

The Effect of Eyelid Cooling on Pain, Edema, Erythema, and Hematoma after Upper Blepharoplasty: A Randomized, Controlled, Observer-Blinded Evaluation Study

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Background: The purpose of this study was to investigate the efficacy of eyelid cooling to reduce postoperative pain, edema, erythema, and hematoma after upper blepharoplasty.

Methods: After bilateral upper blepharoplasty in 38 consecutive patients, one eyelid per patient was randomized for cooling with an ice pack, and the other eyelid was left uncooled. Pain was scored by the patients using a visual analogue scale (0 to 10) 1 hour and 1 day after surgery. Degree of edema, erythema, and hematoma were scored by the patients on a four-point rating scale (no, minimal, moderate, or severe) 1 hour, 1 day, 1 week, and 2 months after surgery. Light photography was obtained 1 week after surgery for scoring the degree of bruising on a four-point rating scale by a blinded observer.

Results: Pain did not differ between cooled and uncooled eyelids on the day of surgery. However, pain in cooled eyelids was significantly lower 1 day after surgery ($p = 0.046$), yet absolute pain scores were low (median, 0 and 0.5, on a scale of 10). Edema, erythema, or hematoma did not differ between cooled and uncooled eyelids on any of the time points studied.

Conclusions: Cooling of eyelids after upper blepharoplasty does not reduce edema, erythema, or hematoma of the eyelids, but reduces pain 1 day after surgery. However, because the degree of pain seems clinically irrelevant and because the majority of patients indicate that they have no preference for cooling over noncooling, eyelid cooling after upper blepharoplasty as a rule of thumb can be abandoned. (*Plast. Reconstr. Surg.* 135: 277e, 2015.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, II.

Dermatochalasis is a common condition of skin redundancy of the upper eyelids hanging on or even beyond the eyelashes, mostly caused by aging. This condition can be treated by upper blepharoplasty, one of the most common procedures performed by plastic surgeons. It is often advised that the eyelids be

cooled immediately after upper blepharoplasty and that cooling should be applied frequently in the first 24 hours postoperatively to reduce pain and minimize edema, erythema, and hematoma of the eyelids. However, thus far, there is no scientific evidence that cooling of the eyelids after upper blepharoplasty may reduce pain, edema, erythema, or hematoma. Moreover, cooling of the eyelids with ice packs has been described to cause an unpleasant sensation in some patients and bears the risk of frostbite injury when used inappropriately.¹

The aim of this study was to investigate whether cooling of the eyelids after upper blepharoplasty indeed leads to a reduction of postoperative pain, edema, erythema, and hematoma. To

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our knowledge, this is the first prospective randomized study evaluating these supposed effects of eyelid cooling after upper blepharoplasty.

PATIENTS AND METHODS

We conducted an observer-blinded, randomized, controlled trial, starting January 1, 2013. Patients with dermatochalasis, who were scheduled for bilateral upper blepharoplasty in the Bergman Clinics Heerenveen and Zwolle, were asked to participate in the study. The exclusion criterion was previous surgery on the upper eyelids. The study received approval from the Medical Ethical Committee of the University Medical Center Groningen. Written informed consent was obtained from all participants.

Sample size calculation was based on pain as the primary outcome measure, with a difference of one point on the pain visual analogue scale score considered to be clinically relevant. With an estimated standard deviation of 2.0, a power (β) of 0.80, and two-sided significance level (α) of 0.05, a minimum of 35 participants were to enroll in the study.

Bipolar coagulation-assisted orbital septo-blepharoplasty² was performed in all patients. In this technique, redundant skin and a very small rim of preseptal orbicularis muscle are removed. Subsequently, bipolar coagulation of the septum is executed, resulting in shrinkage of the septum and disappearance of the bulging fat compartments without removal of the fat.² Blepharoplasties were performed by one of four plastic surgeons working in the Bergman Clinics. Immediately after the operation, a randomization procedure determined that one of the two upper eyelids was to be cooled and that the other eyelid was to serve as an uncooled control. The upper eyelid allocated for cooling was cooled with a 10 × 12-cm ice pack (Heltiq; Koninklijke Utermöhlen NV, Wolvega, The Netherlands) for the first 30 minutes after the operation, another 15 to 20 minutes after returning home, and three times for 15 to 20 minutes on the first day after surgery. The other upper eyelid was not cooled at all.

