

# Refining the Anesthesia Management of the Face-Lift Patient: Lessons Learned from 1089 Consecutive Face Lifts

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**Background:** The importance of anesthetic technique is often underappreciated in face-lift procedures and is sparsely written about in the literature. Appropriate control of blood pressure, anxiety, pain, and nausea is essential for reducing the complications of face lift, primarily, hematoma risk. This study discusses the standard anesthetic protocol provided at the authors' institution and describes the preoperative, intraoperative, and postoperative management of face-lift patients resulting in low hematoma and complication rates.

**Methods:** One thousand eighty-nine patients who underwent face-lift procedures performed by a single surgeon (R.J.R) were included in a retrospective chart review following institutional review board approval. Patient demographics, operative data including additional ancillary procedures, and the anesthesia regimen were recorded. In addition, postoperative complications and reoperation rates were documented.

**Results:** Between 1990 and 2013, 1089 face-lift procedures were performed. Of these, 10 patients developed postoperative hematomas. Benzodiazepines were commonly administered preoperatively to reduce anxiety level. Intraoperatively, a specific regimen and combination of inhalation agents, neuromuscular blockers, antiemetics, antihypertensives, and narcotics was given to control the ease of induction and emergence from anesthesia. Postoperatively, nausea, vomiting, anxiety, pain, and hypertension were treated as needed.

**Conclusions:** The described protocol is safe and has been instituted at the authors' facility for approximately 20 years. The benefit of this regimen is related to the synergy of combination therapy. It is successful in reducing patient anxiety and pain, controlling blood pressure and postoperative emesis, and subsequently results in a reduced risk of hematoma. (*Plast. Reconstr. Surg.* 135: 723, 2015.)

**CLINICAL QUESTION/LEVEL OF EVIDENCE:** Therapeutic, IV.

Facial rejuvenation has evolved into the fifth most popular cosmetic procedure in the United States, with over 100,000 procedures performed in 2012.<sup>1</sup> Techniques in anesthesia are a vital component of the surgery itself and assist in preventing postoperative complications; however, analgesia is often underappreciated and is sparsely published in the literature. As more surgeons are performing face lifts, the significance of proper analgesia, anxiety, pain, and blood pressure control needs to be stressed.

Although face lifts can be performed under intravenous sedation or general anesthesia, basic tenets of adequate hemodynamic monitoring and control should be followed. It has been well documented that hypertension can directly influence hematoma rates and therefore should be controlled in the perioperative setting. Normal blood pressure and heart rate can be achieved in the perioperative period by providing adequate intraoperative anesthesia and postoperative anxiolytics, analgesia, and antiemetics. Strict control

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and monitoring of hemodynamics can minimize the risk of postoperative hematomas, which remain a major complication associated with this procedure.

Blood pressure can be optimized by controlling influential factors, including pain, anxiety, nausea, and vomiting. This can be achieved by an appropriate preoperative, intraoperative, and postoperative medication regimen. In the immediate preoperative setting, benzodiazepines are given to reduce anxiety. A combination of propofol, inhalation agents, and neuromuscular blockade allows for a smooth induction with minimal airway irritation and maintenance of normal and stable vital signs. Nausea and vomiting are prevented by administering antiemetics shortly after induction and before emergence. Hypertension is prevented not only by controlling emesis and pain also but with the addition of a clonidine transdermal patch. This is placed preoperatively in all patients undergoing this procedure.

This retrospective review of 1089 face-lift procedures performed by a single surgeon (R.J.R) describes the evolution of anesthesia at our institution. A single anesthesiologist (J.E.C) oversees the majority of anesthesia care at our surgery center. A protocol has been established for effective management of pain, anxiety, hypertension, and nausea in face-lift patients. The purpose of this article was to analyze the evolution of our experience with face lifts at this institution.

## PATIENTS AND METHODS

Institutional review board approval was granted at the University of Texas Southwestern Medical Center before initiation of this study. One thousand eighty-nine patients were identified who underwent surgery from April of 1990 to January of 2013 performed by a single surgeon (R.J.R). Patient demographics, including age, body mass index, medical comorbidities, surgical history, and home medications, were recorded (Table 1). Perioperative records were evaluated for the type of face lift performed and any additional ancillary procedures.

