

# High-Frequency Radiowave Electrosurgery for Persistent Conjunctival Chemosis following Cosmetic Blepharoplasty

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**Background:** Conjunctival chemosis often complicates cosmetic lower eyelid blepharoplasty. With the conventional approaches, including medical or surgical methods, irritative symptoms are produced and complete recovery is delayed. The authors introduced a new simple surgical approach for treating persistent conjunctival chemosis following cosmetic blepharoplasty.

**Methods:** Eleven patients (12 eyes) with persistent chemosis lasting 6 weeks to 2 years were recruited for this study. Subconjunctival coagulation on the edematous conjunctiva was performed with a fine-needle electrode using a high-frequency radiowave electrosurgical unit in coagulation mode, and subconjunctival fluid drainage was performed by gentle pressure with a wet applicator. After the procedures, topical steroid and antibiotic eye drops were given four times per day for 1 month.

**Results:** Chemosis in 11 eyes (91.7 percent) was resolved within 1 week and remained stable for a follow-up period of 6 months. Recurrence of chemosis and complications related to the procedure were not noted during the follow-up.

**Conclusions:** A surgical approach with high-frequency radiowave electrosurgery produced a significant reduction of persistent chemosis and provided prompt symptom improvement. This procedure can be considered as a simple and safe method of treating persistent conjunctival chemosis following cosmetic blepharoplasty.

**CLINICAL QUESTION/LEVEL OF EVIDENCE:** Therapeutic, IV. (*Plast. Reconstr. Surg.* 133: 1336, 2014.)

Conjunctival chemosis is defined as transudative edema of the conjunctiva and is characterized by visible swelling of the conjunctiva. Conjunctival chemosis often complicates cosmetic lower eyelid blepharoplasty and is especially bothersome for patients, because it provokes irritative symptoms and affects cosmesis, and for physicians, who have to address postoperative patient care. In addition to symptoms of irritation, foreign body sensation, pain, epiphora, and decreased vision, patients are often concerned about the gelatinous material protruding from their eyes. Typically, chemosis resolves spontaneously early in the postoperative period, but for some patients, conjunctival chemosis may persist.<sup>1-3</sup>

There is no standard treatment for persistent conjunctival chemosis following cosmetic

blepharoplasty. Conservative treatments, including lubrication, ocular decongestants, steroid ointment or drops, pressure patching, and oral steroids, have been attempted. However, the effects of medical treatments can be limited, and when they fail, surgical treatment becomes necessary. The surgical therapies for persistent conjunctival chemosis include silicone bolster in the lower fornix, lymphatic drainage, limbal peritomy

**Disclosure:** *The authors have no financial interest to declare in relation to the content of this article.*

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*Received for publication October 25, 2013; accepted December 2, 2013.*

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DOI: 10.1097/PRS.0000000000000175

conjunctivoplasty, drainage conjunctivotomy, and perilimbal needle manipulation.<sup>4-6</sup>

In our previous study, we introduced a new simple surgical approach with high-frequency radiowave electrosurgery to treat conjunctivochalasis.<sup>7</sup> The radiowave surgical techniques provided a significant reduction of conjunctivochalasis and an improvement of symptoms. We describe a simple surgical approach with high-frequency radiowave electrosurgery to treat persistent conjunctival chemosis following cosmetic blepharoplasty that, to the authors' knowledge, has not been reported.

## PATIENTS AND METHODS

This prospective, noncomparative, interventional case series analysis was performed in adherence with the Declaration of Helsinki and after approval from the Institutional Review Board and Ethics Committee of the Kangbuk Samsung Hospital in Seoul, Republic of Korea.

From July of 2009 to June of 2012, 11 patients (12 eyes) were transferred and diagnosed with persistent conjunctival chemosis after lower eyelid blepharoplasty and underwent high-frequency radiowave electrosurgery. All patients had severe irritative ocular symptoms lasting 6 weeks to 2 years (mean, 6.6 months) after cosmetic blepharoplasty despite conventional medical management including topical lubrication drops or ointments, steroids, and antibiotics. Dry eye syndrome with multiple punctate corneal erosions on fluorescein stain examination was observed in seven cases preoperatively. The diagnosis of persistent conjunctival chemosis was based on observation using slit-lamp biomicroscopy.

