Management of Hypertension in the Facelift Patient: Results of a National Consensus Survey

Aesthetic Surgery Journal
31(5) 493–500

DOI: 10.1177/1090820X11411292
www.aestheticsurgeryjournal.com
SAGE

Andrew P. Trussler, MD; Daniel A. Hatef, MD; and Rod J. Rohrich, MD

Abstract

Introduction: In the facelift patient, uncontrolled perioperative hypertension is a difficult, acute condition that can lead to significant complications. Although the treatment of hypertension in the ambulatory medical setting has been standardized, its management in the cosmetic surgery setting has been ambiguous.

Objectives: The authors evaluate the results of a survey to assess current national trends in perioperative facelift hypertension management.

Methods: A 13-question survey regarding perioperative hypertension management was sent by postal mail to 1776 members of the American Society for Aesthetic Plastic Surgery (ASAPS). Respondents were queried about their geographic location, caseload volume, facelift method, and hematoma rate.

Results: A 35.4% response rate was attained (629 respondents). Superficial musculoaponeurotic system (SMAS) plication performed under general anesthesia as an outpatient procedure was the most common facelift technique. Perioperative blood pressure management was consistent among all respondents. Beta-blockers were commonly utilized throughout the preoperative period. Administration of alpha agonists was reported more frequently by surgeons with higher-volume caseloads and more years in practice. Reported hematoma rates did not vary with medication. Medical treatment at an intraoperative systolic blood pressure (SBP) threshold below 100 ($p < .04$) and a postoperative SBP of greater than 139 ($p < .05$) significantly increased reported hematoma rates.

Conclusions: The data generated from the survey suggest that the timing of treating hypertension deserves more attention than the actual medication administered. Proper perioperative care of the facelift patient is paramount in the reduction of hematoma rates. Preexisting hypertension correlates with a higher hematoma rate, though this study also suggests that normotensive anesthesia, as well as strict postoperative blood pressure control did contribute to a reduction in hematoma rate.

Keywords

facelift, hypertension, hematoma

Accepted for publication July 28, 2010.

Facelift surgery is a popular procedure in the United States. In 2008, the American Society for Aesthetic Plastic Surgery reported that facelifts were the seventh most commonly performed surgical cosmetic procedure.[1] Current techniques of facial rejuvenation surgery have evolved from the original, extensive and open procedures, which have been refined over the past 30 years.[2-8] Currently, less invasive techniques are popular; these utilize limited incisions and dissection planes.[9-14] This trend has followed the desire for minimizing patient discomfort and recovery, as well as reducing complications. Hematoma is a relatively common complication following facelift surgery and can lead to devastating complications such as flap loss, airway compromise, infection, hyperpigmentation, increased recovery time, and a poor aesthetic result.[15-19] Previous authors have highlighted the risk factors for hematoma, which include male gender, tumescent epinephrine, and hypertension.[20-24]

In the ambulatory medical setting, the management of hypertension is well understood and has been relatively well managed with initiation of lifestyle changes, as well as specific medication protocols according to patient gender and race.[25-27] However, this same standardization of perioperative hypertension management has not been achieved in cosmetic surgery.[28-30] In an effort to advance the understanding of hypertension treatment and formulate effective management protocols,

From the Department of Plastic Surgery, University of Texas Southwestern Medical Center, Dallas, Texas.

Corresponding Author:
Dr. Andrew P. Trussler, University of Texas Southwestern Medical Center, Department of Plastic Surgery, 1801 Inwood Rd., WA4.238, Dallas, TX 75390.
E-mail: andrew.trussler@utsouthwestern.edu

we designed a questionnaire to investigate current national trends.

METHODS

A two-page, 13-question survey was composed in "bubble" format with coded answering, through commercially available survey software (Prezza Technologies, Inc., Cambridge, Massachusetts; see the appendix). Questions were included to assess demographics, surgical technique and environment, and hypertension management. The survey was sent by postal mail to all member physicians of the American Society for Aesthetic Plastic Surgery (ASAPS). Included in each survey packet was a prestamped envelope addressed to a centralized location. The survey responses were scanned, with all data filed into a Microsoft Excel data spreadsheet (Microsoft Corp., Redmond, Washington).