Anesthesia records were assessed for length of procedure, intraoperative and postoperative episodes of hypertension and emesis, and medications administered. Hypertension was classified as having a systolic blood pressure greater than 140 mmHg. Intraoperative hypertension episodes were quantified using the 15-minute block of the anesthesia intraoperative reports. Each block with a systolic blood pressure greater than 140 mmHg

**Table 1. Demographic Information of Patients Undergoing Face Lift**

Characteristic	Value
Sex	
Female	994
Male	95
Age, yr	
Mean	58
Range	35–89
BMI, kg/m <sup>2</sup>	
Mean	23.7
Range	15.8–38.3
Comorbidities	
Hypertension	165
Cardiac disease	52
Pulmonary disease	26
Diabetes	5
No. of patients with previous tobacco use	26

BMI, body mass index.

was tallied into one of two categories: (1) blood pressure between 140 and 160 mmHg and (2) blood pressure greater than 160 mmHg.

The postoperative courses of patients were tracked to the most recent follow-up to evaluate for any complications related to their procedure, or need for reoperation. Patients' records were reviewed for hematoma, seroma, infection, skin sloughing, nerve damage, or any other complication. All additional operative records were reviewed for relevant information with regard to complications.

## Anesthesia Protocol

### General Points

All patients receive appropriate preoperative clearance from their primary care physician. Medications are reviewed and herbal supplementation and nonsteroidal antiinflammatory drug use are stopped 10 to 14 days before surgery. In addition, patients are not offered facial cosmetic surgery if they taking antithrombotic or antiplatelet medications. Sequential compression devices are placed on all patients preoperatively. Patients do not receive heparin or enoxaparin postoperatively for deep venous thrombosis prophylaxis. Before incision, patients receive prophylactic antibiotics, generally cefazolin, unless the patient has a cephalosporin allergy. All patients undergo general endotracheal anesthesia with carbon dioxide monitoring.

### Induction

All patients receive 2 mg of midazolam preoperatively, just before entering the operating room. This dose may be modified in those with a personal history of sedative use or in those with an increased preoperative anxiety state. Propofol is

then used for induction. The narcotic of choice is sufentanil, typically given at induction at a dose of 10 µg, followed by an infusion of 0.15 µg/kg/hour until 30 minutes before the end of the procedure. Sevoflurane is the inhalation agent used, whereas rocuronium and vecuronium are used primarily as neuromuscular blockers. The neuromuscular blocker is redosed when the patient's head is turned during the case, as this causes increased patient stimulation and airway irritation. Nitrous oxide is avoided in general because of the increased risk of postoperative nausea and emesis associated with its use.

#### Antiemetics

Patients with diabetes, history of gastric bypass, or other reason for delayed gastric emptying receive metoclopramide (10 mg) before induction. Droperidol (0.625 mg) and dexamethasone (8 mg) are otherwise administered shortly after induction. In addition, ondansetron (4 mg) is given 30 minutes before emergence (Fig. 1).

#### Antihypertensives

Patients that are on a home antihypertensive regimen continue these medications as scheduled on the morning of surgery and during the remainder of the perioperative course. Diuretics are stopped, however, during this time period. A clonidine 0.1-mg/day transdermal patch is applied just before arrival into the operative suite. A higher dose of 0.2 mg/day is used in patients with a history of hypertension or in male patients. Intraoperatively, blood pressure is managed primarily by altering the concentration of inhaled anesthetics. If additional treatment is needed, labetalol or hydralazine is administered, depending on heart rate, to treat acute hypertension, and ephedrine or phenylephrine bolus is given to treat hypotension. During emergence and while in the recovery room, the patient's blood pressure and heart rate can increase. In this instance, intravenous labetalol or hydralazine in repeated doses

is given for a systolic blood pressure greater than 140 mmHg (Fig. 2).

#### Pain

Intravenous acetaminophen has recently been added to our regimen for pain control. The dosage is 1000 mg and is used only in patients staying overnight so that their total acetaminophen dose can be monitored. In routine face lifts, few patients complain of pain in the recovery room; however, for those that do, fentanyl is used. Once the patient leaves the postanesthesia care unit, oral medications are administered as needed.

