

Comparing of Bare Sclera Technique, Pedunculated Conjunctival Sliding Flap and Conjunctival Autografting Transplantation for Primary Pterygium Treatments

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Abstract

Purpose: To compare one-year follow-up results of primary pterygium surgery including bare sclera technique (BST), pedunculated conjunctival sliding flap (PCSF), and conjunctival autografting transplantation (CAT).

Design: Prospective randomized controlled study

Methods: This study is designed to compare three currently techniques for pterygium excision, in order to determine the complication and recurrence rates after grade III primary pterygium excision. There were 263 eyes of 263 patients included in this study. All treated eyes were randomized to undergo bare sclera technique (group A: BST) 85 eyes, pedunculated conjunctival sliding flap (group B: PCSF) 90 eyes, or conjunctival autografting transplantation (group C: CAT) 88 eyes. All patients were treated by a single surgeon and followed up for a period of at least one year.

Results: Sixteen recurrences (18.83%) were observed in group A (BST) whereas two recurrences (2.22%) were detected in group B (PCSF), and only one recurrence (1.14%) was noted in the last group C (CAT). There were no major complications threatening visual ability, reported in the treated patients.

Conclusions: BST was found to be a less effective procedure than PSCF and CAT, with more recurrence rates after primary pterygium excision. PCSF and CAT seem to be a useful treatment in primary pterygium surgery due to their safety and effectiveness in preventing recurrences without development of significant complications.

Key words: pterygium, comparing, pterygium excision, recurrence, complication

Introduction

Pterygium is a common ocular surface disorder in tropical area and especially Thailand. It is characterized by fibrovascular encroachment of bulbar conjunctiva onto the cornea in a wing like fashion. Histological pterygium is an elastotic degeneration of the collagen tissue of the conjunctiva.¹

Prevalence rates ranges from 0.7% to 31%² in various populations around the world, and the condition is more common in warm, dry climates.³ Recently, more researches in ocular surface cell biology have led to recognition that pterygium is an ocular surface growth disorder secondary to UV-B induced p 53 mutations in limbal epithelial cells^{4,5} more likely than a degenerative change as perceived earlier. The treatment of pterygium is mainly surgical. In general, conservative therapy for pterygium is warranted unless one of the following circumstances arises: loss of visual acuity either because of induced astigmatism or encroachment onto the visual axis, marked cosmetic deformity, marked discomfort and irritation unrelieved by medical management, limitation of ocular motility secondary to restriction, or documented progressive growth toward the visual axis so that ultimate loss of vision can reasonably be assumed.

Risk factors reported for occurrence of pterygium and the recurrence after an excision include age, environment,⁶ the pterygium morphology and the fleshiness of the pterygium.^{7,8} The pterygium excision is usually followed by a variable recurrence rate from 0.35% to 82%, depending on the removal method and the adjunctive therapy.

This study is designed to compare one year follow-up results of three currently used surgical techniques for primary pterygium excisions in order to determine the complication and recurrence rates.

Materials and methods

This study was approved by the Medical Science Committee for the protection of Human Subjects in Research of Sawanpracharak Hospital, Nakhonsawan, Thailand and the inclusion and exclusion criteria were proposed as follows:

The inclusion criteria:

- Patients who were diagnosed with grade III primary pterygium⁹ (pterygium; crossing pupillary margin) and met the indication for surgical treatment.
- Patients with pterygium who signed the informed consent to enroll into this study.

The exclusion criteria:

- Patients who had ocular disorder like dry eyes, glaucoma, limbal mass, pseudopterygium, ocular trauma, and previous ocular surgeries in the studied eye.
- Patients who had an intraocular pressure > 21 mmHg in the studied eye.
- Patients enrolled in another study, that might affect this study.
- Patients who had not cooperated during pterygium excision surgery.

A prospective single-blind randomized study was performed among 300 eyes of 300

patients attending outpatients' departments of ophthalmology, Sawanpracharak Hospital, Nakhon-sawan, Thailand between January 2003 and December 2007. The patient's ages ranged from 25 to 65 years and their average age was 43.67 years. All patients were randomly and equally divided into three groups by simple randomization technique.

Group A: BST (100 eyes) treated with Bare Sclera Technique (BST).

Group B: PCSF (100 eyes) treated with Pedunculated Conjunctival Sliding Flap¹⁰ (PCSF).

Group C: CAT (100 eyes) treated with Conjunctival Autografting Transplantation¹¹ (CAT).

