



## RESEARCH ARTICLE

## Effect of triamcinolone acetonide injection on pterygium recurrence in postoperative subconjunctival patients

Nika Bellarinatasari<sup>1\*</sup><sup>1</sup> Department of Ophthalmology, Faculty of Medicine, Universitas Islam Sultan Agung, Semarang, Indonesia\* Correspondence: [nikabella@unissula.ac.id](mailto:nikabella@unissula.ac.id)

## ARTICLE INFO

## ABSTRACT

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Pterygium is an eye disorder characterized by fibrovascular tissue from the bulbar conjunctiva encroaching on the cornea. Inflammation has been suggested to play a role in the pathogenesis of pterygium, indicated by elevated levels of anti-inflammatory cells and markers. Triamcinolone acetonide is a steroid commonly used to treat eye diseases. This study evaluated the effects of anti-inflammatory triamcinolone acetonide injection after the pterygium surgery. This study included 71 eyes of 71 patients. The patients were divided into two groups: triamcinolone and control group. Each eye received a subconjunctival triamcinolone injection of 2.5 mg/ 0.1 ml or no after pterygium surgery with bare sclera technique. The infusion was done around the excision area. Before and after the surgery, the ocular pressure was evaluated. Topical steroid antibiotics and oral analgesics were administered. The outcomes were assessed one day, week, three weeks, and one month after surgery under slit-lamp examination and noncontact tonometry. The evaluated outcomes were the presence of fibrovascular tissue and intraocular pressure. This study was done by a surgeon and assisted by a nurse. There are 71 eyes in this study; 10 eyes are lost during follow-up. The 61 eyes were divided into 28 triamcinolone and 33 control group. The recurrence of pterygium was found in 2 (39. 3%) of the triamcinolone group and in (10.7%) of the control group ( $p=0.16$ ). Eight eyes showed increased ocular pressure, and one patient developed granuloma. Subconjunctival triamcinolone injection after pterygium surgery did not significantly reduce pterygium recurrence.

### 1. Introduction

Pterygium is an eye abnormality characterized by fibrovascular tissue in the bulbar conjunctiva encroaching on the cornea. Although it was suspected that pterygium is a degenerative disease, the current evidence showed proliferative and inflammatory processes in pterygium pathogenesis. Inflammation plays a role in developing pterygium, characterized by increased inflammation and its markers. Steroids are beneficial in inhibiting the progression of recurrent pterygium (Cláudia *et al.*, 2019; Sakti, 2021)

Various techniques for pterygium surgery have been developed in the last few decades. The bare sclera

technique is the simplest method of removing the head and body of the pterygium and left sclera without closure. It has been associated with a high rate of recurrence of 24% -89% (Govindasamy and Reddy, 2022). Various modalities have been used to reduce recurrence after pterygium surgery with bare-sclera techniques such as beta irradiation and chemical agents, including mitomycin C (MMC), 5-fluorouracil, anti-VEGF and cyclosporin A (csA ). One of the factors affecting the outcome of pterygium surgery is postoperative conjunctival inflammation (Nuzzi and Tridico, 2018; Govindasamy and Reddy, 2022). One of the most common drugs to reduce inflammation related to eye disorders is steroids, such as triamcinolone acetonide.

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Triamcinolone acetonide injection is widely used in benign eye tumors (capillary hemangiomas, granulomas, etc.) and diabetic retinopathy (Athanasiadis *et al.*, 2013). This study aimed to evaluate the effects of triamcinolone acetonide injection after the pterygium surgery.

## 2. Materials and Methods

### 2.1. Study design

The study was approved by the Ethics Committee of Faculty of Medicine of Universitas Islam Sultan Agung, Semarang, Indonesia. In this single-blind randomized clinical trial, 71 eyes of 71 patients with pterygium underwent pterygium surgery with bare sclera technique. Patients were divided into two groups using a computer-generated random number table.

