# Putting It All Together: Recommendations for Improving Pain Management in Plastic Surgical Procedures–Surgical Facial Rejuvenation

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**Background:** Postoperative pain is a major concern for patients undergoing facial aesthetic surgery. Aggressive efforts to reduce postoperative pain while avoiding adverse sequelae, such as nausea and vomiting, will result in an improved patient experience. Newer pharmaceuticals, medical devices, and longer-acting local anesthetics offer the potential to reduce pain and enhance patient satisfaction. The purpose of this report is to review the options and apply them to 3 specific facial aesthetic procedures: face-lift, brow lift, and blepharoplasty.
**Methods:** Our review investigates methods used for pain control in the surgical facial rejuvenation patient. We highlight those techniques that have been documented efficacy. We share specific methods of pain management for the more common surgical facial rejuvenation procedures that we perform.
**Results:** In an effort to maximize patient comfort, we assess the effectiveness of various devices, technologies, and treatment modalities available for pain control after surgical facial rejuvenation. These include local anesthetics, topical creams, intravenous acetaminophen, perioperative ketorolac, local anesthetic wound catheter delivery systems, liposomal bupivacaine, tarsorrhaphy/frost sutures, postoperative pharmacologic therapeutics, prophylactic steroids, and tricks to eliminate pain with suture removal. Additionally, we summarize the primary investigator's preferred method of pain management for the common surgical facial rejuvenation procedures performed.
**Conclusions:** Recent advances in postoperative pain control can significantly improve the patient's surgical experience. This multimodal therapy includes new pharmaceuticals, longer-acting local anesthetics, and devices designed to minimize postoperative pain. Adoption of these techniques may also reduce the need for narcotics and prevent postoperative adverse sequelae. (*Plast. Reconstr. Surg.* 134: 108S, 2014.)

Plastic surgeons have become increasingly aware of the importance of postoperative pain control. This has occurred in part in an attempt to improve the patient experience, but it also has been mandated by the Joint Commission on Accreditation of Health Care Organizations. In 2001, Joint Commission on Accreditation of Health Care Organizations required adequate assessment, monitoring, and treatment of pain as 1 of the conditions for hospital accreditation.[1]

However, pain remains a major patient concern. In fact, a recent study documented that 30–80% of patients undergoing outpatient surgery encountered moderate-to-severe pain postoperatively.[1,2] Along with this increased awareness of the importance of pain management, a variety of newer modalities designed to reduce pain have arrived on the scene. These include

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pharmaceutical agents such as intravenous acetaminophen (Ofirmev; Cadence Pharmaceuticals, San Diego, Calif.), longer-acting local anesthetics such as liposomal bupivacaine (Exparel; Pacira Pharmaceuticals Inc., San Diego, Calif.), pain pumps, and regional anesthetic blocks.[3–12]

Nausea, vomiting, constipation, somnolence, and anal fissures are well-known adverse effects of narcotic use. Although these effects may seem minor to some, they can lead to significant complications following aesthetic facial surgery. This includes face-lift hematoma following nausea and vomiting, pulmonary complications from respiratory depression, and even thromboembolic phenomena from bed rest following prolonged opioid use.[13–15] In fact, a recent study documented adverse side effects in 17% of patients due to narcotics.[2]

Modern pain control following facial aesthetic surgery therefore highlights minimizing opioids and substituting nonnarcotics whenever possible (Table 1). Most importantly, "multimodal pain therapy" including pharmaceutical agents mentioned above, long-acting local anesthetic preparations, and pain pumps may in large part replace isolated narcotic treatment of postoperative pain. This approach has been documented to increase patient satisfaction and reduce both narcotic use and the incidence of nausea and vomiting in a large variety of nonfacial aesthetic procedures.[2,3,6,10] Although this multimodal treatment seems to have significant benefits, postoperative dosing becomes more complex, and adverse drug interactions and drug overdose become more likely. Local anesthetics are absorbed more rapidly in the well-vascularized head and neck, making meticulous attention to toxic doses critical.[16] In addition, lidocaine and newly formulated liposomal bupivacaine compete for binding sites that can lead to increased levels of free bupivacaine when the 2 drugs are sequentially injected. Therefore, the manufacturer recommends an interval of 20 minutes between the local injection of lidocaine and the liposomal bupivacaine.[17]

Another recently described medication, intravenous acetaminophen, has been documented to significantly reduce postoperative pain when given toward the end of surgery. However, should the recommended 1 g be given, this significantly reduces total acetaminophen dose that can be administered in the first 24 hours after surgery.