#### Other Postoperative Causes of Hypertension

Efforts are made to minimize other causes of anxiety to prevent subsequent hypertension. Common sources include discomfort from the postoperative head wrap and Foley catheter. The head wrap is used in all patients as a slightly compressive dressing and, although this can cause anxiety, we feel the benefits in decreasing dead space and hematoma outweigh this discomfort, which can be treated medically as needed. Foley catheters are placed in all patients at induction given the duration of the procedure. We find that this minimizes anxiety and hypertension that can result from a full bladder. In general, the catheter remains in place until the following morning in women and obviates the need to use a bedpan, which can be difficult for some patients. The Foley catheter is removed in all male patients before awakening. These patients tend to experience increased irritation and discomfort from the catheter and are more comfortable using a urinal.

#### Statistical Analysis

All data were collected in a spreadsheet and analyzed using STATA v11.0 (StataCorp, College Station, Texas). Univariate logistic regression was used to analyze whether demographic or intraoperative variables were significantly associated

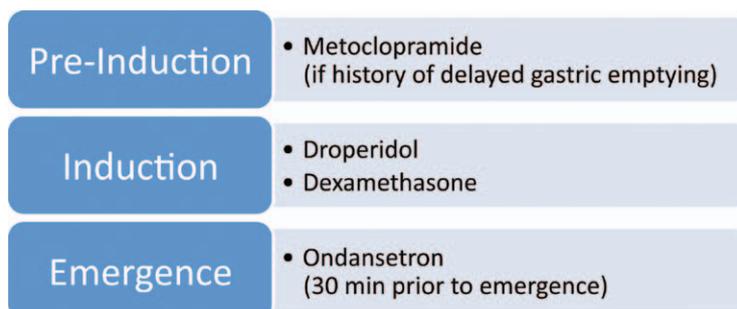
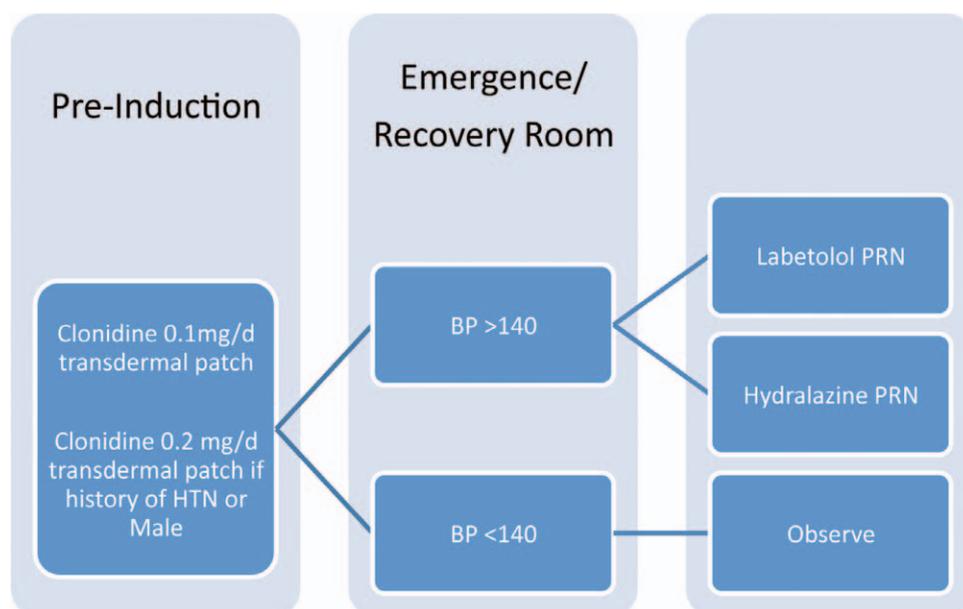


Fig. 1. Nausea and vomiting algorithm.



**Fig. 2.** Hypertension algorithm. *HTN*, hypertension; *BP*, blood pressure; *PRN*, as needed.

with complications. A multivariate logistic regression model was generated to evaluate whether the quantity of intraoperative hypertensive episodes correlated to postoperative complications. In addition to the quantified documented number of episodes of intraoperative hypertension, a binomial variable was created for any episodes of hypertension (systolic blood pressure >140 mmHg) in the postanesthesia care unit for analysis. A Pearson chi-square test was used to determine whether there was a significant difference in patients with a documented medical history of hypertension compared with those with documented hypertension in the postanesthesia care unit. The Pearson chi-square test was used to determine significance in postoperative hematoma for patients with hypertension in the postanesthesia care unit. For all data, a value of  $p < 0.05$  was used to determine statistical significance.

