

Electrocoagulative Surgical Procedure for Treatment of Conjunctivochalasis

Xing-Ru Zhang¹, Zhen-Yong Zhang¹, Matthew R. Hoffman²

¹Department of Ophthalmology, Putuo Hospital, Shanghai Chinese Traditional Medicine University, Shanghai, China

²Department of Surgery, University of Wisconsin-Madison School of Medicine and Public Health, Madison, Wisconsin

The purpose of this study was to present a new procedure to treat symptomatic conjunctivochalasis (CCh) and to evaluate its efficacy. Forty-two patients with symptomatic CCh refractory to medical management were included on this study. Twenty-two patients (n = 32, eyes; n = 14 women and n = 8 men) underwent the new electrocoagulation procedure (Group I). Twenty patients (n = 27 eyes; n = 11 women and n = 9 men) underwent crescent-shaped conjunctiva resection (Group II). Ocular Surface Disease Index (OSDI) was used to evaluate ocular symptoms. There was a significant difference in mean and SD operation time between Group I (8.67 ± 2.07 minutes) and Group II (20.45 ± 3.98 minutes; $P < 0.0001$). OSDI scores (mean ± SD) were significantly lower in Group I (28.38 ± 3.14) than Group II (31.62 ± 3.17) at postoperative week 2 ($P = 0.0004$). No differences in OSDI scores were found between the 2 groups at postoperative week 4 ($P = 0.1749$) or 8 ($P = 0.1483$). OSDI scores were significantly lower at postoperative week 8 than at baseline in both Group I ($P = 0.0002$) and Group II ($P = 0.0011$). Electrocoagulation of the conjunctiva can successfully treat symptomatic CCh with earlier symptomatic attenuation and less operation time than traditional conjunctiva resection.

Key words: Conjunctivochalasis – Electrocoagulation – Conjunctiva

Conjunctivochalasis (CCh), defined as a redundant, loose, nonedematous, inferior bulbar conjunctiva interposed between the globe and the lower eyelid, tends to be bilateral and is more prevalent in older populations.^{1,2} It is a common cause of ocular

surface irritation, and its clinical significance is often overlooked.² For symptomatic occurrences, medical therapies are directed at suppressing ocular surface inflammation. When medical therapy fails, surgical intervention to remove the redundant conjunctiva is



Fig. 1 (A) A 62-year-old woman with conjunctivochalasis. **Conjunctival folds** are evident on the lower eyelid margin (arrow). (B) At 7 days after surgery; the arrow indicates the coagulation point. (C) At 90 days after surgery, no conjunctival fold is evident on the lower eyelid margin.

necessary. Traditional surgical techniques include excision of the bulbar conjunctiva^{3,4} or suture fixation of the conjunctiva to the sclera.⁵ Amniotic membrane transplantation has been successful in facilitating reconstruction of the conjunctival surface after removal of the **loose conjunctiva**.^{3,6} These procedures all require suture; accordingly, suture-related disadvantages and complications, such as postoperative discomfort, **abscess** formation, granuloma formation, and **giant papillary conjunctivitis**, cannot be avoided. We describe an alternative surgical technique, termed conjunctiva electrocoagulation, that does not require sutures and is still an effective treatment for CCh.

Methods

Patients

Forty-two patients (n = 24 women and n = 18 men) with a mean \pm SD age of 73 ± 7.46 years (range, 48–90 years) were included on this study. All had symptomatic CCh that was refractory to medical management. **Twenty-two patients** (n = 32 eyes; n = 14 women and n = 8 men) underwent the experimental electrocoagulation procedure (Group I). **Twenty patients** (n = 27 eyes; n = 11 women and n = 9 men) underwent crescent-shaped conjunctiva resection (Group II). Prior to participation, procedures were fully explained, and consent was obtained. This study followed the tenets of the Declaration of Helsinki for research involving human participants and received approval from the Putuo Hospital Office of Research Ethics, Shanghai Chinese Traditional Medicine University.

Surgical procedures

For the electrocoagulation procedure, the conjunctiva was anesthetized by using 0.5% Alcaine eye drops

(Alcon, Belgium). Eyes were exposed, and patients were told to look straight ahead. The loose conjunctiva was pushed downward, and the folded conjunctiva was kept 5 mm posterior from the limbus. **Redundant conjunctiva** was gathered together without influencing eye movement and was coagulated at its root by an electric coagulator (Bausch & Lomb Incorporated, Rochester, NY, USA) at 3 to 6 points. Electrocoagulation parameter settings were as follows: energy, 20% to 40%; duration, 0.1 to 2 seconds (Fig. 1).

For the crescent-shaped conjunctiva resection procedure, the conjunctiva was anesthetized by using 0.5% Alcaine eye drops. The eye was then exposed with a speculum and the loose conjunctiva was pushed downward and the folded conjunctiva was kept 5 mm posterior from the limbus. Redundant conjunctiva was gathered without influencing eye movement and then was excised like a crescent. The incision was approximated with a 10-0 nylon silk suture. Sutures remained in place for 10 to 14 days, during which 0.5% gentamicin and artificial eye drops were administered 4 times per day.

