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## ORIGINAL ARTICLE

# Surgical result of pterygium extended removal followed by fibrin glue-assisted amniotic membrane transplantation

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**KEYWORDS**

amniotic membrane transplantation;  
caruncle;  
fibrin glue;  
pterygium;  
recurrence

**Background/Purpose:** To report the recurrence rate and cosmetic results of conjunctival wound edge and caruncle, and complications after pterygium extended removal followed by fibrin glue-assisted amniotic membrane transplantation.

**Methods:** A prospective interventional cohort study enrolled 57 (58 eyes) patients undergoing pterygium extended removal followed by fibrin glue-assisted amniotic membrane transplantation. All patients received postoperative follow-up for at least 12 months. Recurrence rate was graded from 1 to 4, and cosmetic results of conjunctival edge and caruncle were graded from 1 to 5.

**Results:** The cohort included 48 eyes with nasal pterygium, 5 eyes with temporal pterygium, and 5 eyes with double pterygium. There were 81.0% ( $n = 47$ ), 0% ( $n = 0$ ), 12% ( $n = 7$ ), and 7% ( $n = 4$ ) of eyes with Grades 1–4 recurrence, respectively. The cosmetic results of conjunctival wound edge and caruncle in cases with nasal pterygium showed 59.3% ( $n = 32$ ), 14.8% ( $n = 8$ ), 9.3% ( $n = 5$ ), 16.6% ( $n = 9$ ), and 0% ( $n = 0$ ) of eyes with Grades 1–5 morphology, respectively. Overall, 5.1% ( $n = 3$ ), 3.4% ( $n = 2$ ), 3.4% ( $n = 2$ ), 3.4% ( $n = 2$ ), 1.7% ( $n = 1$ ), 6.9% ( $n = 4$ ), and 1.7% ( $n = 1$ ) of patients suffered from postoperative pyogenic granuloma, transient diplopia, permanent motility restriction, steroid glaucoma, fat prolapse, subamniotic membrane hemorrhage, and early detachment of amniotic membrane, respectively.

Conflicts of interest: The authors have no commercial proprietary interest in the products or companies mentioned in the article.

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**Conclusion:** Pterygium extended removal followed by fibrin glue-assisted amniotic membrane transplantation results in low recurrence, satisfactory cosmetic results and a low incidence of additional complications.

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## Introduction

Pterygium is a common ocular disorder with a tendency for recurrence after surgical removal. In addition to the simple pterygium removal leading to bare sclera, several adjunctive procedures have been developed with the goal of preventing pterygium recurrence after surgery.<sup>1</sup> Among these strategies, mitomycin C application,  $\beta$ -irradiation, amniotic membrane transplantation, and conjunctival transplantation are well-accepted procedures.<sup>2</sup> However, these techniques are associated with their own complications. In addition to these adjunctive therapies, other surgical factors can also affect the postoperative recurrence rate.<sup>2</sup> The extent of Tenon's layer removal underneath the conjunctival edge after pterygium removal is an issue under debate.<sup>3,4</sup> Extended removal of Tenon's layer has been proposed in the pterygium extended removal followed by extended conjunctival transplantation (P.E.R.F.E.C.T.) method, developed by Hirst.<sup>5,6</sup> The P.E.R.F.E.C.T. method consists of extended pterygium and Tenon's layer removal followed by extended autologous conjunctival transplantation obtained from the superior bulbar conjunctiva, demonstrated low recurrence, and satisfactory cosmetic results for both primary and recurrent pterygia. Although the results with this technique provide a promising way to treat pterygium, this procedure has drawbacks such as lengthier operative time, more complex procedures, and additional damage to the healthy superior conjunctiva.<sup>7</sup> Finding a way to preserve the advantages of P.E.R.F.E.C.T. and reduce its drawbacks is clinically important.

Herein, we report the results of a prospective study in which the Tenon's layer was extensively removed, while fibrin glue-assisted amniotic membrane transplantation instead of conjunctival autograft was performed to cover the bare sclera after removal of pterygium and Tenon's layer. Patients were followed-up for at least 12 months, and the recurrence rate, cosmetic results of conjunctival wound edge and caruncle, and additional complications were analyzed.

## Methods

A prospective study in 57 consecutive patients who sought treatment in the clinic of the author (W.L.C.) was performed. All patients warranted excision of their pterygium for either corneal invasion more than 3 mm and/or strong request for cosmesis. Surgery was performed by a single surgeon (W.L.C.) in the Department of Ophthalmology, National Taiwan University Hospital, Taipei, Taiwan between July 2011 and January 2013. This study was

conducted in accordance with the Declaration of Helsinki and approved by an Institutional Review Board of the National Taiwan University Hospital (protocol approval number: 200910010M). Complete ophthalmologic examinations, including slit-lamp examination, intraocular pressure measurement, and dilated fundus examination were performed before the surgery. External eye photography was taken before and after the operation for record purposes. Each patient was followed-up for at least 12 months.

## Surgical technique

The technique included extended removal of the pterygium by the method of Hirst<sup>5,6</sup>, but followed by amniotic membrane transplantation instead of conjunctival autograft. Anesthesia was initiated with 0.5% proparacaine hydrochloride (Alcaine, Alcon-Couvreur, Puurs, Belgium) topically followed by peribulbar anesthesia with 2% lidocaine hydrochloride (Xylocaine, Recipharm, Monts, France). Lamellar keratectomy was performed meticulously using a No. 64 crescent knife to remove the pterygium head on the corneal surface. The body of the pterygium which included the conjunctiva and underlying Tenon's layer was excised. The recipient bed previously covered by pterygium was then prepared for subsequent amniotic membrane transplantation. The Tenon's layer, near the superior and inferior recti and back to the caruncle, was isolated by undermining the two surgical planes: one between Tenon's layer and sclera, and the other between the conjunctiva and Tenon's layer. After identifying and securing the medial rectus insertions with a muscle hook, Tenon's layer was carefully excised using Westcott Tenotomy Scissors (without damage to the rectus muscles). The semilunar fold was excised leaving a bare sclera, approximately 14 mm  $\times$  14 mm, measuring from the limbus to the paracaruncular edge of conjunctiva. A surgical sponge soaked with mitomycin C (2 mg/10 mL) was placed on the exposed sclera for 2 minutes followed by vigorous irrigation with normal saline. Amniotic membrane was obtained from the tissue bank of the National Taiwan University Hospital. The prepared amniotic membrane was then applied on the bare sclera with the assistance of fibrin glue (Tissuoco Duo Quick, Baxter, IL, USA) between the amniotic membrane and bare sclera for fixation. The amniotic membrane attached firmly to the bare sclera within 15 seconds. To prevent graft detachment in a relatively large size of amniotic membrane, three stitches of 10-0 nylon suture were anchored to the limbus for strengthening the amniotic membrane attachment, and two stitches of 8-0 polyglactin 910 sutures were used to anchor the superior/inferior conjunctival wound edge, episcleral tissue, and the edge of

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