

# Interface Between Cosmetic and Migraine Surgery

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Received: 16 April 2017 / Accepted: 7 May 2017 / Published online: 31 May 2017  
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**Abstract** This article describes connections between migraine surgery and cosmetic surgery including technical overlap, benefits for patients, and why every plastic surgeon may consider screening cosmetic surgery patients for migraine headache (MH). Contemporary migraine surgery began by an observation made following forehead rejuvenation, and the connection has continued. The prevalence of MH among females in the USA is 26%, and females account for 91% of cosmetic surgery procedures and 81–91% of migraine surgery procedures, which suggests substantial overlap between both patient populations. At the same time, recent reports show an overall increase in cosmetic facial procedures. Surgical techniques between some of the most commonly performed facial surgeries and migraine surgery overlap, creating opportunity for consolidation. In particular, forehead lift, blepharoplasty, septo-rhinoplasty, and rhytidectomy can easily be part of the migraine surgery, depending on the migraine trigger sites. Patients could benefit from simultaneous improvement in MH symptoms and rejuvenation of the face. Simple tools such as the Migraine Headache Index could be used to screen cosmetic surgery patients for MH. Similarity between patient populations, demand for both facial and MH procedures, and technical overlap suggest great incentive for plastic surgeons to combine both.

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**Keywords** Migraine surgery · Nerve decompression surgery · Migraine treatment · Cosmetic surgery

## Introduction

Cosmetic surgery lies at the heart of migraine surgery. The first description of nerve release to improve migraine headache (MH) goes back to an observation made following forehead rejuvenation procedures. The senior author (B.G) discovered that patients who had undergone glabellar muscle group resection during endoscopic, transpalpebral, or open forehead rejuvenation procedures reported improvement in MH symptoms [1]. This led to description of MH trigger sites and techniques to decompress or release these nerves, which have been adopted internationally with excellent results [2–7]. Cosmetic surgery principles continue to be an integral part of migraine surgery.

MH is a debilitating disease that reduces patient's quality of life to varying degrees [8, 9]. Based on the most recent prevalence data in the USA, MH affects between 16.6 and 22.7% of the population [10]. The odds of having severe MH as a female are 2.32 times higher compared with males, and 26.1% of females suffer from MH [10]. While the exact prevalence of migraines among cosmetic plastic surgery patients is unknown currently, the percent of female migraine surgery patients is known and ranges between 81 and 91% [2, 5, 11, 12].

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Further, the American Society for Aesthetic Plastic Surgery (ASAPS) reported that women accounted for 91% of cosmetic surgical procedures in 2016 [13]. Among cosmetic surgical procedures, facial plastic surgery is gaining in popularity based on findings published by the American Society of Plastic Surgery (ASPS) [14]. Of 1.8 million cosmetic surgeries performed in 2016, approximately 700,000 were facial procedures [14]. Surgical treatment of MH involves some of the techniques that are used during three of the top five cosmetic procedures in this report [15]. These are nose reshaping (third most common), eyelid surgery (fourth), and facelifts (fifth). Other common procedures such as forehead lift also overlap in surgical technique. Forehead lift was performed 43,000 times in 2016, which increased 6% from the year before.

### Technical Overlap Between Cosmetic Plastic Surgery and Migraine Surgery

As previously described, common migraine trigger sites are frontal (I), temporal (II), rhinogenic (III), occipital (IV), auriculotemporal (V), lesser occipital (VI), and nummular headaches (VII) [16, 17]. Sites I, II, and III are the most common migraine trigger sites and are often combined with cosmetic procedures, thus underscoring the importance of this connection.

#### Frontal Trigger (Site I)

Nerves irritated at the frontal trigger site are the supraorbital nerve (SON) and supratrochlear nerve (STN) [18–20]. Characteristic patient findings are strong frown lines and pain in the area of the supraorbital notch/foramen, as well as nerve exit points from the corrugator and depressor supercilii muscle [21]. Both endoscopic and transpalpebral approaches have been described for surgical decompression at this site [2, 4, 22, 23]. Principles of nerve release are the same for the two methods. The glabellar muscle group (corrugator supercilii, depressor supercilii, and lateral portion of the procerus muscle) is removed as thoroughly as possible to decompress the SON and STN [21]. If a bony foramen is present (27% of cases), a foraminotomy is performed [18, 21], and the supraorbital and the supratrochlear arteries are cauterized with bipolar cautery. If a tight band is seen at the supraorbital notch, it is released [4]. These three maneuvers constitute the departures from the routine forehead rejuvenation. Lipofilling is commonly used to replace the removed muscle and create an aesthetic forehead contour [24]. With an endoscopic approach, fat is harvested from an area deep to the deep temporalis fascia above the zygomatic arch medially [24, 25]. If a transpalpebral approach is chosen, the redundant nasal

compartment fat pad can be used [24]. On younger patients, or those who do not have protruding nasal compartment fat pad, fat is aspirated from the abdomen, processed, and injected in the muscle site and the glabellar area [23].

Substantial technical overlap exists between MH surgery at this site and commonly performed forehead rejuvenation techniques. Both the endoscopic and transpalpebral approaches to SON/STN decompression rejuvenate the face by removal of glabellar muscles and reduction of frowning lines and frowning action.

The endoscopic approach to SON and STN, which is ideal for patients with normal to short forehead length, can easily be combined with other procedures to rejuvenate the forehead. Examples are endoscopic brow lift for correction of brow asymmetry, correction of brow ptosis, subcutaneous forehead lift to improve deep wrinkles, shaving down of the frontal bone for frontal bossing, and thinning of the frontalis muscle in cases of frontalis hyperactivity [24, 26, 27].