Responses were calculated through Excel, and data were also placed into the SAS Version 9.13 statistical package (SAS, Inc., Cary, North Carolina). Survey questions allowing more than one possible answer were coded into indicator variables. Frequencies were calculated for each of these questions. Survey questions asking respondents to place preselected responses in rank order were coded appropriately; the total number of ordinal responses and mean rank scores was calculated.

Hematoma frequency was calculated from responses to question 12, in which respondents were asked to select the number of hematoma incidences they experienced per year, according to a set range. The median hematoma number for each coded response was used as the numerator to calculate hematoma frequency (ie, response B was one to three per year, so the numerator was calculated as two). The respondent's median number of facelift cases performed per year (question 2) acted as the denominator in the equation to calculate hematoma frequency (ie, response D was 21-30 per year, so the denominator would be 25.5). Division of these numbers provided the respondent's frequency of hematoma, which was used for the statistical comparisons.

In order to further delineate and confirm the practice trends in facelift surgery, a separate mailing of the same survey was sent to 20 known high-volume facelift surgeons. A 55% response rate was achieved, and these results were compared to the ASAPS member survey results. Chi-square analysis and Tukey multiple comparisons of proportions were applied for all statistical analyses.

RESULTS

Demographics and Caseload Statistics

A total of 1776 surveys were mailed to ASAPS members, with 629 surveys returned (35.4%). Four hundred forty-six (71.3%) respondents had been in practice for more than 15 years. The majority of respondents were evenly distributed across the East Coast region (n = 180; 28.6%), the South (n = 170; 27.0%), and the West Coast (n = 151; 24%) (Figure 1). One hundred sixty-four respondents reported performing an average of 11 to 20 rhytidectomies per year (26.4%); 197 reported performing 31 or more (31.6%). West Coast respondents reported a significantly higher volume of facelift cases compared to the rest of the country, with the average number of procedures being between 31 and 40 per year.

Many respondents performed their facelifts in an office setting, with 212 (33.8%) reporting this as the location of their operations; 192 utilized an outpatient surgery center (30.5%). Of the 30.5%, 64% performed facelifts in an outpatient setting, with only 12% performing them in a surgery center with a short stay and 15% in the hospital setting.

The most popular method of anesthesia was general anesthesia with endotracheal intubation (n = 292; 46.5%); local anesthesia with sedation was the second most popular mode of anesthesia, with 147 respondents (23.4%). Anesthesia administration was most commonly performed by a physician anesthesiologist, otherwise referred to as "MD anesthesia" (n = 347; 55.3%). East and West Coast respondents utilized MD anesthesia over 80% of the time. Twenty-three percent reported that Certified Registered Nurse Anesthetists (CRNA) administered anesthesia; this appeared to be more common among Southern respondents.

The most popular rhytidectomy technique reported was superficial muscular aponeurotic system (SMAS) plication (n = 234; 37.1%) (Figure 2). Twenty-nine percent of respondents reported utilizing more than one technique. For the respondents in the first mailing of this survey, the average rate of hematoma was calculated as 3.97% of their cases. This rate was significantly increased for the surgeons who employed a sub-SMAS dissection technique. The hematoma rate did not vary with operative location, nor did it vary with anesthesia type or postoperative disposition.

Hypertension Management

Cardiac disease was considered the most important indication for preoperative medical screening (average rank, 2.19). (Note that throughout this section, respondents were asked to rank the given responses beginning with 1, so lower average rank scores indicate a higher frequency.) Respondents reported that preoperative evaluations were most often performed by the plastic surgeon, internist, and anesthesiologist (49.3%). Eighty-four respondents reported performing the preoperative evaluation alone (13.3%). One hundred fifty-four respondents reported that the preoperative evaluation was performed solely by the internist (24.5%).