## RESULTS

Of the 1089 patients, 48 underwent an extended superficial musculoaponeurotic system (SMAS) procedure, 197 patients underwent SMA-Sectomy or SMAS stacking based on facial analysis, 355 patients underwent SMA-Sectomy with superficial diffuse fat augmentation, and 489 patients underwent SMA-Sectomy with deep and superficial specific fat compartment grafting. Average operative time for face lift alone without ancillary procedures was 234 minutes, and with additional procedures, time increased to 293 minutes. This

time includes total anesthesia time. Nine hundred ninety-four patients were women and 95 patients were men. Mean age and body mass index were 58 years and 23.7 kg/m<sup>2</sup>, respectively. Comorbidities included cardiac disease in 52 patients, pulmonary disease (asthma) in 26 patients, and diabetes in five patients. Twenty-six patients had a history of smoking; however, all patients were instructed to quit at least 4 weeks before the operation.

One hundred sixty-five patients had a documented medical history of hypertension and were treated for this before surgery. Preoperatively, on the day of surgery, blood pressure was documented to be high (>140 mmHg systolic) in 170 patients. Postoperatively, in the postanesthesia care unit, there were 354 patients who had documented hypertension ( $p < 0.001$ ). Overall, there were few complications. Ten patients developed a hematoma postoperatively. Nine hematomas occurred in the recovery room or during the overnight stay at our institution. Eight of the 10 patients returned to the operative suite for evacuation. There were two patients that had minor hematomas noted, approximately 5 cc or less. One was treated at the bedside and the other presented on postoperative day 2 and was observed. Evaluation of demographic factors showed male sex to be the only significant variable related to development of postoperative hematoma ( $p < 0.001$ ) (Table 2). Episodes of intraoperative hypertension did not correlate with development of hematoma (Table 3). However, hypertension in the postanesthesia care unit was found to be

**Table 2. Univariate Analysis of Relevant Demographics and Comorbidities Related to Incidence of Complications**

Characteristic	<i>p</i>
Age	0.626
BMI	0.571
Male sex	<0.001
Comorbidities	
HTN	0.946
Cardiac disease	0.647
Pulmonary disease	0.007
DM	—
History of smoking	0.107
Face-lift technique	0.473
Intraoperative BP >161 mmHg, no. of occurrences	0.650
Intraoperative BP 141–160 mmHg, no. of occurrences	0.669
PACU BP >141 mmHg	0.045

BMI, body mass index; HTN, hypertension; DM, diabetes mellitus; BP, blood pressure; PACU, postanesthesia care unit.

**Table 3. Evaluation of Intraoperative Episodes of Hypertension and Postoperative Hypertension Correlating to Incidence of Hematoma\***

SBP (mmHg)	Mean Events	Range	<i>p</i> (95% CI)
SBP 140–160	1.15	0–39	0.863 (–0.429–0.359)
SBP >160	0.06	0–2	0.740 (–1.38–1.94)
PACU >140	—	—	0.06 (0.940–22.3)

SBP, systolic blood pressure; PACU, postanesthesia care unit.

\*Controlled for age, sex, and body mass index.

a statistically significant factor in development of hematoma ( $p = 0.045$ ).

## DISCUSSION

The previously described protocol is safe and has been instituted at our facility for approximately 20 years. Ten of our patients developed postoperative hematomas. Eight of the 10 had documented hypertension in the postanesthesia care unit, which was found to be statistically significant. Of note, over twice the number of patients were found to be hypertensive in the postanesthesia care unit compared with those immediately preoperatively (355 and 170, respectively) and compared with those with a medical history of hypertension (165) ( $p < 0.001$ ). For this reason, it is vital that all patients receive appropriate prophylactic hypertensive, anxiolytic, and antiemetic treatment regardless of their medical histories.

Perioperative anesthesia management is critical for preventing complications during rhytidectomy, regardless of the setting in which the procedure is being performed.<sup>2</sup> For this reason, an open dialogue should exist between the surgeon and the anesthesia provider during all

phases of the operation. The surgeon should understand the benefits and risks of various anesthetic methods and medications and their interactions with one another. Unfortunately, the plastic surgery literature is rather sparse in this arena. Vigilant control of hemodynamics is imperative, including strict monitoring of oxygen saturation, blood pressure, heart rate, respiratory rate, and temperature.<sup>2</sup> Blood pressure control, specifically, is of utmost importance in face-lift procedures. Poorly controlled hypertension can be associated with perioperative bleeding and hematoma formation.<sup>3</sup> Patients with a history of hypertension should obtain appropriate blood pressure control preoperatively with the assistance of their primary care physician. Blood pressure, in our practice, is kept stable intraoperatively in the low normal range so that bleeding is minimized.<sup>2</sup> Extreme hypotension, however, is avoided because this can mask perforators that may bleed postoperatively when blood pressure returns to the normal range or if rebound hypertension occurs.<sup>4,5</sup> In addition, tachycardia and hypertension occur primarily because of pain and anxiety in an awake patient. This should be treated appropriately once other causes such as hypovolemia, anemia, and acidosis have been ruled out.<sup>4</sup>