### 2.2. Treatment and Outcomes Observation

The treatment group received 2,5 mg subconjunctival triamcinolone acetonide injection (the T.A. group), and the control group received no injection (the control group). Patients with primary pterygium grade II-IV, undergoing pterygium surgery with bare sclera techniques, and providing informed consent for participation in the study were included. The grading was based on corneal topography, determined by the extension of the head over the cornea, and divided into four grades. Grade I refers to the head of a pterygium located at the limbus. Grade II indicates the authority of a pterygium situated between a point midway between the limbus and pupillary margin. Grade III indicates the jurisdiction of pterygium at the pupillary margin but not across the pupillary margin. In grade IV, the head of the pterygium crosses the pupillary margin and sometimes covers the visual axis (Maheshwari S, 2007). Exclusion criteria included a history of recurrent pterygium or pterygium surgery, a history of glaucoma, steroid allergy, and moderate eye infections (conjunctivitis, keratitis, episcleritis, scleritis) (Sakti, 2021). Dropout criteria included loss of follow-up, postoperative infection, and non-compliance to medication. Ten patients were lost to follow-up; thus, the number of samples used was 61 eyes.

Before the surgery, anamnesis of the eligible patients was conducted to obtain the baseline characteristics of the patients, including age, gender, occupation, and history of disease and use of the drug. Informed consent was obtained from all participants before recruitment in our study. All patients were subjected to an ocular examination, including slit lamp biomicroscopy, to determine the pterygium grade before operation and a standard exam for blood pressure, blood glucose, and noncontact tonometry to measure ocular pressure before randomization. Procedure pterygium surgery with bare sclera technique

includes subconjunctival injection of lidocaine excision of fibrovascular tissue. A single surgeon performed all surgery under subconjunctival lidocaine injection as anesthesia. The head and body of the pterygium were removed by a similar technique in all patients, with resection of the body at 2 mm in front of plica semilunaris. Finally, at the end of surgery, 2.5 mg/0.1 ml of subconjunctival triamcinolone acetonide was injected around the surgical site for patients in the T.A. group at the end of surgery. Patients in the control group did not receive any steroid injections. The bare sclera technique was without sutures and mitomycin application. After surgery, all patients received Xitrol® ointment and eyes bandaged for a day. Therapy after the operation included mefenamic acid 3x500 mg for three days, Tobrosol® eye drops 6x1 drops/day for one week, tapering topical steroids for three weeks, and tapering to 3-4x1 drops/day for three weeks. The patients instilled the eyedrops by themselves. Postoperative follow-up examinations were performed one day, one week, three weeks, and one month after surgery. The follow-up examinations were slit lamp biomicroscopy and noncontact tonometry. In addition, the adverse reaction and the compliance with medication were evaluated. The pterygium surgery technique (bare sclera technique) could induce the recurrence, so to reduce bias, the bare sclera technique was performed in all patients.

### 2.3. Data Analysis

The SPSS software was used for the statistical analysis. A p-value of  $\leq 0.05$  was considered statistically significant. The data were analyzed using the chi-square test

## 3. Results

Seventy-one eyes from 71 patients diagnosed with pterygium provided informed consent to undergo surgery using the bare sclera technique at Sultan Agung Islamic Hospital, Semarang. There were ten who were lost to follow-up. Thus, the number of samples used was 61 eyes.

The mean age of the sample in this study in the control group was 48.70 years old in the control group and 53.89 years old in the T.A. group. There was no significant difference in the age of the patients. Thus, the age factor did not affect the results of the study. The laterality factor of the right and left eye also did not affect the study results because the analysis results were not significantly different. Most of the pterygium grades in this study were grade III, where the fibrovascular tissue reached the cornea's limbus (more than 2 mm). There was a significant difference between the two groups.

Table 1. Characteristics of the patients

| Characteristics | T.A. group   | Control group | p-value |
|-----------------|--------------|---------------|---------|
| Age             | 53.89 ± 9.44 | 48.70 ± 7.60  | 0.293   |
| Sex             |              |               | 0.873   |
| - Male          | 13 (46,4%)   | 16 (48,5%)    |         |
| - Female        | 15 (53,6%)   | 17 (51,5%)    |         |
| Lateralisation  |              |               | 0.283   |
| - OD            | 14 (50%)     | 21 (63,6%)    |         |
| - OS            | 14 (50%)     | 12 (36,4%)    |         |
| Pterygium       |              |               | 0.003   |
| - Grade II      | 7 (25%)      | 16 (48,5%)    |         |
| - Grade III     | 11 (39,3%)   | 16 (48,5%)    |         |
| - Grade IV      | 10 (35,7%)   | 1 (3%)        |         |