One patient (patient 3) had a history of multiple operations (transconjunctival fat removal and lateral canthoplasty 2 years previously and additional lower blepharoplasty 7 months previously), with diffuse chemosis and multiple corneal and conjunctival erosions. In temporal bulbar conjunctiva, severe conjunctival injection with fibrotic conjunctival scar was observed, although there was no history of conjunctival surgery. Ectropion of the lower eyelid on the eye was noted. In this case, it was felt that ectropion caused by excessive skin excision might lead to conjunctival exposure and chemosis.

Surgery was deferred for patients who presented with severe inflammatory or allergic conjunctivitis and had a history of head and neck surgery or radiation therapy for head and neck cancer treatment. Patients with improved chemosis after medical treatment were excluded as well. Clinical data are summarized in Table 1.

## Surgical Technique (Choi Procedure)

Before surgery, the alternatives, risks, and benefits were fully explained to the patients and written informed consent was obtained. All procedures were performed under an operating microscope by one of the authors (C.Y.C.). After preparing and draping the eye and inserting a lid speculum, drops of 0.5% proparacaine were instilled to the ocular surface for anesthesia.

The extent of conjunctival swelling was confirmed by grabbing the conjunctiva with smooth forceps. A fine-needle electrode (Fine Insulated Coated Needle, 004 Super Fine) was used to penetrate the conjunctiva of the edematous area for subconjunctival fluid drainage. Next, subconjunctival coagulations on the involved area were performed with the fine-needle electrode using a high-frequency radiowave electrosurgical unit (Ellman Surgitron; Ellman International, Inc., Hewlett, N.Y.) in coagulation mode. The output power intensity of the radiofrequency generator was adjusted to produce shrinkage of the redundant conjunctival tissues without charring the tissue. A power setting of 0.5 to 1 was used on the majority of patients. While the electrode was being inserted into the target conjunctiva, coagulation was not operated for subconjunctival fluid drainage. Coagulation was conducted as the electrode was pulled out (Fig. 1). Approximately 10 to 20 linear segmental subconjunctival coagulations, 1 to 2 mm in length, were made in horizontal and vertical directions, depending on the severity and extent of the conjunctival chemosis, and subconjunctival fluid drainage was performed by gentle pressure with a wet applicator. Caution was taken to not cauterize the vessels or the conjunctiva close to the limbus to avoid corneal and underlying globe damage. Antibiotic eye drops (0.5% levofloxacin) were applied at the end of the procedure. None of the patients required a patch or shield. The surgical procedure is shown in Video 1. (See Video, Supplemental Digital Content 1, which demonstrates the surgical method using the high-frequency radiowave electrosurgical unit, <http://links.lww.com/PRS/A999>.)

## Postoperative Care

After the procedure, patients received a topical steroid eye drop (0.1% fluorometholone) and an antibiotic eye drop (0.5% levofloxacin) four times per day for 1 month. They were examined postoperatively after 1 day, 1 week, 1 month, 3 months, and 6 months. During each postoperative visit, changes of the patient's symptoms were

**Table 1. Clinical Data of 12 Patients Presenting with Persistent Chemosis**

Patient	Age (yr)	Sex	Side	History	Chemosis Duration	Chemosis Location and Shape/Color	Associated Problem	Follow-Up (mo)
1	68	F	R	Transcutaneous lower blepharoplasty	6 mo	Nasal		9
2	51	F	L	Upper and transcutaneous lower blepharoplasty with lateral canthoplasty	6 mo	Nasal and temporal	Dellen, DES	12
3	43	M	L	Transconjunctival lower blepharoplasty (2 yr ago), transcutaneous lower blepharoplasty with lateral canthoplasty (7 mo ago)	2 yr	Temporal	Ectropion, DES	18
4	23	F	R	Lower blepharoplasty with cosmetic lateral canthoplasty	6 wk	Temporal		6
5	26	F	R	Lower blepharoplasty with cosmetic lateral canthoplasty	2 mo	Temporal		6
6	56	M	L	Transcutaneous lower blepharoplasty	9 mo	Nasal and temporal	DES	6
7	54	F	L	Lower blepharoplasty	3 mo	Nasal and temporal		6
8	45	M	R	Transcutaneous lower blepharoplasty	4 mo	Temporal	DES	6
9	45	M	L	Transcutaneous lower blepharoplasty	4 mo	Temporal	Dellen, DES	6
10	58	F	R	Lower blepharoplasty	8 mo	Nasal and temporal	DES	6
11	57	F	R	Lower blepharoplasty	6 mo	Nasal	DES	6
12	63	F	R	Transcutaneous lower blepharoplasty	4 mo	Nasal		6