It is well documented in the literature that hypertension can result in hematoma formation. This risk ranges from 0.2 to 8 percent in the literature, with male patients being on the higher end of this spectrum.<sup>6</sup> The risk of hematoma in men remains higher than in women because of skin differences, including a thicker epidermis and dermis, and more sebaceous, elastic, and vascular skin compared with female patients.<sup>6</sup> Baker et al. showed in their studies on the male face-lift patient that blood pressure control is a key factor in hematoma formation. With strict control perioperatively, they were able to decrease their incidence of hematoma from 8.7 percent in 1977 to 3.97 percent in 2005.<sup>6</sup> Hematomas can be detrimental in a face-lift procedure, as this can cause pressure on the skin flap leading to flap loss, pigment changes, puckering, subcutaneous masses, increased recovery time, and poor aesthetic results. If expanding rapidly, primarily in the neck, airway compromise can occur.<sup>6</sup> To decrease these risks, it is recommended that anxiety, pain, emesis, and blood pressure be controlled adequately.

The ideal anesthetic should have sedative, anxiolytic, and analgesic properties and ameliorate hypertension.<sup>7</sup> During surgery, sympathetic activity is increased, resulting in catecholamine release. In addition, the neuroendocrine response

to this stress is the release of cortisone. Therefore, the medications used ideally should have properties that can blunt these responses and therefore decrease the symptoms of anxiety, pain, emesis, and hypertension.

### Induction and Emergence

All patients in our practice undergo general endotracheal anesthesia based on surgeon preference. This allows for a more controlled, secure airway during head position changes and minimizes the motion that occurs during negative-pressure ventilation by means of a laryngeal mask airway. This also eliminates the increased work of breathing associated with laryngeal mask airways. In addition, the endotracheal tube allows for a closed system for oxygen delivery, enabling the safe use of electrocautery.

The goals during induction and emergence from anesthesia involve maintaining a stable and controlled heart rate and blood pressure, with minimal airway irritation, bucking, and coughing.<sup>2</sup> The agents commonly used at our facility are chosen because they effectively control this.

Propofol is a short-acting hypnotic and sedative agent used for induction of anesthesia. It has several mechanisms of action, including potentiation of gamma-aminobutyric acid (GABA)<sub>A</sub> receptor activity and acting as a sodium channel blocker. Its rapid onset and recovery, and its amnestic effects, make it an ideal medication for induction.<sup>8</sup> Sevoflurane is an inhaled anesthetic that is halogenated exclusively with fluorine, thereby providing greater stability and less toxicity. It is less soluble in blood and tissues, allowing for faster awakening and recovery. This agent is better tolerated in general compared with other inhalation agents because it lacks a characteristic pungent odor, causes minimal airway irritation, and is a potent bronchodilator.<sup>2,9,10</sup> Rocuronium is an intermediate-acting nondepolarizing neuromuscular blocking drug that possesses efficient clearance mechanisms that result in a shorter duration of action. Its onset of action is roughly 1 to 2 minutes at initial doses of 0.6 mg/kg intravenously and a duration of 30 to 40 minutes.<sup>9,10</sup>

Although other anesthetic techniques exist in the literature that avoid inhalation agents, neuromuscular blockade and narcotics altogether and effectively decrease the incidence of nausea and vomiting, this regimen is rather surgeon-specific and allows for improved control and elimination of patient movement or increased work of breathing as seen with a laryngeal mask airway. Neuromuscular blockade is sparsely redosed after intubation other

than during head turning and injection of local anesthetic when the patient is further stimulated.