Although these newer entities have proven to be effective in nonfacial aesthetic procedures, it might therefore seem reasonable to assume that they would be similarly effective in the face. There remains, however, little prospective data documenting this efficacy in facial aesthetic surgery. Because of the increasing use of these therapies, prospective trials are certainly called for. In the following pages, these techniques will be illustrated with specific facial aesthetic procedures, including brow, face-lift, and blepharoplasty (Table 2). When data are available about pain relief effectiveness for specific procedures, this is cited.

**Table 1. General Principles of Pain Control for Facial Rejuvenation Surgery**

| | |
|---|---|
| 1 | Utilize new pharmaceutical advancements |
| 2 | Utilize longer-acting local anesthetics before the conclusion of surgery |
| 3 | Utilize devices designed to minimize postoperative pain |
| 4 | Utilize regional anesthesia to block sensory nerves of the face |
| 3 | Treat nausea prophylactically and aggressively in the postoperative period |
| 4 | Avoid nonsteroidal anti-inflammatory drugs, aspirin, and other hemophilic therapeutics |
| 5 | Traditional methods of head elevation, cold compress (when appropriate), and relaxation techniques |

**Table 2. Proposed Methods of Pain Control for Various Facial Rejuvenation Surgeries[17]**

| | |
|---|---|
| Brow lift | Before incision, relative tumescence of the forehead, temple, and scalp with 0.5% lidocaine with epinephrine 1:200,000<br>Block of supratrochlear, supraorbital, zygomaticofrontal, and zygomaticotemporal nerves with liposomal bupivacaine at the conclusion of the operation*<br>Head wrap, elevation<br>Acetaminophen/narcotic tablets |
| Face-lift | Before incision, tumescence of the face and neck with 0.25% lidocaine with epinephrine 1:400,000<br>Injection of surgical incisions and drain sites with 0.25% bupivacaine with epinephrine 1:200,000 at the conclusion of the procedure<br>Intravenous acetaminophen 30 min before conclusion of the operation<br>Head wrap, elevation<br>Acetaminophen |
| Blepharoplasty | Subdermal infiltration of the lids with 1% lidocaine 1:100,000<br>Balanced saline and prophylactic steroid ophthalmic drops<br>Periorbital cold compresses for 48 h postoperatively |

*Note adverse drug interaction when liposomal bupivacaine is utilized within 20 min of lidocaine injection.

## BROW LIFT

As the brow lift operation is potentially the most painful of the common facial aesthetic procedures, pain control measures in this instance are especially important. These principles of pain control can be applied to the wide variety of brow lift techniques.[18–22]

The procedure is performed under deep sedation or general anesthetic. A large volume of dilute lidocaine (0.5%) with 1:200,000 epinephrine is used to "relatively tumesce" the forehead temple and scalp, resulting in both hemostasis and long-term pain relief postoperatively. For a number of years, continuous infusion pumps have been recommended for added postoperative pain control (ON-Q pain pump; I Flow Corporation, Irvine, Calif.). They function through a positive pressure infusion pump attached to tubing placed percutaneously. The tubing has a capillary restricting opening at its end. Multiple surgical specialties have documented reduced narcotic use, hospital stay, nausea and vomiting, and higher patient satisfaction rate with a wide range of procedures, including head and neck, chest, vascular, general, and gynecologic surgery with pain pump use.[4,6,7] However, drawbacks also exist including product bulkiness, catheter malfunction, removal of local anesthesia when drains are used, and uneven, inconsistent pain relief on occasion. In the future, the pain pump may be replaced by liposomal bupivacaine. The prolonged duration of action of liposomal bupivacaine is due to the delivery system which encapsulates the bupivacaine molecules while not altering their structure. As the body breaks down, the liposomal wall free bupivacaine is released. The duration of action is up to 72 hours.[10,23,24] Liposomal bupivacaine is packaged in a 20-cc (266 mg) vial. For large areas, this can be diluted with saline. For limited areas such as the brow, this is generally unnecessary.