One hour after surgery and on the first day after surgery, patients were asked to score the pain of both upper eyelids by means of a visual analogue scale ranging from 0 (no pain at all) to 10 (unbearable pain). In addition, 1 hour, 1 day, 1 week, and 2 months after surgery, patients scored the degree of edema, erythema, and hematoma of both upper eyelids on a four-point rating scale with the following response options: 0 = no,

1 = minimal, 2 = moderate, and 3 = severe swelling/redness/blue discoloration. The patients also subjectively indicated whether or not they observed or experienced less pain, swelling, redness, and blue discoloration. Furthermore, 1 week after surgery, patients scored which treatment they would have preferred for both eyelids: cooling, no cooling, or no preference at all. Lastly, 1 week after surgery, photographs of the upper eyelids of each patient were obtained so that the degree of bruising could be analyzed. The blinded first author (S.M.W.P.) scored the degree of bruising of each eyelid (photographs were shown separately and randomly) by using a four-point rating scale with the following response options: 0 = no, 1 = minimal, 2 = moderate, and 3 = severe bruising. The Wilcoxon signed rank test for nonparametric data was used to analyze whether scores for pain, edema, erythema, hematoma, and bruising were significantly different between the cooled and uncooled eyelids at different time intervals after upper blepharoplasty.

RESULTS

A total of 38 patients were included in this study, seven men (18.4 percent) and 31 women (81.6 percent). Ages ranged from 30 to 69 years, with a mean age of 53 ± 10.1 years.

Pain

One hour after upper blepharoplasty, the scores for pain were lower in cooled eyelids than in uncooled eyelids (median scores, 1.5 and 2.0, respectively, on a scale ranging from 0 to 10) (Fig. 1), but this was not significant ($p = 0.088$). One day after surgery, the scores were significantly lower in cooled eyelids compared with uncooled eyelids ($p = 0.046$; medians, $p = 0$ and $p = 0.5$, respectively).

Edema, Erythema, and Hematoma

One hour after upper blepharoplasty, the scores for edema and hematoma in cooled and uncooled eyelids were comparable ($p = 0.206$ and $p = 0.454$; median score, 1). The scores for erythema were lower in cooled eyelids compared with uncooled eyelids (median scores, 0 and 1, respectively) (Fig. 2), but this was not significant ($p = 0.073$). One day after surgery, the scores for edema, erythema, and hematoma in cooled and uncooled eyelids were comparable ($p = 0.134$, $p = 0.819$, and $p = 0.527$, respectively; median scores, 2, 2, and 1, respectively). One week after upper blepharoplasty, the scores for edema and

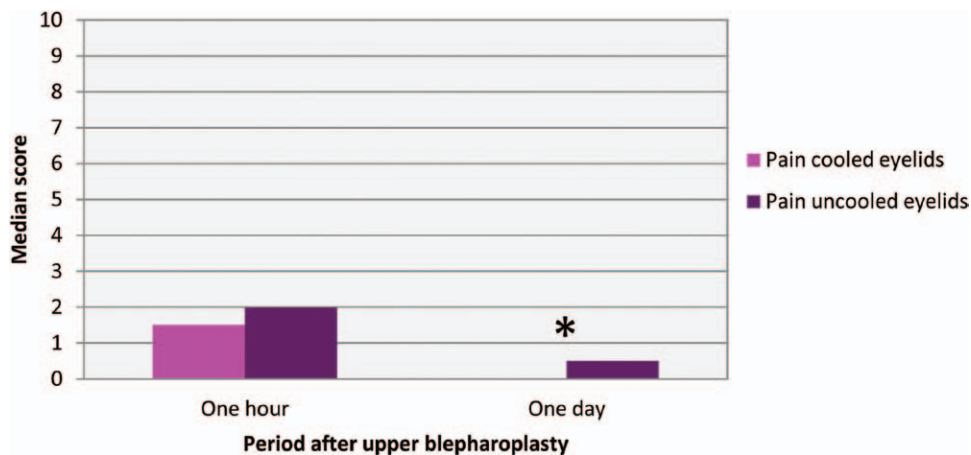


Fig. 1. Median scores for pain 1 hour and 1 day after upper blepharoplasty for cooled and uncooled eyelids (* $p = 0.046$).

