

# Comparison of the Efficacy of Pterygium Resection Combined with Conjunctival Autograft versus Pterygium Resection Combined with Amniotic Membrane Transplantation

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## Abstract

**Purpose:** To compare the efficacy of pterygium resection combined with conjunctival autograft versus pterygium resection combined with amniotic membrane transplantation in the treatment of pterygium.

**Methods:** A total of 118 cases (133 eyes) were randomly assigned to receive pterygium resection combined with conjunctival autograft ( $n=81$ ) or pterygium resection combined with amniotic membrane transplantation ( $n=52$ ). Corneal wound healing and neovascularization and the presence or absence of conjunctival proliferation and hyperemia were analyzed at 12 months post-operatively.

**Results:** In the conjunctival autograft group, 6 eyes (7.4%) had recurrent pterygium, while in the amniotic membrane transplantation group, 10 eyes showed recurrence (19.2%,  $P<0.05$ , chi-square). Patients in the conjunctival autograft group recovered significantly faster compared with those in the amniotic membrane transplantation group.

**Conclusion:** Patients receiving pterygium surgery combined with conjunctival autograft had lower recurrence rates and experience faster recovery compared with those undergoing pterygium resection combined with amniotic membrane transplantation. (*Eye Science* 2012; 27:102–105)

**Keywords:** pterygium; conjunctival autograft; amniotic membrane transplantation

**P**terygium is a chronic inflammatory disease. Its incidence and development are associated with environmental factors, ultraviolet radiation, conjunctival inflammation, etc<sup>1</sup>. Ocular hyperemia and vision loss are the most common clinical symptoms of

pterygium. Pterygium resection serves as the main treatment, while post-operative recurrence remains notably challenging. The recurrence rate after pterygium resection alone achieved up to 30%~69%<sup>2</sup>. A total of 118 patients (133 eyes) with pterygium underwent pterygium surgery combined with conjunctival autograft or pterygium resection combined with amniotic membrane transplantation in Dongguan Taiping Hospital between July 2008 and July 2010. Findings showed that the recurrence rate was lower and the recovery rate was faster in patients receiving pterygium surgery combined with conjunctival autograft than those undergoing pterygium resection combined with amniotic membrane transplantation.

## Patients and methods

### General information

In this clinical trial, 118 patients (133 eyes) with pterygium (51 males, 82 females, aged from 30 to 85 years) were enrolled. Pterygium tissues invaded pupil, and the lesions were located at nasal side. No other ocular surface diseases or systemic illnesses were observed. No participants had undergone surgery before. The 118 patients were randomly divided into two groups. In the pterygium surgery combined with conjunctival autograft group, 81 eyes were assigned (32 males and 49 females, aged between 32 and 85 years); in the pterygium resection combined with amniotic membrane transplantation group, there were 52 eyes (20 males and 32 females, aged from 30 to 81 years). The surgery was performed by one single surgeon. The recovery status and recurrence rate between the two groups were compared at a 12-month follow-up.

### Surgical procedure

All the operations were performed under microscope. Surface anesthesia was given by proxymetacaine. Infiltration anesthesia was conducted by 2% lidocaine. (1) Pterygium resection plus conjunctival autograft: after eyelid was opened, conjunctiva was cut open from pterygium neck using a scissor under microscope. Then, conjunctiva and subconjunctival pterygium tissue were separated. Superficial incision was made at the upper 0.5 mm cornea of pterygium using a shaver, separated toward limbus direction until plica semilunaris, fiber tissue, and vascula in the lesions were removed. The pterygium was totally isolated, and the corneal surface was smooth. The conjunctival surface was exposed; hemorrhage spots around limbus and on the conjunctival surface were cauterized, a 3 mm conjunctival flap in width was made above. Conjunctival flap was sutured with superficial sclera approximately 2 mm from corneal limbus to cover pterygium area and closely adhered to sclera surface. (2) Pterygium resection combined with amniotic membrane transplantation: amniotic membrane was measured as 15 mm×15 mm, 0.1~0.3 mm in thickness (Jiangxi Ruiji Bio-engineering Technology Co., Ltd), sterilized by 60 Co radiation, and pre-treated by sterile PBS. After pterygium resection, amniotic membrane with a similar size was used to cover exposed sclera, top side was put upward, discontinuously sutured and closed adhered to sclerotic surface using 10-0 nylon wire. The surgically-treated eye was tightly bandaged post-operatively. At two days post-operation, tobramycin hexadecadrol eye drops were administered four times per day. Tobramycin ointment was rubbed once daily for a week. The stitches were removed at 12 days post-operatively.

### Results

Recovery status: the patients presented with discomforts and foreign body sensation of various degree, eyelid edema, and conjunctival hemorrhage and edema during the early period after surgery. The symptoms and physical signs were gradually alleviated by one week post-operatively. In the pterygium combined with conjunctival autograft group ( $n=81$ ), 11 eyes (13.58%) had foreign body sensation or discomforts at one week post-operatively, and eight eyes (9.88%) presented with mild eyelid edema and conjunctival hyperemia edema. Six eyes (7.41%) had recurrent pterygium at a 12-month follow-up. In the pterygium resection combined with amniotic membrane transplantation group ( $n=52$ ), 17 eyes (32.69%) had foreign body sensation or discomforts at one week post-operatively, and 12 eyes (23.08%) showed mild eyelid edema and conjunctival hyperemia edema. Ten eyes (19.23%) were recurrent at the 12-month follow-up. *Chi-square* analysis revealed that the two groups significantly differed regarding foreign body sensation or discomforts ( $\chi^2=6.9600, P=0.0083$ ), eyelid edema and conjunctival hyperemia edema ( $\chi^2=4.3192, P=0.0377$ ), and recurrence rate ( $\chi^2=4.1833, P=0.0408$ ).