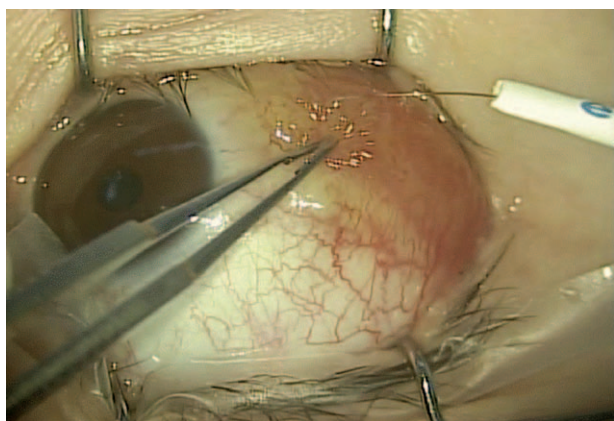
F, female; M, male; R, right; L, left; DES, dry eye syndrome with multiple punctate corneal erosions.

recorded, and routine examinations and photography were performed.

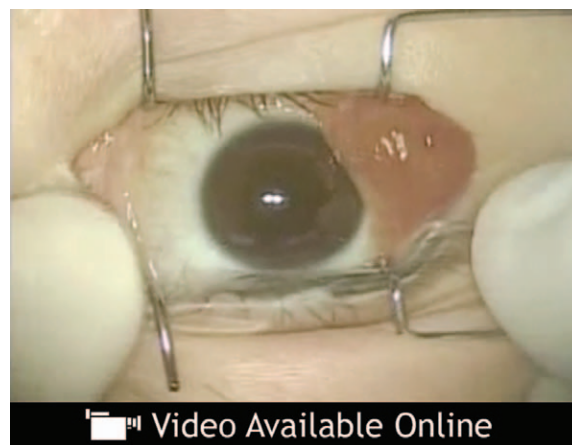
## RESULTS

The surgical approach for persistent conjunctival chemosis with high-frequency radio-wave electro-surgery was well tolerated by all

patients. The surgical procedure took approximately 10 minutes, and none of the patients complained about severe pain during the procedure. The technique provided excellent results with relief of symptoms beginning on postoperative day 1 (Fig. 2).

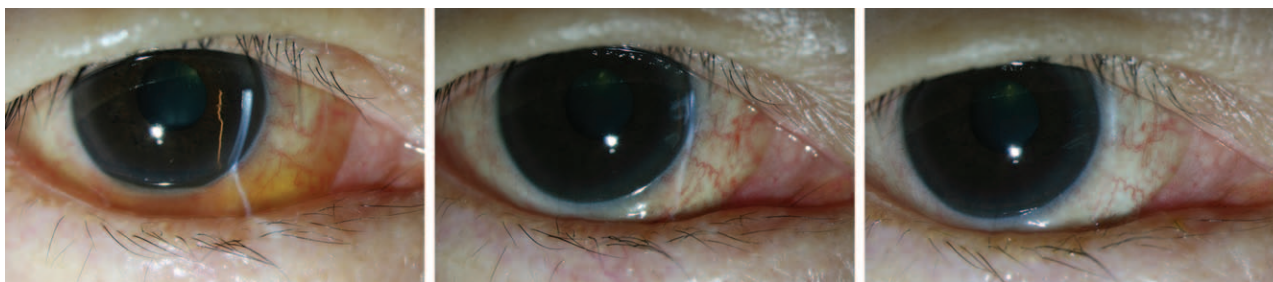


**Fig. 1.** Surgical procedure of high-frequency radio-wave electro-surgery for persistent chemosis. Subconjunctival coagulations were performed with a fine-needle electrode. Caution should be taken to not damage the cornea and underlying globe.