Beta-blockers were the most common treatment reported for hypertensive management during the preoperative period (Table 1). Intraoperatively, increased anesthesia was most commonly used for hypertension management (average rank, 1.95). Respondents who had been in practice

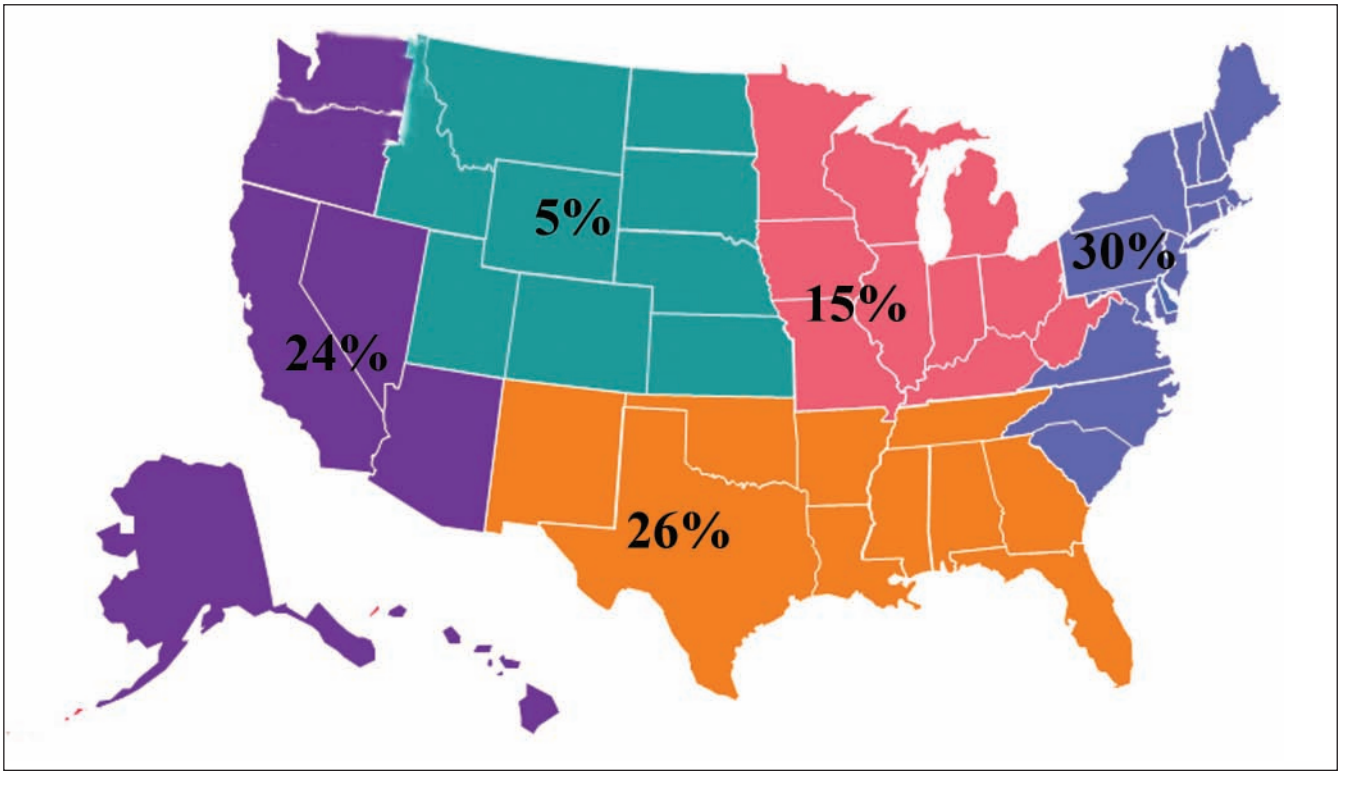

Figure 1. Geographic location of respondents. The majority of questionnaires were returned from physicians practicing in higher-volume regions in the United States.