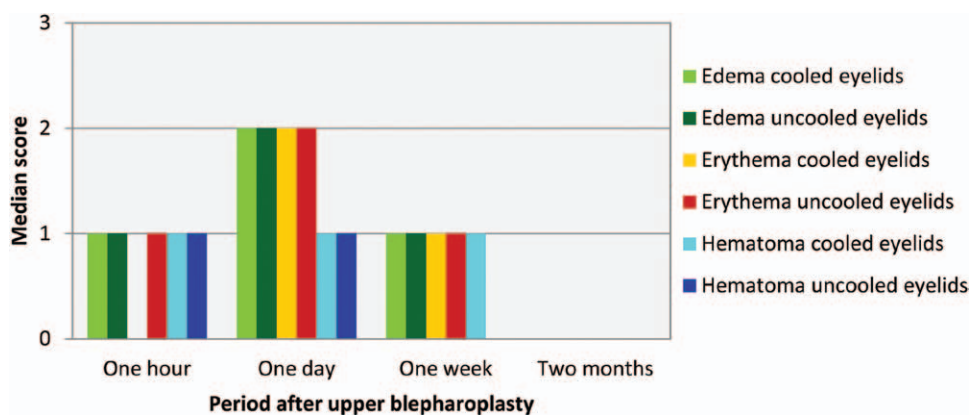


Fig. 2. Edema, erythema, and hematoma after upper blepharoplasty. There were no significant differences in scores for edema, erythema, or hematoma between cooled and uncooled eyelids at any of the time points studied.

erythema in cooled and uncooled eyelids were comparable as well ($p = 0.705$ and $p = 0.527$; median score, 1). The scores for hematoma were higher in cooled eyelids than in uncooled eyelids (median scores, 1 and 0, respectively), but this was not significant ($p = 0.705$). Two months after surgery, the scores for edema and erythema in cooled and uncooled eyelids again were comparable ($p = 0.317$ and $p = 317$; median score, 0). At this time point, no hematomas were noted.

Observer’s Rating

After 1 week, scores for bruising in cooled and uncooled eyelids, based on analysis of light photography, were comparable ($p = 0.589$; median score, 2). In two patients, there was a marked difference (two points) between both eyelids, for one patient in favor of the cooled eyelid and in the other patient in favor of the uncooled eyelid (Fig. 3). In four patients, there was a slight

difference (one point) between both eyelids, for three patients in favor of the cooled eyelid and in one patient in favor of the uncooled eyelid. In all other patients, there was no difference between the scores of both eyelids.

Patients’ Preference

One week after surgery, 11 patients (28.9 percent) indicated that they preferred to cool the eyelids after upper blepharoplasty, whereas 15 patients (39.5 percent) indicated that they preferred not to cool the eyelids. Twelve patients had no preference for either cooling or noncooling (31.6 percent).

DISCUSSION

This is the first randomized, controlled, observer-blinded evaluation study demonstrating that cooling of the eyelids after upper



Fig. 3. A 69-year-old man (*left*) and a 44-year-old woman (*right*) 1 week after upper blepharoplasty showing minimal bruising of the right side and severe bruising of the left side. The first patient mentioned that they cooled the right side after surgery, and the other patient had cooled the left side postoperatively.

blepharoplasty does not affect postoperative edema, erythema, or hematoma. Although pain was slightly reduced in cooled eyelids 1 day after upper blepharoplasty, its clinical impact is questionable.