### Blood Pressure

As stated previously, blood pressure control is vital to minimize hematoma formation. Intraoperatively, blood pressure is typically easy to control with little anesthetic, as the patient is injected with a local infiltration and stimulation is minimal. If needed, the concentration of inhalation agents is adjusted to treat acute changes in blood pressure. As stated previously, if the patient remains hypertensive after this adjustment, labetalol or hydralazine is given, depending on heart rate, and ephedrine or Neo-Synephrine is administered to treat hypotension. Postoperatively, labetalol and hydralazine are used as needed. Labetalol is more commonly used during emergence and transport to the recovery room, as blood pressure elevations are common during this time. We find this medication effective in addressing hypertension and tachycardia. Hydralazine is routinely used once in the recovery room. The key medication in our protocol, however, is clonidine, an alpha-2 adrenergic receptor agonist that works centrally on the postsynaptic alpha-2 receptor to decrease sympathetic outflow and partially on the presynaptic receptor.<sup>5,11</sup> This central action produces sedation, anxiolysis, analgesia, and potentiation of narcotics.<sup>11</sup> Its sympatholytic effects attenuate the hemodynamic responses of hypertension and tachycardia. In addition, this drug has postoperative sedative effects when given by means of the oral route and can also reduce shivering and shaking in the recovery room.<sup>12</sup> The oral bioavailability is 75 to 90 percent and takes effect in roughly 90 minutes, with a peak at 2 to 3 hours. Its effects, however, are still present at 8 hours. The half-life is 9 to 12 hours.<sup>6,11,13</sup> The transcutaneous route is routinely used in our practice, however, and provides a sustained drug delivery with constant drug levels for up to 7 days.<sup>14</sup> We find the transdermal route easy to administer and longer acting, thereby minimizing swings in blood pressure. Onset of action is several hours following placement of the patch; therefore, it does not have an effect on intraoperative blood pressure management. The system consists of a 0.2-mm adhesive patch with a drug reservoir, a membrane that controls delivery rate, and a pliable backing.<sup>14</sup> Clonidine is released at a constant rate and, therefore, has zero-order kinetics. With this system, drug levels take 2 to 3 days to achieve therapeutic blood levels; however, initially after placement of the patch, clonidine is released rapidly within the first 8 hours. On removal of the patch, plasma levels remain constant for roughly

8 hours and then decline over several days, with a plasma half-life of 21 hours.

Although clonidine is routinely used in our practice, it has been found that this is a commonly used drug nationwide. Trussler et al., in their 2011 survey, documented that a majority of American Society of Plastic Surgeons members in practice greater than 15 years incorporate clonidine regularly. This was also the case in secondary survey results sent to high-volume facilities.<sup>5</sup>

A double-blind prospective study was performed by Beer et al. in which the effects of midazolam, morphine, and clonidine were compared individually with respect to sedation, anxiolysis, analgesia, hemodynamic response, and emesis when given preoperatively in cases in which facial operations were performed under local anesthesia. They found the reduction of anxiety to be largest in the midazolam and clonidine groups, and the reduction of pain was experienced primarily in the morphine and clonidine groups. The clonidine group showed a clear trend in amelioration of the hemodynamic response and lower blood pressure rates postoperatively. The authors deduce that the goals of reducing anxiety and pain, and stabilizing hemodynamic parameters, are best achieved with clonidine.<sup>15</sup>

### Anxiety

Most patients during the preoperative and postoperative setting experience some degree of anxiety, and this can directly cause hypertension and tachycardia. Patients that experience a high level of anxiety the night before surgery are encouraged to take an oral benzodiazepine. Oral medication is avoided on the day of surgery, as we want the patients to remain alert during the informed consent process. Midazolam, a short-acting benzodiazepine, is commonly used in our practice in the immediate preoperative setting. It works through activation of the GABA<sub>A</sub> receptor complex and has amnestic, anxiolytic, and sedative effects.<sup>10</sup> This medication decreases beta-endorphin levels, thereby lowering the pain threshold, and acts as an anticonvulsant and muscle relaxant. The usual dose is 1 to 2 mg (titrated up to 0.7 mg/kg) in the preoperative setting and is rapidly metabolized, with a half-life of 2.5 hours.<sup>9</sup> When coadministered with opioids, patient satisfaction and amnesia are increased, and nausea, vomiting, and anxiety are decreased.<sup>9</sup> These characteristics make it an ideal medication to be given for preoperative anxiety.<sup>15</sup> Oral benzodiazepines such as alprazolam and diazepam are used in the postoperative setting as needed.