The transpalpebral approach to the SON/STN nerve utilizes a classic upper lid blepharoplasty incision. It is best for patients with cosmetic concerns of the upper lid, such as lid ptosis and redundant skin. Classic blepharoplasty techniques can be employed through the same incision.

#### Temporal Trigger (Site II)

The temporal trigger site is often associated with frontal trigger site pain and is therefore addressed concomitantly in many cases. At the temporal trigger site, the zygomaticotemporal (ZT) nerve is compressed by the temporalis muscle, deep temporal fascia, or accompanying vessels. The nerve can be identified, on average, 1.7 cm lateral and 0.6 cm cephalad to the lateral palpebral commissure or later canthus. Patients will describe pain in this area, experience tenderness on palpation, and may have a history of clenching or grinding and temporomandibular joint pathology [21]. Goals of surgery are to remove or decompress the ZT nerve by using either an endoscopic or open approach [3].

With an endoscopic approach, two small incisions 3.5 cm apart and 1–5 cm long are made in the temporal hair bearing area; the medial incision is placed approximately 7 cm from the center point of the forehead hairline, and the second incision is placed about 3.5 cm lateral to the first incision [4]. These incisions can also be used for the lateral dissection of a forehead lift [24]. The dissection is started immediately superficial to the deep temporal fascia and continued medially at this level until the nerve and the vessels are identified. The nerve can be decompressed by widening the fascia opening and cauterization and

transection of the vessels or by avulsion of the nerve with matching outcomes [3, 4].

Release of the ZT nerve through an upper blepharoplasty incision has also been described [2, 22]. Thereby, dissection is performed along the inferior lateral orbital rim over the deep temporal fascia until the sentinel vein and ZT nerve branch are identified. The ZT nerve can then be decompressed or avulsed. The transpalpebral approach to the ZT nerve can be combined with an upper blepharoplasty.

### Rhinogenic Trigger (Site III)

Irritation of terminal branches of the trigeminal nerve in the nasal mucosa causes pain at the rhinogenic trigger site. Patients will complain about pain behind the eyes and sensitivity to weather, allergies, and hormonal changes [21]. CT imaging findings include deviated septum, enlarged turbinates with contact to the septum, and concha bullosa with or without sinus irritation [21].

Migraine surgery at this site is not uniform and depends on the intranasal findings on examination and imaging. Patients may undergo septoplasty and inferior, middle, or superior turbinectomies [4]. The spurs are removed and the medial wall of the concha bullosa is eliminated using an XPS shaver (Medtronic). Although both closed and open rhinoplasty approaches could be chosen, an open approach is preferred due to better exposure of deeper septal structures. For those not undergoing simultaneous rhinoplasty, the septoplasty is performed through a Killian incision.

Rhinogenic trigger site exposure and treatment can be combined with cosmetic improvements to the nose. Rhinoplasty techniques that have been described by the senior author and others are all applicable to this trigger site.

### Auriculotemporal Trigger (Site V)

The difference between this trigger site and the temporal trigger (site II) is that the pain in site V is usually closer to or within the sideburn hairline. Often the pain is sharp; patients can identify the trigger site with fingertip and a vascular Doppler signal can often be detected in the site identified by the patient. Commonly, the superficial temporal artery or its branches are irritating the main auriculotemporal nerve or its anterior or posterior branches. Removal of the main superficial temporal artery or its branches with or without removal of the main auriculotemporal nerve or its branches while the sideburn is elevated to suspend the superficial muscular aponeurotic system can eliminate or reduce the temporal MH within the territory of this nerve.

## Discussion

Cosmetic surgery marked the beginning of migraine surgery, and they remain closely intertwined. The prevalence of MH among females in the USA is 26.1%, and females account for 91% of cosmetic procedures and 81–91% of migraine surgery procedures, which suggests substantial overlap between both patient populations [2, 5, 10–13]. Concurrently, ASPS data show that facial cosmetic procedures are among the most common surgeries performed by plastic surgeons in 2016 [14, 15]. Several procedures listed, such as forehead lift, blepharoplasty, rhytidectomy, and septorhinoplasty, can be easily combined with migraine surgery for trigger sites I, II, III and V.

It is important for plastic surgeons to be familiar with this interface. Screening cosmetic patients for MH could help identify patients in need of either conservative or surgical management of MH. A tool that could easily be integrated into everyday practice is the Migraine Headache Index (MHI), which is the current gold standard for evaluation of migraine surgery outcomes. Three simple questions (MH frequency per month, duration in hours, and pain on a scale of 0–10) are used to screen for MH. Patients who screen positive for migraines could then undergo further evaluation by neurology and plastic surgeons to determine the best treatment. If deemed good candidates for migraine surgery, treatment can be offered during their primary cosmetic procedure. Similarly, MH patients undergoing migraine surgery can take advantage of the possibility of secondary cosmetic interventions if indicated.

Both cosmetic and migraine surgery patients can benefit from a combination of procedures. If MH can be treated as part of a cosmetic procedure, disability from MH can be improved substantially, as shown in several outcome studies [7]. Migraine surgery patients have the added advantage of facial rejuvenation and improvement in appearance.

## Conclusion

In conclusion, significant patient and procedural overlap exists between cosmetic surgery and migraine surgery. Plastic surgeons should consider utilizing this interface to benefit patients. Patients who are undergoing cosmetic surgery would be incentivized if they realize that their migraines may be eliminated or reduced, and patients who are undergoing migraine surgery would be more eager to undergo surgery if they recognize the cosmetic side benefits of the migraine surgery. This substantial interface cannot be underestimated.

## Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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