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Risk Factors for Recurrence of Primary Pterygium after Conjunctival Autograft in Ophthalmology Training Program

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Abstract

Objectives: The purpose of this study was to determine the risk factors related to recurrence of pterygium after surgical excision with conjunctival autograft for primary pterygium performed by ophthalmology trainees.

Methods: Fifty-eight eyes of 58 patients with primary pterygium were consecutively included in the prospective observational study. The pterygia were preoperatively graded based on corneal involvement and translucency. Recurrence rates and associated risk factors were evaluated at 1, 3, 6, 9 and 12 months postoperatively.

Results: Recurrences occurred in 8 out of 58 eyes (13.79%) and most cases were detected within 6 months. The mean recurrence onset was 5 ± 4.2 weeks postoperatively. Operation time ranged from 30 to 120 minutes and the average was 65.43 ± 21.01 minutes. Mean duration of postoperative topical corticosteroid was 6.48 ± 2.27 weeks. The recurrence was not statistically significantly associated with age (P = 0.669), gender (P = 0.418), occupation (P = 0.706), address (P = 0.462), pterygium translucency (P = 0.637), corneal involvement (P = 0.334), academic year of ophthalmology trainees (P > 0.999) , duration of postoperative topical corticosteroid (P = 0.535) and operation time (P = 0.139). Prolonged operation time, however, showed the highest relative risk (4.28).

Conclusions: The authors could not find significant risk factors associated with the recurrence of pterygium in the training program. Prolonged operation time was more likely to relate with the recurrence of pterygium.

Key words: pterygium; recurrence; trainee; operation time; relative risk

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Introduction

Pterygium is a common degenerative change of the ocular surface. The pathogenesis of pterygia remains incompletely understood and multiple causative factors have been reported.[1] Definite treatment for pterygium is surgical removal. The most common and major complication of concern is recurrence.[2]

Risk factors for recurrence may be from patient factors, characteristics of pterygium and/or surgical factors.[2-4] Surgeon experience has been reported to be one of the predictive factors.[3,5-7] One study tried to identify the risk factors related to pterygium recurrence in trainee surgeons, however, there was no significant factor.[7]

Conjunctival autografting technique is one of the most effective surgery for pterygium. Although conjunctival autografting is effective in preventing pterygium recurrence, this technique requires technical expertise and extended operative time due to 2-step procedure (removing of conjunctival donor and fixation of conjunctival autograft). Moreover, this technique may not be suitable, if future glaucoma surgery is required.[3,4]

In some training centers, pterygium surgery is started early in residency training. Case selection, eg., avoiding cases with possible risks, should be an important criterium to reduce the recurrence rate in little-experienced surgeons such as ophthalmology trainees or new ophthalmologists. The purpose of the present study was to identify the risk factors that influence the recurrence of primary pterygia after conjunctival autografting by ophthalmology trainees.

Materials and Methods

The prospective observational study adhered to the tenets of the Declaration of Helsinki and was approved by the Khon Kaen University Ethics Committee for Human Research (HE 581521). Written informed consents were obtained from all participants.

Fifty-eight eyes of 58 patients with primary pterygium were included. The exclusion criteria were recurrent pterygium, chemical burn, thermal burn, ocular cicatricial pemphigoid, symblepharon, glaucoma or glaucoma suspect, moderate or severe ocular surface disease, previous conjunctival surgery and bihead pterygia. All cases underwent pterygium excision with conjunctival autografts by ophthalmologist trainees at Srinagarind Hospital, Khon Kaen University, Thailand from March 2018 to July 2019. First, 2nd and 3rd year trainees were included. All surgeons had surgical experience of at least 5 cases for conjunctival autograft. Every steps of the surgeries were undertaken by trainees under supervision of senior staff.

Slit-lamp biomicroscopy including pterygium grading was performed. Pterygium translucency is based on the grading scale of 1 to 3 as previously described by Tan et al.[8] Grade 1 indicated that the episcleral vessels underlying the body of the pterygium were clearly visible, grade 2 indicated that the episcleral vessels were partially obscured and grade 3 indicated that the episcleral vessels were totally obscured. Pterygium corneal involvements were classified as grades 1 to 4 modified from RM Young as follows [9]: Grade 1 indicated that the corneal involvement was less than 1.5 mm from limbus, grade 2 indicated that the corneal involvement was more than 1.5 mm from the limbus but less that one fourth of the corneal

diameter, grade 3 indicated that the pterygium corneal involvement was more than one fourth of corneal diameter but less than half of the corneal diameter. Grade 4 indicated the pterygium corneal involvement was more than half of the corneal diameter.