### Nausea and Emesis

Postoperative nausea and vomiting are of utmost concern following rhytidectomy. There is a 25 to 30 percent risk of nausea and vomiting in the literature after the procedure, and this is increased in those that have a history of postoperative nausea and vomiting and those with a history of motion sickness.<sup>4</sup> Emesis and the subsequent hypertension can result in hematoma formation and for this reason should be controlled. Ondansetron is a commonly used drug in our practice, and acts as a serotonin antagonist that reduces autonomic neuroactivity in the vomiting center of the brain. The usual dose of 4 mg can ameliorate these symptoms. This can be given with or without metoclopramide, which is the drug of choice in patients that have gastric dysmotility. Dexamethasone, a glucocorticoid, can also be used to resolve nausea. It has potent glucocorticoid but minimal mineralocorticoid activity; however, its mechanism of action in nausea and emesis is unknown. It has a slow onset of action and therefore should be given at the beginning of the procedure. Propofol used during induction is associated with reduced nausea and vomiting as well.<sup>2</sup> This is often also used during emergence and aids in awakening the patient smoothly. Droperidol is a butyrophenone derivative similar to haloperidol and antagonizes serotonin, GABA, norepinephrine, and dopamine receptors in the central nervous system. It has more potent antiemetic properties and reduces the incidence of nausea and vomiting associated with anesthesia. It has risks of arrhythmic events and prolonged QT intervals; however, this appears to be a clinically insignificant finding in our experience at the low doses used for antiemesis.<sup>16</sup> Regardless, one should remain cautious when administering this medication.

### Pain Control

Pain control is of utmost importance in any operative procedure, especially in rhytidectomy patients. Commonly used medications in our practice include sufentanil, acetaminophen, and fentanyl. It is important to note that total narcotic used intraoperatively is minimal because of decreased overall patient stimulation and use of local anesthetic. All intubated patients, however, receive a bolus of sufentanil during induction to lessen the stimulation from laryngoscopy. A slow rate of infusion is then administered to blunt stimulation during infiltration of local anesthetic and to prevent overbreathing of the ventilator. We have found that this also aids in increased sedation during the remainder of the day, which eases patient anxiety and comfort. Sufentanil is a commonly used

narcotic intraoperatively in our practice. It is the most potent opioid, a mu agonist, and is more intrinsically efficacious at the opioid receptor; therefore, much smaller doses are needed compared with less potent drugs. Acetaminophen is used to control postoperative pain and is thought to mediate its actions centrally by activating descending serotonergic pathways. It is believed to increase the pain threshold by inhibiting prostaglandin synthesis by means of the cyclooxygenase pathway. Intravenous acetaminophen is preferred over oral acetaminophen in our practice, as the peak effect is approximately 1 hour, enabling rapid pain control. This is repeated 8 hours postoperatively, to decrease overall narcotic use. In addition, oral absorption occurs in the duodenum; therefore, this form can be unpredictable, especially with delayed gastric motility caused by anesthesia, stress, and narcotic use. Fentanyl is a stronger agonist at the mu- and kappa-opiate receptors and has a more rapid onset of action compared with morphine. Analgesia is mediated by changing the perception of pain at the spinal cord and higher levels in the central nervous system. Opioids also modulate the endocrine and immune systems and inhibit the release of vasopressin, somatostatin, insulin, and glucagon.<sup>10</sup>

The rhytidectomy patient is unique in that blood pressure should be strictly controlled to minimize subcutaneous bleeding and hematoma formation. Because blood pressure can be influenced by patient anxiety, pain, nausea, and vomiting, effective control and prevention of these symptoms is recommended. For this reason, a safe and effective anesthesia protocol is vital, with clear and constant communication between the surgeon and the anesthesia provider. We have described our commonly used regimen, which is based on the preferences of the primary surgeon and anesthesia provider. Although other protocols exist and remain safe—including, for example, the use of propofol or intravenous sedation—the regimen described enables us to more predictably manage and secure the airway and control the factors that can increase hematoma rates and other complications.

## CONCLUSIONS

Face lift is overall a safe procedure, and anesthesia assistance during all perioperative phases can reduce the risk of complications. This cohort was noted to have a significantly higher incidence of hypertension in the immediate postoperative period in the postanesthesia care unit despite having no documented history. This variable, in addition to male sex, was significantly associated with

development of hematomas. Aggressive blood pressure control measures should be established between surgeon and anesthesia care provider to prevent this easily treatable risk factor.

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