Clinical evaluation

The **Ocular Surface Disease Index (OSDI)** was used to evaluate ocular symptoms.⁷ We modified this questionnaire into 9 questions as described by Li *et al.*⁸ The OSDI questionnaire is graded on a scale from 0 to 4, for which 0 indicates none of the time, 1 indicates some of the time, 2 indicates half of the time, 3 indicates most of the time, and 4 indicates all of the time. The total score is calculated by using the following formula: $OSDI = [(\text{sum of scores for all questions answered}) \times 100] / [(\text{total number of questions answered}) \times 4]$. Patients were evaluated at 2, 4, and 8 weeks after surgery.

Table 1 OSDI scores before and after surgery at 3 time points

Group	Eyes	OSDI scores ^a				<i>P</i> ^b
		Baseline	2 weeks	4 weeks	8 weeks	
I	32	19.52 ± 16.55	28.38 ± 3.14	11.80 ± 1.40	7.80 ± 1.38	0.0002
II	27	19.57 ± 17.03	31.62 ± 3.17	11.09 ± 1.42	8.19 ± 1.44	0.0011
		<i>t</i> = 0.0114, <i>P</i> = 0.9910	<i>t</i> = 3.200, <i>p</i> = 0.0004	<i>t</i> = 1.406, <i>p</i> = 0.1749	<i>t</i> = 1.503, <i>p</i> = 0.1483	

OSDI, ocular surface disease index.

^aData presented as mean ± SD.

^bDifferences between baseline and postoperative week 8.

Statistical analysis

All statistical analyses were performed by using Stata 10.0 software (Stata Corp, College Station, Texas). A Shapiro-Wilk test was used to confirm normal distribution. *T* tests were then performed to determine if there were significant differences between groups. A significance level of $\alpha = 0.05$ was used for all comparisons.

Results

Operation time and ocular surface symptoms evaluation

There was a significant difference in mean ± SD operation time between Group I (8.67 ± 2.07 minutes) and Group II (20.45 ± 3.98 minutes; *t* = 16.1751, *P* < 0.0001). There was no difference in OSDI scores for mean ± SD ocular surface symptoms at baseline between Group I and Group II. OSDI scores were significantly lower in Group I (28.38 ± 3.14) than in Group II (31.62 ± 3.17) at postoperative week 2 (*P* = 0.0004). No differences in OSDI scores were found between the 2 groups at postoperative weeks 4 and 8. OSDI scores were significantly lower at postoperative week 8 than at baseline in both Group I (*P* = 0.0002) and Group II (*P* = 0.0011; Table 1).

Discussion

Though the clinical significance of CCh is often underestimated, it can cause distressing symptoms to the patient. Compression of the redundant conjunctiva during eyelid blinking or closure can cause a foreign body sensation.^{1,2} Subconjunctival hemorrhage can occur as a result of destruction of bent vessels in the conjunctival folds.⁹ Epiphora can occur secondary to interference with lower tear meniscus formation and occlusion of the inferior punctum by conjunctival folds on the margin of the lower eyelid.² Dry eye symptoms are often seen in

patients with CCh because of tear film instability caused by the relaxed conjunctiva.¹⁰ Because the symptoms in CCh are caused by mechanical problems subsequent to folded conjunctiva, alleviation of the symptoms can only be achieved through surgical removal. Hughes¹ successfully treated this condition by removing crescent-shaped section of the conjunctiva under the lower eyelid and closing the incision with a continuous black silk suture. This approach has been widely used and demonstrated to be successful^{2,9}; however, it is difficult to determine how much conjunctiva should be excised before the operation. Liu² has cautioned that overzealous resection of the conjunctival tissue may result in a compromised lower fornix, potentially restricting mobility or causing corneal problems. Inadequate resection would leave loose conjunctiva remnants, which would likely not completely eliminate patient symptoms. Although this difficulty cannot be completely avoided in our procedure, a second procedure is easier to perform if necessary to correct any residual issues. Secondly, the suture required to close the incision in a traditional conjunctiva resection must stay in for 10 to 14 days, which is longer than for other ophthalmic surgeries. This difference may be due to a specific healing mechanism of loose conjunctiva.

Similar to suture fixation of the conjunctiva to the sclera, electrocoagulation allows local inflammation to occur, and the conjunctiva attaches to the subconjunctival Tenon's capsule. Because the coagulation point is located 5 mm posterior to the limbus, and because the anatomic depth of the lower fornix from the limbus is no deeper than 8 mm, no restriction of lower gaze occurs. Also, our procedure carries no risks of eye perforation or suture-related complications.

We observed in this study that the OSDI score in patients undergoing conjunctiva resection is significantly higher than in those undergoing the coagulation procedure at postoperative week 2. This may

be due to pain caused by the incision or to suture-related complications. By postoperative week 4, a point by which one could expect the above complications to resolve, patients in the 2 groups reported predictably comparable OSDI scores. Decreasing recuperative time by 2 weeks is clinically meaningful for patients. Moreover, because this procedure demands no surgical microscopy, it can be easily done in the outpatient department with shorter operative time.

In this study, we successfully treated CCh with electrocoagulation of the conjunctiva inferior to the limbus. Specific advantages of this procedure, notably the lack of suture required, decreased operative time, and decreased healing time, are presented and compared with traditional conjunctiva resection and suture fixation of the conjunctiva to the sclera. Further studies to evaluate this procedure are warranted and could investigate additional factors, such as the height of the tear meniscus and tear break-up time.

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