The technique is as follows: the patient is injected with 20 cc (266 mg) across the brow, the temple bilaterally, and circumferentially across the scalp, including endoscopic brow incisions, thus blocking supraorbital supratrochlear, zygomaticofrontal, and zygomaticotemporal nerves regionally (Fig. 1).

Although anecdotal, since initiation of the combination of relative tumescence of the forehead before surgery, the use of liposomal bupivacaine and intravenous acetaminophen toward the completion of the procedure, our patient's pain relief has been more consistent and uniform. However, a recent prospective randomized study comparing bupivacaine to liposomal bupivacaine instilled in the breast pocket at the time of primary breast augmentation failed to show any difference in long-term pain relief.[25]

## FACE-LIFT

The patient undergoing face-lift surgeries generally has an easier course than those undergoing brow lift surgeries with regard to swelling and ecchymosis. As with the brow lift procedure, the face is "tumesced" with a large volume of dilute lidocaine with epinephrine (10 cc of 0.5% lidocaine with 1:200,000 epinephrine and 50 cc of 0.25% lidocaine with 1:400,000 epinephrine per side) for both hemostasis and postoperative pain relief. At the completion of the procedure, all incisions and the drain site are injected with 20 cc of 0.25% bupivacaine with 1:200,000 epinephrine. Although liposomal bupivacaine is a very reasonable option for postoperative pain relief, the long-term pain relief needs to be weighed against its increased cost.

Thirty minutes before completion of the procedure 1 g of intravenous acetaminophen is given. Intravenous acetaminophen works centrally to elevate the pain threshold in a fashion similar to narcotics but without the narcotic side effect. Two randomized double-blind placebo-controlled clinical trials in orthopedic and general surgery procedures have documented significant reduction in pain relief and narcotic use with intravenous acetaminophen. In addition, a large retrospective abdominoplasty case series found similar results.[3,9] Following recovery room, discharge patients are strongly encouraged to use oral acetaminophen and avoid narcotic use. Whether oral acetaminophen would be as effective as the intravenous route is as of yet unstudied. However, the theoretic benefit of intravenous acetaminophen is that therapeutic blood levels are reached and pain receptors are blocked perioperatively potentially enhancing pain relief.

Ketorolac (Toradol) is an additional nonnarcotic analgesic with documented efficacy in reducing pain and narcotic use. Torgerson et al[26] described a reduction in pain and narcotic use with no increased hematoma rate in 140 facial plastic surgery patients. Ketorolac is available for intravenous and local injection use only.

Clonidine has been used for many years both peri- and postoperatively for its analgesic, sedating, and hypotensive effects. This latter property has been documented to lead to a significant reduction in face-lift hematomas and is therefore frequently used in the male face-lift.[27–30]

## BLEPHAROPLASTY

Although ecchymosis and swelling may follow upper and lower lid blepharoplasty, the operation generally follows an easy recovery.