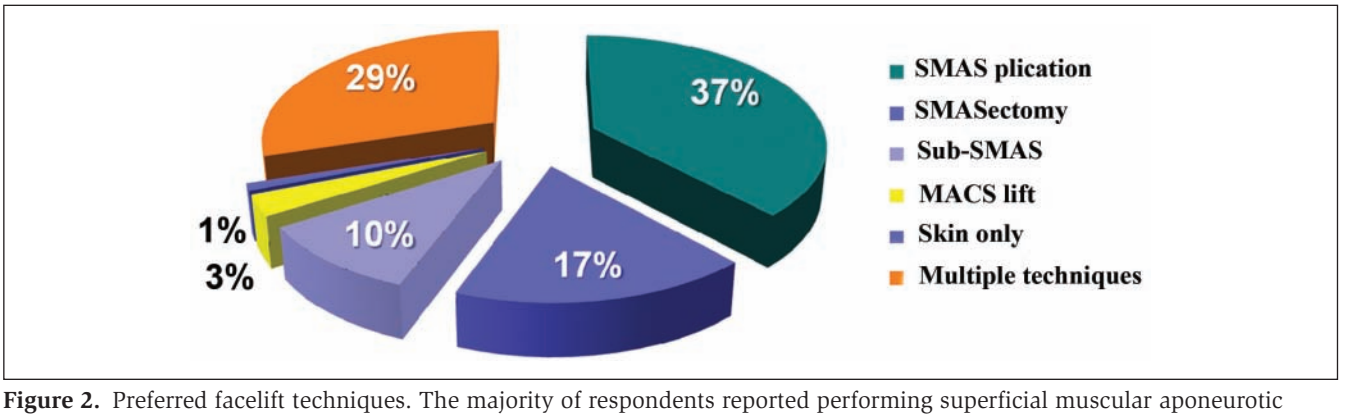

Figure 2. Preferred facelift techniques. The majority of respondents reported performing superficial muscular aponeurotic system (SMAS) plication or utilizing multiple techniques.

for longer than 15 years were more likely to administer alpha agonists postoperatively (average rank, 2.16 vs 2.32 in the group who had been in practice less than 15 years). This result was confirmed with unanimous use of alpha agonists in the respondents from the second mailing, the "high-volume" facelift group.

The reported medication types had no regional variability, but they did vary significantly with anesthesia type; more anxiolytic therapy was reported in the local anesthesia group ($p < .0001$), and more beta-blocker therapy was utilized intraoperatively in the MD anesthesia group ($p < .0001$).

The most commonly reported complication was hypertrophic scarring, with a mean ranking of 1.64; hematoma was second, with a mean rank of 2.25. The least frequent complication was facial nerve injury, with a mean rank of 4.41. More surgeons who set their threshold for intraoperative blood pressure treatment at a systolic blood pressure of 100 (n = 46) had a hematoma rate greater than

Table 1. Physician-Reported Perioperative Hypertension Management Average Rankings (1-5)

Preoperative	Intraoperative	Postoperative
Beta-blocker (2.10)[a]	Anesthesia (1.97)	Beta-blocker (1.86)[a]
Anxiolytic (2.23)[b]	Beta-blocker (2.00)[a]	Pain medication (2.09)
Clonidine (2.27)	Anxiolytic (2.64)	Anxiolytic (2.31)[b]
Other (2.99)	Alpha-blocker (3.20)[c]	Clonidine (2.36)
ACEI (3.12)	Nitrate (4.81)	ACEI (3.36)

ACEI, angiotensin-converting enzyme inhibitor.
[a]Beta-blockers were utilized more frequently in facelifts performed under general anesthesia. Note: No medication had an effect on hematoma rate.
[b]Anxiolytics were utilized more commonly in facelifts performed under local anesthesia.
[c]Alpha-agonists were utilized significantly more commonly by senior, high-volume surgeons.

two per year (n = 27; 58.7%), as compared to those who instituted blood pressure management at thresholds of 115, 130, and 140 (n = 583), 224 of whom (38.4%) had a hematoma rate of less than two per year. This difference was found to be statistically significant (p = .037). The postoperative treatment level of systolic blood pressure was also statistically significant for hematoma rate, in that respondents who allowed blood pressure to rise above 139 prior to treatment had a higher hematoma rate (p < .05; Figure 3). No medication type in the perioperative period had a correlative effect on the hematoma rate.