**Video 1.** Supplemental Digital Content 1 demonstrates the surgical method using the high-frequency radio-wave electro-surgical unit, <http://links.lww.com/PRS/A999>.





**Fig. 2.** Patient 1. High-frequency radiowave electrosurgery for persistent conjunctival chemosis was performed in a 68-year-old woman. (Left) Preoperative appearance, yellowish diffuse conjunctival chemosis. (Center) One week postoperatively, decreased edema is shown. (Right) One month postoperatively.

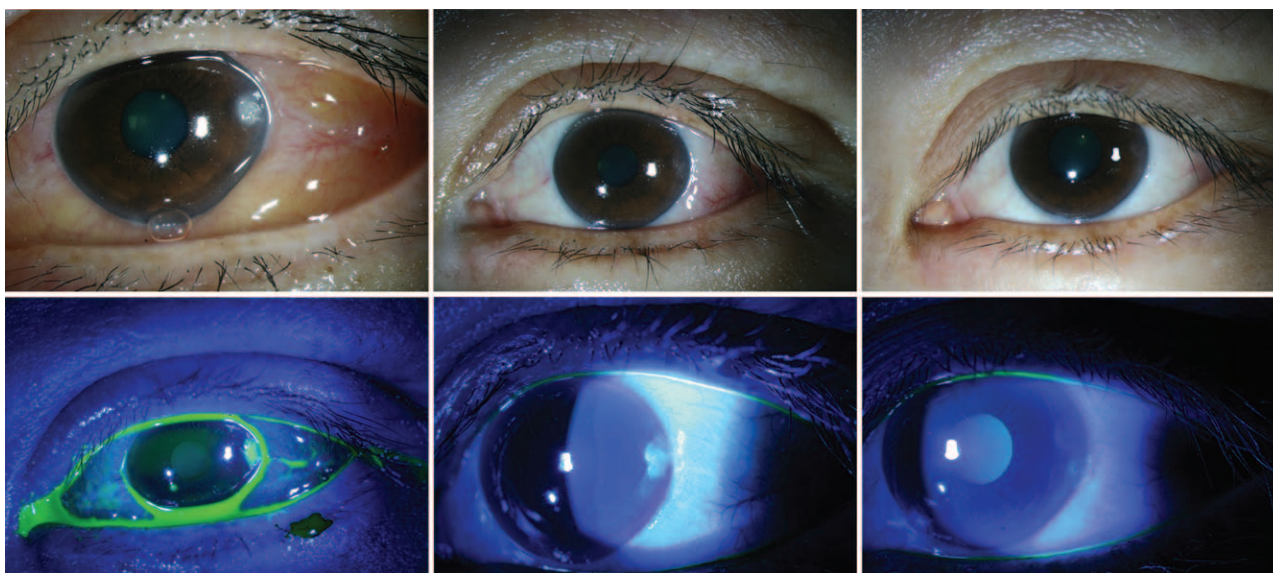
Chemosis of 11 patients was resolved within 1 week and remained stable for a follow-up period of 6 months. Recurrence of chemosis and complication related to the procedure were not noted during the follow-up visits. There was no need for additional surgery for recurrence or inadequate treatment. Recovery of chemosis was delayed in two patients (patients 2 and 9) with dellen, a corneal complication from unstable tear film caused by the adjacent swelling of conjunctiva. At the final follow-up, the chemosis and corneal complications had resolved completely in both patients (Fig. 3).

The patient with a history of chemosis and injection (patient 3) needed a longer recovery period of approximately 3 months for resolution of hyperemia and fibrotic scar on conjunctiva