Surgical technique

Topical and subconjunctival anesthesia were applied. The pterygium's head is excised using Wescott scissors and toothed forceps. The limbus is then cleaned with a 15-blade scalpel. Radical removal of subconjunctival tissue is performed. The autograft is created from the superior conjunctiva without limbal tissue dissection. It is sutured to the episclera for 3 points (superior, inferior and temporal or nasal) and anchored to the host conjunctiva with an interrupted 10-0 nylon sutures. Each steps and final result are checked by senior staff. If there is any defect, for example, tenon resection is inadequate, the staff will correct before proceeding to the next step.

Pterygium excision with conjunctival autograft was undertaken without an antimetabolite. Operation times and intraoperative complications were observed. All complications were minor and included recurrence (8/58, 13.79%), pyogenic granuloma (2/58, 3.45%) and symblepharon formation (1/58, 1.72%). Slit-lamp examinations were undertaken at 1, 7, 14 and 28 days and then at 3, 6, 9 and 12 months postoperatively. Pterygium recurrence was defined as regrowth of fibrovascular tissue across the limbus onto surgical cornea. Simple regrowth of subepithelial and stromal vascularization into the cornea without fibrovascular tissue was not included. All recurrent cases were photographed and sent to assess by one cornea specialist. After surgery, topical dexamethasone phosphate 0.1% combined with neomycin sulfate 0.5% was prescribed for at least 1 month until the conjunctival inflammation subsided. Total postoperative topical corticosteroid durations were recorded. Conjunctival sutures were removed at 1 week after surgery.

Statistical analysis

Multivariate logistic regression analysis was used to calculate the relative risk. A P value less than 0.05 was considered statistically significant. Statistical analyses were performed using the STATA version 10.0 (STATA Corporation, College Station, Texas).

Results

A total of 58 eyes of 58 patients (male:female = 19:39) were included. The ages of the patients ranged from 37 to 84 years (mean ± SD = 58.4 ± 10.8). Operation times ranged from 30 to 120 minutes (mean ± SD = 64.91 ± 18.5). The duration of topical corticosteroids ranged from 4 to 11 weeks (mean ± SD = 6.43 ± 2.26). Of 58 patients, the mean of topical corticosteroids duration was 7.0 weeks in the recurrent group and 6.4 weeks in non-recurrent group. Eight surgeons were included; 5 surgeons in 1st year, 2 surgeons in 2nd year and 1 surgeons in 3rd year of residency training.

Table 1 shows the results of multivariate regression analysis of risk factors associated with recurrence of pterygium. Age, gender, occupation, address, grading of pterygium translucency, grading of corneal involvement, operation time, academic year of ophthalmologist trainees, and duration of topical corticosteroids were included. Multivariate analysis showed that none of the factors had a statistically significant effect on recurrence of pterygium. Prolonged

Table 1 Multivariate analysis of factors in patients with recurrent pterygium

Factors	Number of patients	Recurrence (%)	*P* Value*	RelativeRisk	95%CI**
Age					
< 50 years old	13	1 (7.69)		1	0.27 - 14.98
> 50 years old	45	7 (15.56)	0.669	2.02	
Gender					
Male	19	4 (21.05)	0.418	2.05	0.57 - 7.33
Female	39	4 (10.26)		1	
Occupation					
Indoor	24	4 (16.67)	0.706	1.42	0.39 - 5.11
Outdoor	34	4 (11.76)		1	
Address					
Urban	22	4 (18.18)	0.462	1.64	0.45 - 5.89
Rural	36	4 (11.11)		1	
Translucency					
Grade 1	20	4 (20.00)	0.637	1	0.10 - 2.31
Grade 2	21	2 (9.52)		0.48	0.12 - 2.82
Grade 3	17	2 (11.76)		0.59	
Corneal involvement					
Grade 1	3	1 (33.33)	0.334	1	0.04 - 2.27
Grade 2	21	2 (9.52)		0.29	0.05 - 2.37
Grade 3	26	3 (11.54)		0.35	0.10 - 5.54
Grade 4	8	2 (25.00)		0.75	
Operating room time					
< 1 hour	22	1 (4.55)		1	0.56 - 32.48
≥ 1 hour	36	7 (19.44)	0.139	4.28	
Year of Resident					
First year	46	7 (15.22)		1	0.10 - 5.23
Second year	9	1 (11.11)	> 0.999	0.73	N/A
Third year	3	0 (0)		N/A	

*Fisher's exact test, **95% Confidence Interval, N/A : Not available

operation time, however, had the highest relative risk (RR = 4.28).

