Review Article

Evidence of Hematoma Prevention After Facelift

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Abstract

Hematoma is a common complication after facelift procedures. Multiple factors have been shown to increase the risk of hematoma formation, such as male gender, anticoagulant medication use, perioperative hypertension, increased intrathoracic pressure, and operative technique. The purpose of this manuscript is to provide an overview of existing literature to provide surgeons with evidence-based recommendations on how to minimize hematoma risk during facelift surgery. A literature search for hematoma and facelift surgery was performed that identified 478 unique manuscripts. Abstracts were reviewed, excluding articles not describing facelift surgery, those written before 1970, studies with a sample size of fewer than 5 patients, non-English studies, and those that did not provide postoperative hematoma rates. Forty-five articles were included in this text, with their recommendations. Measures such as the prophylactic management of pain, nausea, and hypertension, the use of fibrin glue tissue sealants, the use of local anesthesia rather than general anesthesia, and strict blood pressure control of at least <140 mmHg were found to significantly reduce hematoma formation. Quilting sutures has shown benefit in some high-risk patients. Measures such as drains, compression dressings, perioperative use of selective serotonin reuptake inhibitors, and perioperative steroids had no significant effect on hematoma formation. In addition to appropriate patient selection and careful intraoperative hemostasis, many adjunct measures have been shown to reduce postoperative hematoma formation in facelift procedures.

Level of Evidence: 3

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Facelifts are one of the most common aesthetic surgical procedures. In 2021, over 87,000 were performed in the United States, a 54% increase from the year before.[1] Hematoma is the most common complication after facelift, with reported incidences of 0.2% to 8%.[2-4] Minor hematomas can be treated with bedside aspiration, whereas major or expanding hematomas may emergently affect the airway and must be surgically evacuated. The pressure from hematoma can contribute to skin necrosis, and smaller hematomas left untreated can lead to irregular contours that are unsightly and noticeable. Known risk factors include a

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Table 1. Adjunct Medications

Topic	Author(s)	Level of evidence	Methodology	Main findings
PONV	Marcus et al[6]	1	120 patients received either preanesthesia ondansetron or placebo.	Incidence of emesis significantly higher in females ($P < .05$). Ondansetron significantly reduced emesis and sensation of postoperative nausea ($P < .05$).
PONV	Frojo et al[7]	4	Case series of 6 patients who underwent facelift with local anesthesia and oral sedation.	PONV reported to be 45% and 3.4% had postoperative emesis.
Use of steroids	Rapaport et al[8]	1	50 facelift patients randomized to either 6 mg IM betamethasone preoperatively or no steroids.	No significant differences in postoperative swelling were found.
Use of steroids	Owsley et al[9]	1	30 facelift patients, one-half given preoperative steroids.	No significant differences in postoperative swelling were found.
Prophylactic management	Beer et al[10]	3	308 patients were given PRN pain, HTN, and nausea control, and 68 patients received 150 µg of clonidine for blood pressure control, 4 mg of ondansetron to prevent nausea, and 1 g of Perfalgan (Bristol Myers Squibb, New York, NY).	Prophylactic pain, HTN, and nausea management resulted in a significant reduction in hematoma rate with an incidence of 7% in group 1 and 0% in group 2 ($P = .029$).
Acetylsalicylic acid (ASA)	Abboushi et al[11]	4	Retrospective review.	Despite holding ASA 7 days preoperatively, ASA group had increased hematoma rate (18% vs 4%).
Acetylsalicylic acid (ASA)	Grover et al[12]	3	Review of 1078 consecutive facelifts.	Patients with a history of aspirin or NSAIDs had a significantly increased rate of hematoma formation despite holding ASA 14 days preoperatively ($P < .04$).
SSRI	Harirchian et al[13]	4	Retrospective review of 250 patients; 22 with antidepressants.	No increased hematoma risk in the antidepressant group (1.95% non-antidepressant vs 1.72% antidepressant).
SSRI	Harvey et al[14]	4	Retrospective review of 392 patients; 30% had psychiatric diagnosis. Compared DDAVP administration between groups.	Psychiatric diagnosis did not predict DDAVP administration (14.3% with psychiatric diagnosis vs 20.88% without).

DDAVP, desmopressin acetate; HTN, hypertension; IM, intramuscular; NSAID, nonsteroidal anti-inflammatory drug; PONV, postoperative nausea and vomiting; PRN, as needed; SSRI, selective serotonin uptake inhibitor.

history of hypertension, poor perioperative blood pressure control, male gender, aspirin use, smoking, and deep neck dissection.[5] In this article we discuss the relevant literature and review measures to reduce hematoma. All the studies that are mentioned in this article are summarized in Tables 1-3 under the following general topics, respectively: adjunct medications, intraoperative management, and postoperative management.[6,35]

METHODS

A literature search was completed by C.S. in May 2023 with PubMed (National Institutes of Health, Bethesda, MD) with various search terms such as [hematoma] AND [facelift] OR [rhytidectomy] AND [hypertension], [hemostasis], [tumescent], [drains], [hemostatic net], [tissue sealant], [TXA], OR [epinephrine]. A total of 428 manuscripts were identified through the general search terms of [hematoma] AND [facelift]. An additional 50 manuscripts were found when independently searching specifics such as [drains], [hemostatic net] and [TXA]. Abstracts were reviewed, and we excluded papers not written in English, those published before 1970, case series with fewer than 5 patients, those that did not give postoperative hematoma rates, and studies not describing facelift surgery. This resulted in a total of 45 manuscripts. These included retrospective studies, systematic reviews, meta-analyses, and randomized controlled trials.