Before surgery, the best-corrected Snellen visual acuity, intraocular pressure, and details of slit-lamp and fundus examinations were recorded. Surgical procedures were performed under local anesthesia using an operation microscope by a single surgeon. All patients received topical anaesthesia of 0.5% tetracaine hydrochloride (Alcon, Thailand). After the eye was prepped and draped, lidocaine 2% was injected into the subconjunctival space to balloon the conjunctival layer of the pterygium. A full thickness vertical incision was done at the junction between the head and the body of the pterygium. The body was dissected from the overlying conjunctiva. A small amount of lidocaine 2% was injected just under pterygium to separate pterygium from the sclera. Muscle hook was inserted under pterygium and moved back and forth, resulting in a separation of the body from the sclera. The body was incised as far as possible. By holding the body, the head

was dissected from the cornea with a surgical blade. The tissue left over sclera or cornea may be removed with a surgical blade as well.

In group A (BST), the conjunctival was fixed to sclera with virgin nylon 10-0 interrupted sutures about 2 mm. away from limbus.

In group B (PCSF), subconjunctival injection of lidocaine 2% was accomplished at the bulbar conjunctiva. A pedunculated conjunctival flap without Tenon's capsule was created from adjacent conjunctiva and was slid down over the bare sclera. The flap was fixed to sclera with virgin nylon 10-0, leaving bared sclera about 2 mm. between the flap sutured with virgin nylon 10-0 interrupted sutures.

In group C (CAT), the pterygium was extracted as described above and the dimension of bare sclera was measured. Superior temporal conjunctiva of the same eye, approximately 1 mm. greater than bare sclera size, was measured and marked. The area under the marked space was inflated with lidocaine 2%. The objective of this procedure was to ease the dissection of the conjunctiva from the tenon during autografting, and to obtain the thinnest conjunctiva as possible. In due course, the autograft was freed by cutting the limbal edge of the conjunctiva. The autograft was flattened in place, and transferred to the receiver area by handling from the two limbal edges. The limbal side of the autograft was placed on the limbal area at the receiver. As the autograft regularly flattened, it was sutured to the adjacent conjunctiva with nylon 10-0 interrupted sutures and fixed to sclera at the limbal level.

Afterwards the eye of all patients was closed with a pressure patch after the application of combined tobramycin 0.3% and dexamthasone 0.1% ointment (Tobradex; Alcon, Thailand). All cases were outpatients. Combined topical neomycin sulfate 0.5% and dexamethasone phosphate 0.1% eye drop (DexOph; Sang Thai Medical, Bangkok, Thailand) were administered postoperatively 4 times a day for 2–4 weeks, depending on the amount of inflammation. Follow-up schedule was first postoperative day, then two weeks, one month, three months, six months, and then every six months. The minimum follow-up period of one year was required in all cases. All suture materials were removed two weeks after the procedure. The criterion for recurrence was determined to be the invasion of cornea more than 1 mm. in diameter beginning from the limbus by fibrovascular tissue derived from the operation site.¹²⁻¹⁴ The postoperative follow-up was undertaken in all cases. They were observed for any recurrence, complications and postoperative visual improvement was noted.

Results

A total of 300 eyes from 300 patients were enrolled in the study. Although some of the patients had bilateral pterygium in these series, patients were allowed to carry out surgery only monocularly. All patients were Thai. In total, 37 patients were lost to the follow-up (two patients died from car and motorcycle accidents and the remainder did not show up with unknown at the clinic). Of 37 patients lost to the follow-up, there were 15 patients in group A (BST), 10 patients in group B (PCSF), and 12 patients in the group C (CAT). Consequently, the total number of eyes was 85 eyes, 90 eyes and 88 eyes for group A (BST), group B (PCSF) and group C (CAT), respectively. The demographic data are shown in Table 1. The ratio of the right and the left eye, male and female, the age range, and occupation were similar in the three groups. The mean follow-up time was 15.5 months (12–25 months).

Table 1 Demographic characteristics of study patients.

	Group A (BST)	Group B (PCSF)	Group C (CAT)
Patients	85	90	88
Eyes	85	90	88
Age (mean)	31–64 (44.17)	28–65 (43.21)	28–60 (42.64)
Gender			
– Male	30	28	31
– Female	55	62	57
Side (heads)			
– Nasal	65	68	70
– Temporal	3	4	3
– Both	17	18	15
Side (eyes)			
– Right	49	48	50
– Left	36	42	38
Occupation			
– Agriculturist	35	35	39
– General labor contract	20	23	20
– Merchant	8	5	7
– House wife	11	14	14
– Office employee	3	4	3
– Monk	1	3	1
– none	7	6	4

Postoperatively, 94.67% of all groups gained visual acuity at least the same as pre-operative visual acuity as shown in Table 2. The

most postoperative complaint was irritation followed by photophobia, wetting, FB sensation and conjunctival hyperemia.