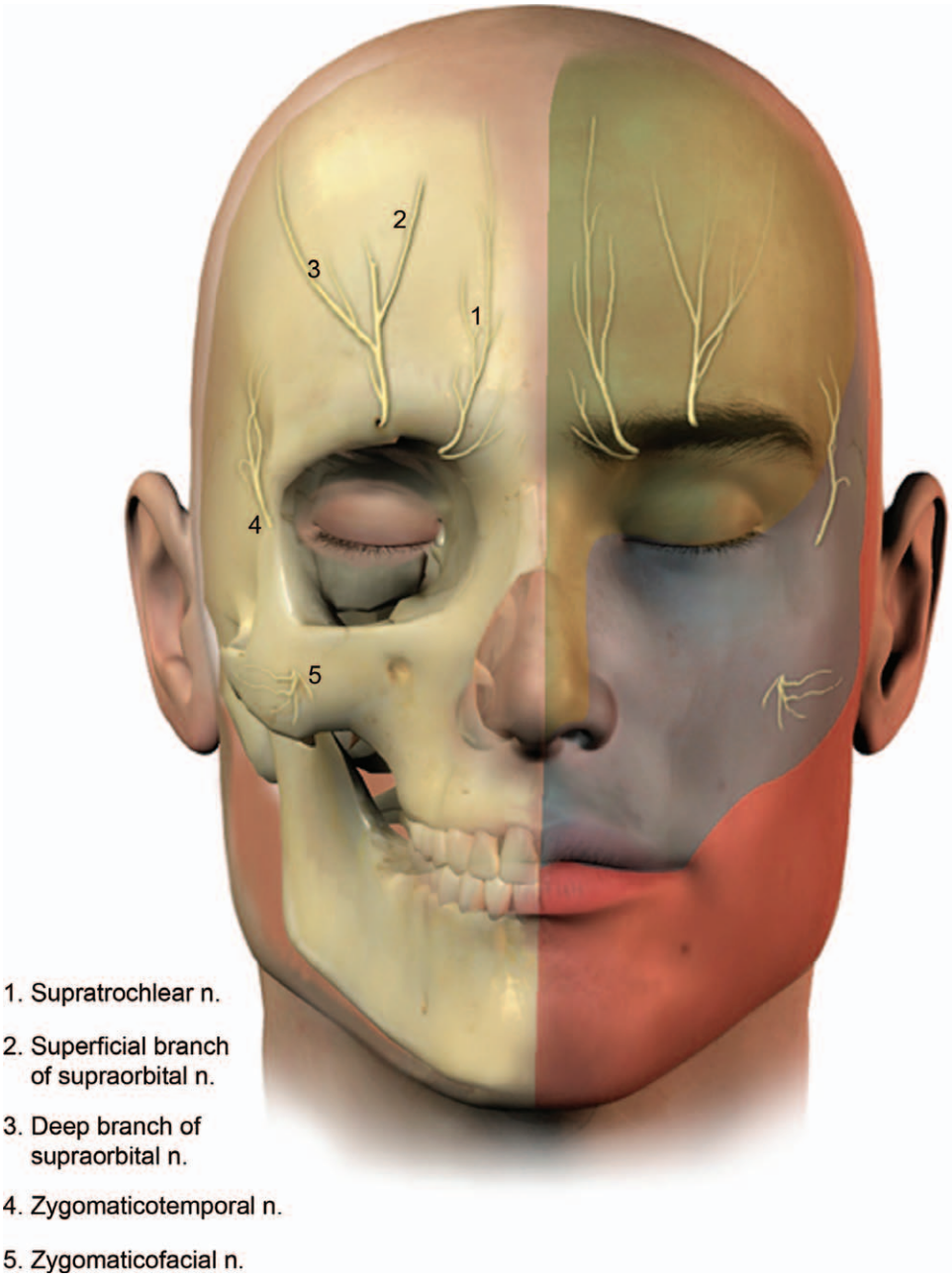


**Fig. 1.** Sensory innervation of the mid and upper face. Reprinted with permission from Cleveland Clinic Center for Medical Art & Photography © 2014. All Rights Reserved.

That being said lateral canthal manipulation is frequently followed by bothersome chemosis.[31,32]

The operation is usually performed under local anesthesia with sedation. If local anesthesia only is being used for upper eyelid blepharoplasty, EMLA cream can be applied to the upper eyelids before local anesthesia for pain relief and anxiety reduction.[33] One percent lidocaine with 1:100,000 epinephrine is injected using a 30-gauge needle in the upper and lower lids with care to avoid hematomas caused by injection into the orbicularis oculi muscles.

At the completion of lower eyelid surgery with lateral central tightening, if chemosis is a concern, a frost stitch or a lateral tarsorrhaphy is helpful to prevent or minimize this occurrence.[32] Avoiding dry spots on the cornea with the use of artificial tears and ophthalmic steroid (Lotemax 0.5% solution; Bausch and Lomb, Tampa, Fla.) is helpful. Narcotics are avoided postoperatively, as pain is rarely a problem.

## CONCLUSIONS

Recent advances in postoperative pain control have been shown to significantly improve the patient's surgical experience in nonfacial aesthetic surgery. This multimodal therapy includes new pharmaceuticals, longer-acting local anesthetics, and devices designed to minimize postoperative pain. Although promising, additional prospective studies regarding pain control in facial aesthetic surgery are needed.

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