DISCUSSION

The selection criteria for facelift surgery and the regimen of perioperative care have been relatively uniform over the past 30 years.[31] The management of hypertension and prevention of hematoma has been addressed, although there has been no consensus on the optimal method of treatment.[32-34] This study evaluates the practice habits and blood pressure treatment thresholds in the facelift patient through a nationally distributed survey to all ASAPS members. Our response rate compared favorably to similar survey studies; Matarasso et al[19] and Reinisch et al[35] both had lower rates. Although we appreciate the inherent weaknesses of survey studies, we felt that quantifying current practice trends would be a valuable initial contribution to developing a consensus treatment regimen for hematoma prevention in the facelift patient.[36,37]

The majority of respondents replied that they utilized MD anesthesia in an outpatient setting, neither of which had any significant correlation with reported hematoma rates, although the utilization of beta-blockers with general anesthetic was significantly more common. This is likely secondary to the increased use of sensitive monitoring, as well as increased familiarity with the medication and its effects. Ironically, anxiolytics were more commonly administered to treat blood pressure in the group of respondents who most often used local anesthetic; these cases are most likely performed in an office setting without the ability to carefully monitor the patient population. The unanimous use of MD anesthesia in the latter part of this study, in which high-volume surgeons were surveyed, highlights the significant

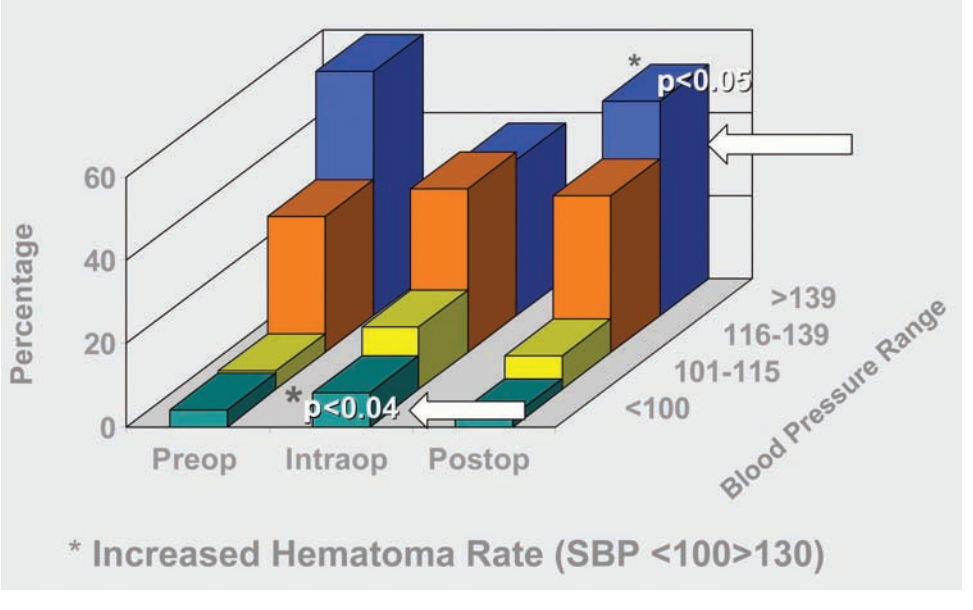

Figure 3. Threshold-to-treat blood pressure in the perioperative period. Intraoperative treatment of blood pressure to reduce the systolic blood pressure to below 100 and allowing postoperative systolic blood pressure to rise above 139 both contributed to a significantly higher reported hematoma rate.

responsibility and concern for patient safety among our respondents.