Table 2 Postoperative visions of study patients.

Postoperative Visual Acuities	Group A (BST)	Group B (PCSF)	Group C (CAT)
Improve Vision	66 (77.65%)	77 (85.56%)	70 (79.55%)
Equivalent Vision	10 (11.76%)	11 (12.22%)	15 (17.05%)
Decreased Vision	9 (10.59%)	2 (2.22%)	3 (3.41%)

Complications included pyogenic granuloma in four eyes from group A: BST (4.71%), two eyes from group B: PCSF (2.22%), and one eye from group C: CAT (1.14%). Keratitis occurred in three eyes in group A: BST (3.53%), three eyes

in group B: PCSF (3.33%) and one eye from group C: CAT (1.14%). Dellen was found in only two eyes from group A: BST (2.35%). No major complication threatening visual ability was reported (Table 3).

Table 3 Postoperative complications of study patients.

Postoperative Visual Acuities	Group A (BST)	Group B (PCSF)	Group C (CAT)
Pyogenic granuloma	4 (4.71%)	2 (2.22%)	1 (1.14%)
Keratitis	3 (3.53%)	3 (3.33%)	1 (1.14%)
Dellen	2 (2.35%)	0 (0.00%)	0 (0.00%)

Recurrence was observed in 18 eyes, with overall rate of 6.84%. The total recurrence rate were 18.83% in group A: BST (12 eyes), 2.22% in group B: PCSF (2 eyes), and 1.14% in group

C: CAT (1 eye). The detected recurrence varied from 3 months to 22 months in all groups as shown in Table 4.

Table 4 Recurrent eyes and time of study patients.

Postoperative Visual Acuities	Group A (BST)	Group B (PCSF)	Group C (CAT)
Recurrent eyes	16 (18.83%)	2 (2.22%)	1 (1.14%)
Recurrent time after surgery:			
- < 3 months	2 (2.35%)	0 (0.00%)	0 (0.00%)
- 3-6 months	5 (5.88%)	1 (1.11%)	0 (0.00%)
- 6-9 months	4 (4.71%)	0 (0.00%)	1 (1.14%)
- 9-12 months	3 (3.53%)	2 (1.11%)	0 (0.00%)
- > 12 months	2 (2.35%)	0 (0.00%)	0 (0.00%)

Discussion

Pterygium is one of the common ophthalmic conditions in Thailand. However, the actual prevalence in Thailand has not been confirmed. It is well known that this condition is characterized by excessive fibrovascular proliferation on the exposed ocular surface, and is thought to be caused by increased ultraviolet light exposure from climatic factors and aggravated by microtrauma and chronic inflammation from environmental factors.¹⁵⁻²⁰ Despite the multi-factorial pathogenesis, surgery is the mainstay of treatment. The primary concern in pterygium surgery is a recurrence defined by regrowth of the fibrovascular tissue across the limbus and on to the cornea.²¹

The reported recurrence rates vary greatly not only among different surgical procedures but also different groups treated by the same procedure. To eliminate such variability, the same technique was carried out by the same surgeon throughout the study. With these variable controlled, and similar demographic data (Table 1.)

and sufficient follow-up procedure, this study can compare the role of three recent surgical techniques for primary pterygium in respect of recurrence rate and postoperative complications. Based on the study, patients in group A: BST had highest recurrence rate of 18.83%, patients in group B: PCSF had recurrence rate of 2.22% and patients in group C: CAT had the lowest recurrence rate of 1.14%. The recurrent rates in this study were similar to those previous studies including bare sclera procedure 24.0% to 82.0%,^{22,23} pedunculated conjunctival sliding flap reconstruction 1.6% to 25.0%^{10,24-26} and conjunctival autograft transplantation 5.0% to 10.0%.^{11,22} However, this study shows relatively lower recurrence rates, regardless the surgery techniques, possibly by the following explanations:

1. The study focus on selected cases with grade III primary pterygium only.
2. The bias of possible different surgical skill was reduced as only one surgeon performed the procedure.

3. The difference in environment, which was claimed to be an important factor for the recurrence, especially the day light exposure time.

4. In this study, all patients treated with surgery were well-educated the instruction to follow before and after surgery, especially wearing sun-blocking, wind-shield glasses and avoiding themselves from exposure to sunlight, dust, wind and smoke as well as outdoor working.