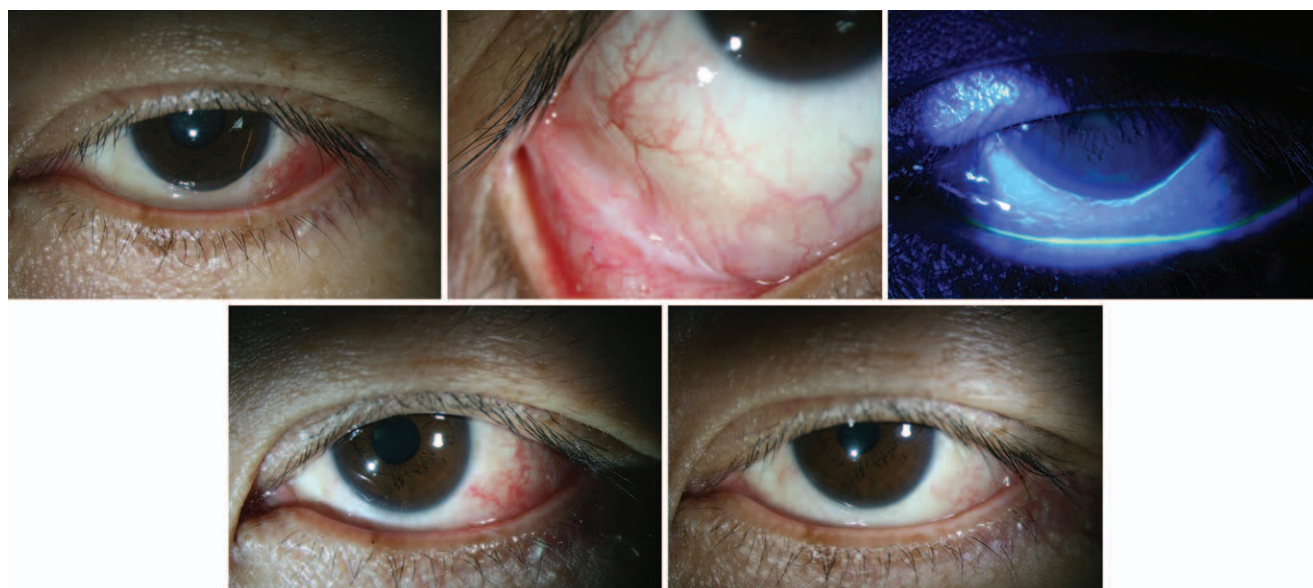
(Fig. 4). In contrast, the patient with a relatively short history of chemosis (patient 4) did not show any sequelae of chemosis (Fig. 5).

### DISCUSSION

Edema is defined as excess fluid in a tissue. Chemosis refers to conjunctival edema and thus identifies the presence of excess interstitial fluid in the substantia propria. Conjunctival chemosis is a common finding in the immediate days after eyelid surgery because of accumulation of fluid in the subconjunctival space. Weinfeld et al., in a chart review of 312 patients with primary bilateral lower transcutaneous blepharoplasty, reported that the incidence of chemosis was 11.5 percent.<sup>8</sup>



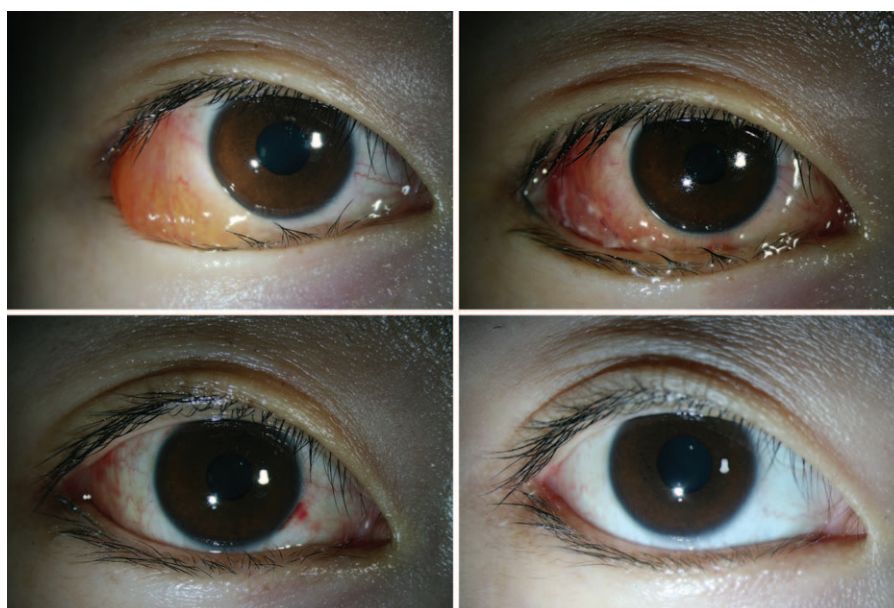
**Fig. 3.** Patient 2. High-frequency radiowave electrosurgery for persistent conjunctival chemosis was performed in a 51-year-old woman. (Above, left) Preoperative appearance, diffuse yellowish chemosis, and white concave corneal lesion (dellen) at temporal cornea. (Below, left) Photograph of fluorescein staining shows corneal dellen. (Center) One month postoperatively, markedly improved chemosis but partial hyperemia and corneal dellen remained on fluorescein stain photograph. (Right) Three months postoperatively, conjunctival lesion and corneal dellen are resolved.