Table 2. Difference in Recurrent between the study and control group

|               | Group      |             | Total |
|---------------|------------|-------------|-------|
|               | TA         | Control     |       |
| recurrent     | 25 (89,3%) | 20 (60,6%%) | 45    |
| Non-recurrent | 3 (10,7%)  | 13 (39,4%)  | 7     |
|               | 28         | 33          | 61    |

The recurrence was assessed based on the presence of fibrovascular tissue within 12 months in the standard method to determine pterygium recurrence. The presence of the fibrovascular tissue was determined by slit lamp biomicroscopy. There was no significant difference in the recurrence of perygium between the two groups ( $p = 0.16$ ). Recurrency was found in 13 eyes (39.4%) in the control group and three eyes (10.7%) in the T.A. group within 1,5 months (7 weeks).

In the control group, eight eyes had an increase in intraocular pressure after the surgery and then received timolol 0.5% eye drop therapy and one eye-developed granuloma. In this study, cataracts were not found due to a short observation period.

#### 4. Discussion

This study aimed to determine the effect of subconjunctival triamcinolone after pterygium surgery with bare scleral technique. The bare sclera technique is affordable for pterygium surgery but has a high recurrence rate (24% -89 %) (Nuzzi and Tridico, 2018). Triamcinolone acetonide (T.A.) is a potent intermediate-acting steroid with a duration of treatment of 15-20 days in the conjunctiva. Triamcinolone acetonide (T.A.) is an anti-inflammatory, angiogenesis inhibitor. It inhibits fibroblast proliferation, thus halting the recurrence of pterygium and repairing the visual appearance of the exposed area (Athanasiadis *et al.*, 2013).

A previous study (Hatta *et al.*, 2020) showed that subconjunctival injection of triamcinolone acetonide is effective in lowering postoperative conjunctival inflammation with conjunctival autograft, leading to a lower risk of recurrent pterygium. The effect of T.A. on

postoperative subconjunctival inflammation is indicated by a significantly lower expression of VEGF mRNA in the study group compared to that of the control group ( $p=0.006$ ). VEGF plays a role in increased vascular permeability, angiogenesis, and lymphangiogenesis, leading to neovascularization and inflammation in developing pterygium (Cláudia *et al.*, 2019).

In this study, the group treated with an injection of triamcinolone (10.7%) had a lower number of recurrent pterygia than the control group (39.3%). However, it was not statistically significant but may be clinically significant ( $p>0.05$ ). This finding supports that of a previous study (Gupta, Kumar, and Lakra, 2017) on 64 samples, showing that the number of eyes with recurrent pterygium in the group injected with subconjunctival T.A. was lower (10%) compared to that of the control group (15.78%) with autograft conjunctiva. However, it is not statistically significant ( $p>0.05$ ). Triamcinolone acetonide is an intermediate-acting steroid that has a duration of effect of 15-21 days in the conjunctiva. After one month postoperatively, the steroid results might have already been worn off. This may explain the non-significant difference in the incidence of recurrence of pterygium. In one previous study on 51 patients with primary pterygium, surgery using bare sclera technique with intraoperative MMC application and subconjunctival injection of 20 mg depot steroid resulted in no recurrence during 4-14 months of follow-up (Mpyet C and Oko H, 2000). However, no control group was included, and maybe intraoperative MMC application played a leading role in preventing pterygium recurrence (Panda A *et al.*, 1998).

In this study, eight eyes had an increase in

intraocular pressure, and one eye developed granulomas, which were subsequently given medical intervention. This finding is similar to a study (Gupta *et al.*, 2017) showing two eyes developing ocular hypertension after subconjunctival steroid injection with T.A. Granuloma is a common complication in pterygium surgery. In a research conducted by Govindasamy and Reddy 10 (23.7%) eyes of 80 developed granulomas after bare scleral surgery.

## 5. Conclusions

In pterygium surgery, subconjunctival triamcinolone injection did not significantly reduce pterygium recurrence. Further studies with bigger sample sizes and longer time are needed to evaluate the effect of triamcinolone injection after pterygium surgery.

## Conflict of interest

All authors have no conflict of interest in this article.

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