However, the ideal surgical technique should be a procedure that effectively prevents recurrences without the development of complications. Of the procedures used most often to treat advanced pterygium, the one that comes closest in achieving this goal is probably conjunctival autograft transplantation,^{27,28} which was also confirmed by this study. Nonetheless, recurrences were not completely eliminated, especially in patients living in areas with high levels of ultraviolet light.²

Conclusions

Based on this study, primary pterygium excision with pedunculated conjunctival sliding flap reconstruction or conjunctival autografting transplantation is an effective procedure to prevent a recurrence in patients better than bare sclera technique. Although they were more difficult and time-consuming, cosmetic and surgical results were found superior. However, pedunculated conjunctival sliding flap reconstruction may be an alternative as it is easy to perform, especially for complicated cases with bilateral heads or patients who require subsequent surgery.

Acknowledgement

Special thank for all physicians at Sawanpracharak Hospital, Nakhonsawan, who participated in treating these patients.

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การเปรียบเทียบผลของการผ่าตัดลอกต้อเนื้อที่เป็นครั้งแรก โดยวิธีผ่าตัดแบบธรรมดา, วิธีการผ่าตัดโยกเย็บตามาเย็บเสริม และวิธีการผ่าตัดแบบใช้เยื่อบุตาเลาะมาเย็บเสริม

นายแพทย์ณรงค์ ตั้งภากรณ์
กลุ่มงานจักษุวิทยา โรงพยาบาลสวรรค์ประชารักษ์ จังหวัดนครสวรรค์

บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาเปรียบเทียบผลวิธีการผ่าตัดลอกต้อเนื้อที่เป็นครั้งแรกด้วยวิธี การผ่าตัดแบบธรรมดา Bare sclera (BST), วิธีการผ่าตัดโยกเย็บตามาเย็บเสริม (Pedunculated conjunctival sliding flap: PCSF) และวิธีการผ่าตัดแบบใช้เยื่อบุตาเลาะมาเย็บเสริมในการลอกต้อเนื้อ (Conjunctival autografting transplantation: CAT)

ลักษณะการศึกษา: เป็นการศึกษาแบบ Prospective randomized case control study

วิธีการศึกษา: ทำการศึกษาเพื่อเปรียบเทียบภาวะแทรกซ้อน และการเกิดเป็นซ้ำหลังผ่าตัดของวิธีการผ่าตัดลอกต้อเนื้อที่เป็นครั้งแรกระดับ III ที่ทำในปัจจุบันทั้ง 3 วิธีโดยจักษุแพทย์คนเดียวที่ รพ.สวรรค์ประชารักษ์ โดยศึกษาในผู้ป่วยทั้งหมด 263 คน จำนวน 263 ตา โดยวิธีสุ่มแบ่งผู้ป่วยมารับการรักษาทั้ง 3 วิธีโดยมีผู้ป่วย 85 คน จำนวน 85 ตา ในกลุ่มแรก (BST), ผู้ป่วย 90 คน จำนวน 90 ตา ในกลุ่มที่สอง (PCSF) และกลุ่มที่สามมีผู้ป่วย 88 คน จำนวน 88 ตา ที่ได้รับการผ่าตัดแบบ CAT ผู้ป่วยทั้งหมดได้รับการติดตามผลของการผ่าตัดอย่างน้อยเป็นเวลา 1 ปี

ผลการศึกษา: พบจำนวนการเกิดเป็นซ้ำหลังผ่าตัดจำนวน 16 ราย (18.83%) ในกลุ่มแรก (BST) และพบจำนวนผู้ป่วยที่เกิดเป็นซ้ำ 2 ราย (2.22%) ในกลุ่มที่สอง (PCSF) และสำหรับวิธีที่สาม (CAT) พบการกลับมาเป็นซ้ำหลังผ่าตัดเพียงรายเดียวเท่านั้น (1.14%) โดยในการศึกษาครั้งนี้ ไม่มีรายงานภาวะแทรกซ้อนที่เป็นอันตรายต่อการมองเห็นของผู้ป่วยหลังการผ่าตัดลอกต้อเนื้อทุกรายไม่ว่าวิธีใดก็ตาม

สรุป: การผ่าตัดลอกต้อเนื้อวิธี BST มีประสิทธิภาพต่ำกว่าในการป้องกันการเกิดเป็นซ้ำหลังการผ่าตัดลอกต้อเนื้อที่เป็นครั้งแรก และวิธีการผ่าตัดลอกต้อเนื้อ PCSF หรือวิธี CAT โดยมีประสิทธิภาพสามารถป้องกันการกลับมาเป็นซ้ำของโรคต้อเนื้อได้ และมีความปลอดภัย โดยปราศจากภาวะแทรกซ้อนที่สำคัญหลังการผ่าตัด

คำสำคัญ: ต้อเนื้อ, การเปรียบเทียบ, การลอกต้อเนื้อ, การกลับเป็นซ้ำ, ภาวะแทรกซ้อน