Facelift surgery in the United States is a common but highly variable procedure.[38-41] There are multiple acceptable techniques, many of which evolve and change yearly. The most common type of facelift reported in this study was SMAS plication, which has been shown to correct the common complaints of facial aging. It is a reliable and safe technique that was utilized uniformly from every reported geographic region and at all experience levels. Although technique did not have any correlation with the choice of antihypertensive, there was a significantly higher rate of reported hematoma among the sub-SMAS facelift respondents. This contradicts previous large-volume studies, which concluded that facelift technique had no impact on hematoma rates.[22,23]

It is possible that querying surgeons about their hematoma rates may be an arbitrary end point, since opinions about the nature of what represents a hematoma may differ from surgeon to surgeon. Dr. Daniel Baker, in his 30-year review of his male rhytidectomy experience, reported an overall hematoma rate of 4.24%, but his classification of a hematoma was a collection of blood greater than 30 mL that required surgical drainage and hemostasis in the operating room.[20] We did not provide a specific definition in our survey, nor was it the main focus of the study. Likewise, "facelift technique" may be a vague end point, as the interpretation of what each named technique entails may vary. Grover et al[22] found that only an anterior platysmaplasty correlated with a significantly higher hematoma rate and stated that an extended SMAS dissection had no bearing on the rate. In this survey, respondents were not queried about the extent of neck dissection in their preferred technique, which likely is the main contributing technical factor to facelift hematomas.

The choice of antihypertensive seemed to be relatively uniform and predictable, in that preoperative hypertension was likely related to anxiety and was treated with anxiolytics and beta-blockers. Intraoperative hypertension was most often treated with beta-blockade and anesthetics, whereas postoperative hypertension was most often treated with beta-blockade and pain medications. In each perioperative period, there is an identifiable etiology for hypertension, as identified by Baker et al.[20] Preexisting hypertension and male patients are both more difficult to treat intraoperatively and postoperatively. In this study, there was no identifiable correlation between hematoma rate and medication, which is likely secondary to the multifactorial etiology for perioperative hypertension and the numerous methods used to treat it in all periods.

Our main finding related not to *how* hypertension should be treated in the facelift patient but rather *when* it should be treated. Preexisting hypertension has been found to correlate with a higher hematoma rate, but respondents did not identify a significant preexisting blood pressure level for treatment that they felt decreased hematoma rate. This may be attributed to the fact that preexisting hypertension is a known etiology for facelift hematoma and falls within the same boundaries of routine medical management for hypertension. This, combined with the routine administration of anxiolytics in the perioperative period, underestimates the necessity for the strict treatment of preoperative hypertension. The facelift patient with a history of hypertension should be stabilized on a preexisting medical regimen and should usually continue her or his routine medications on the day of the operation. A clonidine patch may also be added to this regimen in the preoperative period, knowing that the effects would be appreciated two to five hours after placement.

Responses to our survey showed that intraoperative hypotension correlated with a significantly higher hematoma rate, which supports the findings of previous studies concluding that hypotensive anesthesia may contribute to postoperative hematoma formation.[23,24] Unidentified areas of bleeding that are quiescent during the period of intraoperative hypotension can bleed during the "rebound period" of hypertension postoperatively.[42] On the basis of our findings, we recommend that normotensive anesthesia and meticulous hemostasis be employed intraoperatively to decrease hematoma rates. Of note, postoperative blood pressure control did correlate with a reduction in the hematoma rate. Conversely, allowing a patient's postoperative blood pressure to rise above 139 systolic did correlate with a higher hematoma rate. The treatment modality for this blood pressure level did not make a significant difference, although the etiology of postoperative hypertension—including postoperative pain, nausea, and vomiting—should be addressed in this period.[43,44] These were not addressed in this study, but all of these confounding factors should be routinely treated in the perioperative period, as shown by Baker et al.[20]

Following the conclusion of the initial mailing of the study, a separate survey was sent to 20 experienced, high-volume facelift surgeons; clonidine was utilized almost unanimously in this group. Clonidine has been shown to decrease hematomas in facelift surgery.[33] Its effects are mediated through its action on a central postsynaptic alpha-2 adrenergic receptor and its role as a partial agonist of presynaptic alpha-2 adrenergic receptors.[45] Clonidine's benefits are multimodal, including a decrease in peripheral vascular resistance as well as a central contribution to sedation, anxiolysis, and analgesia. Side effects of the medication include drying of secretions and postural hypotension. The majority of clonidine's effects (including anxiolysis and analgesia) are beneficial when administered to the facelift patient for the treatment of perioperative hypertension, making this medication a valuable adjunct in medical management. It can be administered orally, transcutaneously, and intrathecally, and effects are noticed within 90 minutes. It has a half-life of 12 hours and is excreted via the renal system. Other alpha agonists such as dexmedetomidine have also been shown to be effective in the same way for the facelift patient.

