctiva to decrease stinging and irritation. Theoretically, the main disadvantage of this method is that when the conjunctiva is covered with amniotic membrane may not have sufficient regulator effect on the fibroblasts under the conjunctiva. In our study, we did not use mitomycin-C as an adjuvant in the surgical treatment of our patients. This is because, although rare, we avoided possible complications of mitomycin-C that could threaten vision and ocular surface integrity.

In the surgical treatment of pterygium, CAT alone is often sufficient and is the first method that comes to mind. However, in our case series, there were usually patients with severe pterygium who had multiple operations. Therefore, we thought that the combination of CAT and AMT might be more effective in the surgical treatment of these cases.

The present study had several strengths, including following the patients for at least 12 months, which allowed a better perspective on long-term recurrence rates. Moreover, the same surgeon performed all treatment procedures, eliminating surgeon-related factors. We conclude that the results of combined CAT with AMT in patients with advanced recurrent pterygium may be satisfactory. In conclusion, recurrent pterygium patients in our study were concerned about having to undergo surgery again because they had already been operated on many times previously. Therefore, we think the treatment of recurrent advance pterygium should be explained well, and it would be beneficial to treat after this with suitable methods. However, further randomized prospective studies are necessary to determine the validity of this technique over other surgeries.

Limitations: Our study did encounter some limitations that should be noted; in particular, the small patient population, lack of control group and the retrospective nature of the study.

Conclusion: In this current study, a combined surgical treatment method in recurrent pterygium cases is discussed. In conclusion, we think that these cases should be evaluated carefully and all therapeutic alternatives with effective results should be considered. In this sense, we believe that CAT combined with AMT surgery is an effective and safe method in the treatment of recurrent pterygium.

Conflict of Interest: No conflict of interest was declared by the authors.

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Ethics Committee Approval: This study was approved by the ethics committee (25/01/2018, Istanbul Medipol University Ethics Committee, document no; 10840098-604.01.01-E-2703).

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