**Fig. 4.** Patient 3. High-frequency radiowave electrocauterization for persistent conjunctival chemosis was performed in a 43-year-old man. (Above, left) Preoperative appearance; chemosis and hyperemia at temporal bulbar conjunctiva, and mild ectropion are noted. (Above, center) Fibrotic scar tissue as a sequela of previous transconjunctival blepharoplasty. (Above, right) Preoperatively, multiple corneal and conjunctival erosions are shown on fluorescein staining examination. (Below, left) One month postoperatively, a decrease is noted but hyperemia remains. (Below, right) Six months postoperatively.

Numerous mechanical and physiologic factors have been found to contribute to the development of postoperative chemosis. Disruption of existing conjunctival and skin lymphatics during dissection and cauterization may cause accumulation of extracellular fluid, resulting in conjunctival chemosis.

Severe or prolonged postoperative inflammation may result in scarring of lymphatics and poor lymph drainage of the conjunctiva.<sup>4</sup> Periorbital edema and facial edema after surgery may cause regional lymphatic stasis and lead to chemosis. Desiccation induced by intraoperative exposure of conjunctiva



**Fig. 5.** Patient 4. High-frequency radiowave electrocauterization was performed for persistent conjunctival chemosis in a 23-year-old woman. (Above, left) Preoperative appearance shows marked conjunctival chemosis. (Above, right) One day postoperatively. (Below, left) One week postoperatively. (Below, right) One month postoperatively.



and postoperative lagophthalmos may also contribute to conjunctival chemosis.<sup>8</sup> In general, conservative treatments are instituted. The first step in management is the liberal use of wetting drops and ophthalmic lubricating ointment. Next, ocular decongestants and ophthalmic steroid drops and ointment can be administered. For more severe cases, pressure patching with or without a circumferential elastic bandage head wrap may be applied. In most cases, chemosis resolves by conservative treatments in the early postoperative period. However, some patients develop persistent conjunctival chemosis, which requires further attention.

Some surgical treatments for persistent conjunctival chemosis have been introduced. Enzer and Shorr proposed a modified Snellen suture to restore the lower conjunctival fornix.<sup>5</sup> Thakker et al. used regional conjunctivoplasty in the area of chemosis. Although these procedures achieved significant improvement in their report, the placement of sutures in the conjunctiva might incite a minimal amount of risk with regard to infection and has been shown to induce more inflammation.<sup>9,10</sup> Inflammation may lead to poor lymph drainage of the conjunctiva and interfere with improvement of chemosis. Sutures also introduce certain disadvantages, including prolonged operating time and patient discomfort such as foreign body sensation.

Some sutureless techniques for persistent chemosis have been proposed to avoid problems related to suture. Jones et al. introduced snip conjunctivoplasty for postoperative conjunctival chemosis.<sup>11</sup> They excised a small elliptical strip of conjunctiva and the tenon capsule at the inferior aspect of the chemotic conjunctiva. This approach may achieve sufficient fluid release. However, this operation does not use suture or coagulation for tissue adhesion and may leave a potential space in which extracellular fluid can accumulate. Perilimbal needle manipulation, reported by Cheng and Lu, also may rest the potential space and induce an aesthetic problem such as conjunctival hemorrhage for several days after the procedure.<sup>6</sup> Moesen and Mombaerts used tetracycline as a sclerosant inducing an inflammatory reaction, but reported that patients might suffer from a burning pain for a few days after the injection.<sup>12</sup>