Cold therapy (ice) is commonly used in sports injuries during the inflammatory phase to decrease bleeding, swelling, inflammation, and pain. The pathophysiologic effects of cryotherapy include decreasing tissue blood flow by causing vasoconstriction, and reducing tissue metabolism, oxygen use, the inflammatory process, and muscle spasm.³ The neural effects are also thought to be mediated through vasoconstriction, leading to decreased edema, decreased release of localized pain mediators, and a slowing of nerve conduction velocity of peripheral nerve fibers.⁴

Although the practice of cooling after surgery is widespread, the paucity of evidence showing that cooling may reduce postoperative edema, erythema, hematoma, or pain is remarkable. In gynecologic patients undergoing exploratory laparotomy, cold ice pack application did not improve postoperative pain,⁵ nor did cooling with facial ice packs improve postoperative pain, facial swelling, or trismus after third molar surgery.⁶ A review by Adie et al. did not support cryotherapy after total knee arthroplasty to reduce blood loss, pain, or swelling.⁷ However, a study by Shin et al. in craniotomy patients did report some positive effects of cooling by cryotherapy on pain, eyelid edema, and facial ecchymosis.⁸

Our study of upper blepharoplasty shows no treatment effect of cooling on edema, erythema, and hematoma. These findings seem in line with our observation that cooling of an eyelid does

not contribute to superior outcome or increased recovery. A positive treatment effect was observed with regard to postoperative pain, yet because of its magnitude, its clinical relevance is questionable. Importantly, only 11 of 38 patients (score, 3 of 10) in our study indicated that they preferred cooling of the eyelid after the blepharoplasty procedure, with the remaining 27 (score, 7 of 10) being negative or neutral toward this regimen. This finding is in contrast to a study of Jones et al., where the majority of patients found cooling masks comfortable after superficial musculoaponeurotic system–based face-lift surgery.⁹ Despite positive patient preference, they did not detect objective benefits of cooling in terms of reducing ecchymosis or hematoma, which is in line with our findings.

A major limitation of our study may relate to the use of the uncooled contralateral eyelid in one patient as the control for the cooled eyelid. Although interindividual tendencies for the development of edema, hematoma, and pain are properly addressed by this study design, it does not correct for potential surgical intraindividual differences between the two eyelids that have been operated on. Hatton et al. charted symmetry in healing after bilateral eyelid surgery and found no statistically significant difference in the average area of bruising between both sides.¹⁰ They even designate bilateral eyelid procedures as good candidates for comparing the effect of an agent designed to modify postoperative healing, as application to one side alone would allow for a placebo control to be administered on the contralateral side.¹⁰ Another potential limitation of our study involves possible patient

noncompliance with the study protocol of cooling only one eyelid. We have not actively assessed patient compliance, which could implicate that some patients may have cooled none or both eyelids postoperatively while at home, neglecting the strict instructions that were provided in both preoperative and postoperative consultations. The cooling protocol for the eyelids in our study (the first 30 minutes after the operation, another 15 to 20 minutes after returning home, and 15 to 20 minutes three times on the first day after surgery) may also be a potential limitation; the protocol might have been insufficient to reduce bruising, and may have resulted in the finding of no difference between cooled and uncooled eyelids. However, this protocol has already been used for years among a large cohort of plastic surgeons in The Netherlands. A last limitation can be that we have not seen the patients between 2 and 6 days after upper blepharoplasty and therefore might have missed significant bruising of the eyelids in this period because of our choice of time points (after 1 hour, 1 day, 1 week, and 2 months), which are in line with the regular follow-up time points after upper blepharoplasty used in the daily practice of our private clinic.

CONCLUSIONS

Our study demonstrates that cooling of the eyelids after upper blepharoplasty does not reduce postoperative edema, erythema, or hematoma of the eyelids and has a clinically marginal effect on postoperative pain. Therefore, the dogma of obligatory cooling after upper eyelid surgery can be abandoned, and it can be left to the preference of the individual patient whether or not to cool their eyelids after upper blepharoplasty. Because (plastic) surgeons are ritualistic in nature, we think that it probably will take years, or even might take a generation of doctors, before surgeons stop advising cooling after blepharoplasty.

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PATIENT CONSENT

Patients provided written consent for the use of their images.

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