CONCLUSIONS

This survey study of ASAPS members provided an accurate account of the current trends in facelift technique

and management of hypertension among plastic surgeons in the United States. The most common surgical technique was reported as SMAS plication, which is most often carried out under physician-administered general anesthesia in an outpatient setting. Alpha agonists, which have significant benefits for hematoma management, were more commonly utilized by plastic surgeons with higher-volume caseloads and more experience. Although medication type did not directly correlate with a reduction in hematoma rate, the treatment threshold for systolic blood pressure did. We conclude that proper perioperative blood pressure management is an effective way to reduce hematoma rates in the facelift patient.

APPENDIX SURVEY

1. Location of practice:
   East Coast / Midwest / Central / South / West Coast

2. Number of facelift procedures per year:
   1-5 / 6-10 / 11-20 / 21-30 / 31-40 / > 41

3. Location of operating room:
   office / outpatient surgery center / surgery center with short stay / hospital

4. Anesthesia type:
   local / local with sedation / general with laryngeal mask anesthesia (LMA) / general with endotracheal tube (ETT)

5. Anesthesia administrator:
   RN / CRNA / anesthesiologist / surgeon

6. Operative technique:
   skin only / SMAS plication / SMASectomy / deep plane / midface / other:

7. Most common location for postoperative care:
   outpatient / after-care facility without RN / after-care facility with RN / hospital inpatient

8. Preoperative medical screening:
   (a) Reason for preoperative medical evaluation
   (b) Rank the following (1, most common; 5, least common):
      age
      diabetes
      abnormal EKG
      cardiac disease
      hypertension
   (c) Who performs the preoperative evaluation?
   plastic surgeon / internist / anesthesiologist / all

9. Preoperative hypertension management:
   (a) Threshold for preoperative systolic blood pressure (SBP) treatment (hypertension definition):
      SBP > 100 / SBP > 115 / SBP > 130 / SBP > 140
   (b) Rank the following (1, most common; 5, least common):
      Anxiolytic (eg, valium)
      Alpha-1 blocker (eg, clonidine)
      Beta-blocker (eg, atenolol)
      ACE inhibitor (eg, lisinopril)
      Other (list):
   (c) Route of administration:
      Oral / transcutaneous / IV / other:

10. Intraoperative hypertension management:
   (a) Threshold for intraoperative systolic blood pressure (SBP) treatment (hypertension definition):
      SBP > 100 / SBP > 115 / SBP > 130 / SBP > 140
   (b) Rank the following (1, most common; 7, least common):
      Anxiolytic (eg, Versed)
      Anesthetic (eg, propofol)
      Alpha-1 blocker (eg, hydralazine)
      Beta-blocker (eg, labetalol)
      Nitrate (eg, nitroglycerine)
      Other (list):
   (c) Route of administration:
      oral / transcutaneous / IV / other:

11. Postoperative hypertension management:
   (a) Threshold for postoperative systolic blood pressure (SBP) treatment (hypertension definition):
      SBP > 100 / SBP > 115 / SBP > 130 / SBP > 140
   (b) Rank the following (1, most common; 5, least common):
      Anxiolytic (eg, valium)
      Alpha-1 blocker (eg, clonidine)
      Beta-blocker (eg, atenolol)
      ACE inhibitor (eg, lisinopril)
      Other (list):
   (c) Route of administration:
      oral / transcutaneous / IV / other:

12. Number of hematomas per year:
   0 / 1-3 / 4-5 / > 6

13. Most common complication (rank 1-5):
   Hypertrophic scar
   Hematoma
   Wound infection
   Skin necrosis
   Facial nerve injury (frontal / zygomatic / buccal / mandibular / cervical)

Disclosures

The authors declared no potential conflicts of interest with respect to the authorship and publication of this article.

Funding

The authors received no financial support for the research and authorship of this article.

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