In this study, we applied a simple surgical approach with high-frequency radiowave electro-surgery for persistent chemosis following cosmetic blepharoplasty. Radiofrequency surgery produced a significant reduction of persistent chemosis and an improvement of symptoms as in conjunctivochalasis in a previous study.<sup>7</sup> Penetration to the subconjunctival space at the chemotic area using

a fine-needle electrode allowed subconjunctival fluid to drain. High-frequency radiowave electro-surgery produces heat and makes the intracellular water boil, thereby increasing the inner cellular pressure to the point of cell lysis. This phenomenon, called cellular volatilization, produces coagulation and shrinkage of the target tissues.<sup>13</sup> Coagulation results in tissue adhesion between the substantia propria and the conjunctival epithelium, which limits the potential space for lymphatic or extracellular fluid to accumulate.<sup>4</sup> Also, shrinkage of the conjunctiva reduces the redundant conjunctival tissue and tightens its surface area, which may further reduce the chance of reaccumulation of subconjunctival fluid.<sup>11</sup>

High-frequency radiowave electro-surgery removed persistent conjunctival chemosis completely in this case series. This procedure produced excellent results, with relief of symptoms and improvement of appearance beginning on the first day after surgery. It required a short surgical time and was well tolerated and resulted in less postoperative discomfort for the patients. No notable complications occurred in this study. Our results with high-frequency radiowave electro-surgery for persistent chemosis were excellent. However, further prospective controlled studies are needed to confirm the efficacy of this approach.

Unfortunately, the recovery of chemosis was delayed in two patients with dellen formation, a corneal problem, compared with other patients. The persistent conjunctival chemosis with the corneal complication of dellen warrants early surgical intervention. In the treatment for persistent chemosis after blepharoplasty, high-frequency radiowave electro-surgery was usually performed at the conjunctiva in the interpalpebral fissure region where the chemosis was most prominent, which was different from conjunctivochalasis treatment. For most conjunctivochalasis cases, surgical success is achieved with subconjunctival coagulation of the inferior bulbar conjunctiva, which is covered by the lower eyelid. As the conjunctival space in the interpalpebral fissure is important from an aesthetic point of view, the surgical procedure should adopt a less traumatic technique for cosmetic outcome, minimizing conjunctival surface damage. In this regard, subconjunctival coagulation with high-frequency radiowave electro-surgery might be the first surgical treatment option for persistent chemosis from cosmetic blepharoplasty.

Most elderly patients undergo lower eyelid blepharoplasty caused by aging changes in periocular tissue; therefore, dry eye syndrome and degenerative ocular surface such as conjunctivochalasis

can be observed easily. Patients enrolled in the present study were mostly elderly, aged 40 years or older, except for a small number of younger patients with a short duration. Younger patients showed diffuse elevation and yellowish discoloration in most cases. In patient 3, with a longer period of surface inflammation, severe conjunctival injection and conjunctival scar were observed. In seven patients in this study, marked dry eye syndrome was found with multiple corneal punctate erosions on the ocular surface.

The relationship between the eyelid and the ocular surface is important. The excessively tightened lids might play a role in increasing the mechanical friction on the ocular surface and cause tear instability, a cause of dry eye syndrome and multiple erosions of the cornea.

Ectropion or other eyelid malpositions can be one of the precipitating factors of conjunctival chemosis in lower eyelid blepharoplasty patients from chronic conjunctival exposure. If conjunctival chemosis persists in spite of conservative measures, high-frequency radiowave electrosurgery could be considered before corrective surgery for eyelid malposition because this procedure is much easier to perform, has low postoperative morbidity, and can provide prompt resolution of chemosis as shown in this case series.

## CONCLUSIONS

High-frequency radiowave electrosurgery produced a significant reduction of persistent chemosis and provided prompt symptom improvement. This procedure can be considered as a simple and safe method for treating persistent conjunctival chemosis following cosmetic blepharoplasty.

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## ACKNOWLEDGMENTS

The authors thank C. K. Choi, M.D., for guidance; and K. Y. Seo, M.D. (Department of Ophthalmology, Institute of Vision Research, Yonsei University College of Medicine), and Norihiko Yokoi, M.D. (Department of Ophthalmology, Kyoto Prefectural University of Medicine), for valued comments on the article.

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