Evaluation criteria on surgical efficacy: recovery criteria: corneal wound was healed and no conjunctival proliferation or hyperemia was found. Recurrence criteria: conjunctival hyperemia was noted. Neovascularization and pterygium tissues invasion were observed onto the corneal surface. The post-operative recovery status and recurrence rate between the two groups were illustrated in Table 1.

### Discussion

Pterygium is a commonly seen eye disease in clin-

**Table 1** Comparison of recovery status and recurrence rate between the two groups post-operatively (number of eyes (%))

| Groups  | Eyes | Foreign body sensation or discomfort | Eyelid edema and conjunctival hyperemia edema | Tendency of recurrence (recurrence rate) |
|---|------|--------------------------------------|---|--|
| Pterygium resection combined with conjunctival autograft            | 81   | 11(13.58)                            | 8(9.88)                                       | 6(7.41)                                  |
| Pterygium resection combined with amniotic membrane transplantation | 52   | 17(32.69)                            | 12(23.08)                                     | 10(19.23)                                |

Note:  $\chi^2=4.1833, P=0.0408$

ical settings. Surgical method remains the dominant treatment of pterygium at present. In recent years, three types of operations including pterygium resection combined with conjunctival autograft, pterygium resection combined with amniotic membrane transplantation, and limbal stem cell transplantation can significantly reduce post-operative recurrence rate<sup>3</sup>. A previous study<sup>4</sup> reported that pterygium resection combined with conjunctival autograft and limbal stem cell transplantation did not significantly differ in terms of recurrence rate. However, pterygium resection combined with conjunctival autograft is easier to perform and gains more recognition from patients. Thus, this clinical trial only compared post-operative recurrence rate and recovery status between patients undergoing pterygium resection combined with conjunctival autograft and pterygium resection combined with amniotic membrane transplantation.

The mechanisms of pterygium resection combined with conjunctival autograft are stated as follows: (1) Normal bulbar conjunctival tissues emerged after the transplantation of bulbar conjunctiva with a pedicle above, changed blood supply direction post-operatively, accelerated wound healing, diminished inflammation reaction, inhibited pterygium remnant in caruncula lacrimalis, and suppressed abnormal proliferation of conjunctiva toward cornea and effectively prevented the recurrence of pterygium<sup>5</sup>. After healing, bulbar conjunctival epithelium injuries were alleviated and discomfort was also reduced post-operatively. (2) Intraoperatively, the upper conjunctival flap transplantation was performed between nasal bulbar conjunctiva and corneal limbus, forming a mechanical protection against the pterygium invasion onto the cornea. In this study, the inflammatory reactions, such as foreign body sensation or discomfort, eyelid edema, and conjunctival edema presented by the patients in the pterygium resection combined with conjunctival autograft group were less compared with those undergoing pterygium resection combined with amniotic membrane transplantation. In addition, the patients receiving pterygium resection combined with conjunctival autograft also had a significantly lower recurrence rate than those in the pterygium resection combined with amniotic membrane transplantation group.

It is well known that postoperative inflammatory reactions are closely associated with the recurrence of pterygium. A previous study investigated the conjunctival inflammatory reactions after pterygium surgery plus amniotic membrane transplantation and pterygium surgery combined with conjunctival autograft, and corroborated that the patients undergoing pterygium surgery plus amniotic membrane transplantation presented with more severe inflammatory reactions than those receiving pterygium surgery combined with conjunctival autograft did<sup>6</sup>. Li<sup>7</sup> conducted a meta-analysis of the recurrence rate of 538 patients undergoing pterygium surgery plus amniotic membrane transplantation or pterygium surgery combined with conjunctival autograft, and the results indicated that the recurrence rate of patients receiving pterygium surgery combined with conjunctival autograft was lower than those undergoing pterygium surgery plus amniotic membrane transplantation.

Biological amniotic membrane mainly consists of human placenta-derived collagen tissues of basilar membrane. Its primary tissues and components resemble fresh amniotic membrane. Both amniotic membranes have similar basilemma and compact layers, and originate from the same biomaterials (with good histocompatibility, while being without immunological rejection), which possess desirable adhesion, while having no toxicity or stimulus. In addition, they are effective and safe, exert anti-inflammatory and anti-fibroplasia effects, and promote epithelial growth<sup>8</sup>. Biological amniotic membrane is merely used as transplantation substrate<sup>9</sup>, and new vascula and pterygium tissues are likely to invade onto corneal surface after tissue uptake. Pterygium surgery plus amniotic membrane transplantation is clinically efficacious in the treatment of pterygium<sup>10,11</sup>. Although the patients receiving pterygium surgery plus amniotic membrane transplantation had more severe complications and higher recurrence rates compared with those undergoing pterygium surgery combined with conjunctival autograft, pterygium surgery plus amniotic membrane transplantation brings benefits for the pterygium patients complicated with glaucoma because it reduces conjunctival injuries, which contribute to the formation of filtration bleb after glaucoma surgery.

To sum up, pterygium surgery combined with conjunctival autograft is recommended due to its less adverse events, faster recovery, and lower recurrence rate, especially at a 12-month follow-up. Besides the high cure rate, it possesses multiple advantages, such as simple operation, abundant sample collection, surgical safety, low cost, etc., thus deserving widespread application in basic-level hospitals.

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