Recurrences into the cornea occurred in eight patients (13.79%). Most recurrent cases (7/8, 87.5%) occurred within the first 6 months after surgery. Recurrence onset ranged from 4 to 48 weeks (mean ± SD = 5.63 ± 4.2).

In subgroup analysis of these factors associated with recurrence of pterygium undertaken by first year residents, no factor had a statistically significant effect on recurrence of pterygium. The relative risk of all factors was decreased compared to all 3 years of training. If for only first year trainees, all relative risks in all factors were decreased compared with all-years-trainee results and the relative risk of prolonged operation time was 3.20

Others adverse events included 1 cases of pyogenic granuloma and 2 cases of temporary increased intraocular pressure.

Discussions

Pterygium is a wing-shaped ocular surface lesion attributed to ultraviolet-B exposure.[4,10] Even though the pathogenesis of pterygia remains incompletely understood, histological features suggest that inflammation plays a prominent role in the initial pathogenesis and recurrence.[1,10]

Recurrence is the most common of complication concerns after pterygium surgery. Multiple techniques have been proposed with variable recurrence rates.[3,9] The most recent literature review and meta-analysis reported recurrence rates between 2% to 39% with conjunctival autografts.[3] There are several risk factors, however, that may affect this rate.[3]

Surgeon experience of pterygium excision with autografts have been reported for both affected and unaffected recurrence rates, especially in trainees. There are 2 studies that compared recurrence rates between consultant and trainee surgeons.[6,11] Farrah et al reported the recurrence rate in the consultant group was 6.8% and in trainee group was 19.4%. This difference was statistically significant *(P* = 0.05).[6] Chalioulias K et al reported that among consultants and trainees were not significantly different (26.3% vs 24.5%).[11] This may be explained by less-experienced trainees in the first study compared with a previous experience of 5 years or more in the second study.

Two studies have only reported results of pterygium surgery in trainees without comparisons. Ti et al found that recurrence rates varied widely among surgeons, ranging from 5% to 82% and were inversely related to previous experience,[12] while another study from Thailand reported that the recurrence rate of 9.7% performed by trainee ophthalmologists was within acceptable limits.[7] The explanation was the number of cases. In the first study, if the surgeon had experience of 5-10 cases, the recurrence rate is 4.8-10%. In another study that included surgeons who had experience with 5 or more cases, the recurrence rate (9.7%) was compatible with the first study.

From previous evidence, it's relatively clear that surgical experience has an effect on recurrence of pterygium. In the current study "the aim was to identify risk factors that may affect the recurrence of pterygium in trainees who have less experience". Most surgeons are from the 1st year of training (46/58, 79.31%). The recurrence was within an acceptable rate compared to previous reports.[3,4,6,7,10]

Even though, all factors had no statistically significant effect on recurrence of pterygium, prolonged operation time (≥ 1 hour) had a relatively high relative risk (4.28). This means that the risk of having a recurrence among the prolonged operation time group was about 4.28 times higher than that of the short operation time group. If only 1st year trainees were included, relative risk was still high at 3.2. The causes of prolong operation time in the presence study may not only from year of traning. Three factors were observed; experience, grading of pterygium and surgical style. The possible explanation for this finding is that prolonged operation time may increase the risk of inflammation.

An example of a correlation between prolonged operation time and recurrence of pterygium is the use of fibrin glue. The use of fibrin glue, instead of sutures, in pterygium surgery significantly reduced surgery time and resulted in a lower recurrence rate compared with suturing.[5,13,14] Surgical trauma to the

eye initiates an inflammatory reaction and, therefore persistent conjunctival inflammation around the surgical site after surgery is considered a potential risk factor for recurrence of pterygium.[15] Conjunctival inflammation may be caused by prolonged operation time and sutures.[5,13,14,16] On the other hand, conjunctival autograft with fibrin glue was found to relate to more complications such as graft dehiscence, retraction, and granuloma.[17]

The limitation of this study is uncontrolled experience of surgeon. Even though, the previous number of pterygium cases or number of years of surgical experience or the academic year were not controlled, most surgeons were from same academic year of training. In subgroup analysis that included only 1st year trainees, the results were relatively identical. The small sample size is another limitation of this study. Increasing the sample size could also give a greater power to detect statistical differences.

In conclusion, there were no statistically significant risk factors associated with the recurrence of pterygium in the training program. Prolonged operation time, however, may be related to the recurrence of pterygium due to it being the highest relative risk. Non-complicated cases should be selected for in-training or less-experienced surgeons for controlling operation times. In addition, senior staff or assistants should have more participation in extended time cases to expedite the surgery.

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Declaration of conflicts of interest :

none declared.

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