RESULTS

Hypertension Management

One of the first papers linking hypertension to postoperative hematoma in facelift was the study by Berner et al in 1976 that included 202 consecutive patients. Berner advocated Thorazine (GlaxoSmithKline; now discontinued in US) as a treatment for perioperative hypertension.[5] A year later, Straith et al studied hematoma rates in 500 consecutive patients and concluded that blood pressure above 150/100 led to a 2.6 times increased risk of hematoma after facelift.[29] There are various reasons for elevated blood

Table 2. Intraoperative Management

Topic	Author(s)	Level of evidence	Methodology	Main findings
Hemostatic net	Auersvald and Auersvald[15]	3	Prospective observational study of 405 patients who underwent facelift with application of a quilting hemostatic net.	No hematomas developed in the quilting net group compared to a 14.2% hematoma rate of the historic control group.
Hemostatic net	Janssen et al[16]	3	304 patient records were reviewed between 2017 and 2022 and outcomes were compared to a control group of 359 patients who underwent facelift without hemostatic net.	Significantly reduced hematoma rate of 0.6% compared to 3.9% in the control group ($P = .006$).
Tissue sealants	Marchac and Sandor[17]	3	Compared 200 sides of faces to the contralateral side treated with fibrin glue.	Hematoma rate reduction of 9% to 2% with fibrin glue.
Tissue sealants	Hester et al[18]	1	75 patients with planned facial rhytidectomy received SoC treatment on 1 side of the face and adjunct FS VH S/D 4 s-apr on the other.	No significant difference in hematoma rates.
Tissue sealants	Killion et al[19]	1	Meta-analysis of 7 randomized controlled trials.	Hematomas were 4 times less likely with fibrin glue.
Tissue sealants	Giordano et al[20]	1	Meta-analysis of 13 studies, 2434 patients in total.	Statistically significant decrease in postoperative hematoma (RR 0.37) and wound drainage with sealant. Significant decrease in edema (RR 0.30) but not ecchymosis, seroma, skin necrosis, or hypertrophic scarring.
Tissue sealants	Oliver et al[21]	1	RCT of 20 patients. Fibrin sealant was placed on either the right or the left side of each patient's face with the contralateral side acting as the control.	The side treated with fibrin glue had a median drainage of 10 mL and the control side 30 mL ($P = .002$).
Tumescent, tranexamic acid, epinephrine	Jones and Grover[22]	3	Review of 678 facelifts, 449 without tumescent and 229 with tumescent.	No significant difference in hematoma formation.
Tumescent, tranexamic acid, epinephrine	Jones and Grover[23]	3	Single-surgeon review of 910 patients.	Drains, fibrin, and dressings do not decrease hematomas. However, there was a significant reduction in the hematoma rate with *removal* of adrenaline from tumescence.
Tumescent, tranexamic acid, epinephrine	Schroeder and Langsdon[24]	3	Retrospective cohort study. As of 2019, 1 cc TXA was added to every 10 cc of local anesthetic and tumescent. Control and TXA patients were compared.	No significant differences in rates of minor or major hematoma formation.
Tumescent, tranexamic acid, epinephrine	Cohen et al[25]	1	Prospective, randomized, double-blind. 44 patients undergoing rhytidectomy. Treatment group received 1-g IV dose of TXA before skin incision and another 1-g dose 4 hours later. Control group received saline.	Significant reduction in surgeon-rated postoperative bruising ($P = .03$) as well as incidence of collections (<0.01).
Local anesthesia	Frojo et al[7]	3	Retrospective analysis of 174 patients.	Minor hematoma rate of 13.2%, and reoperation rate was 1.1%. There was no increased risk of hematoma in their patients with a history of hypertension or in patients with an intraoperative systolic blood pressure over 140 mmHg.
Local anesthesia	Moris et al[26]	3	Retrospective review of 1500 patients who underwent cervicofacial lift under local anesthesia between 1995 and 2016.	Hematoma rate of 0.6%.

FS, fibrin sealant; IV, intravenous; RCT, random controlled trial; RR, risk ratio; SoC, standard of care; TXA, tranexamic acid.

pressure, namely pain, nausea and vomiting, anxiety, and a full bladder. Controlling these have been the cornerstones of postoperative blood pressure control. Over time, antihypertensive medications were added to the perioperative regimen for tighter postoperative blood pressure control. Beninger et al investigated the addition of clonidine to control blood pressure by comparing 100 facelifts treated with clonidine to 100 control patients. The control group's

Table 3. Postoperative Management

Topic	Author name(s)	Level of evidence	Methodology	Main findings
Compression dressings	Jones et al[27]	3	Retrospective review of 678 patients, 331 patients who had standard postoperative compression dressings compared with patients with no postoperative dressings.	No significant difference in hematoma rate.
Compression dressings	Jones et al[28]	1	Randomized controlled trial of 50 consecutive patients managed postoperatively with hilotherapy vs standard dressings. Then 15 patients 1 side alone.	Statistically significant increase in patient reported postoperative swelling with hilotherapy. There were no benefits in treatment of ecchymosis, hematoma, or pain.
Blood pressure management	Straith et al[29]	3	Review of 500 patients who underwent facelifts.	Elevated blood pressure above 150/100 led to a 2.6 times increased risk of hematoma after facelift.
Blood pressure management	Beninger and Pritchard[30]	1	Randomized control trial with 200 patients assigned to either clonidine or control.	Hematoma rate was 4% compared to 0% hematoma rate in the clonidine group.
Blood pressure management	Grover et al[12]	3	Review of 1078 consecutive facelifts.	Systolic blood pressures greater than 150. demonstrated a 3.6 increased odds ratio of hematoma.
Blood pressure management	Baker et al[2]	3	30-year review of male patients undergoing facelift.	Significant reduction of hematoma rates from 8.7% to 3.97% after a strict blood pressure protocol was implemented.
Blood pressure management	Trussler et al[31]	3	National consensus survey regarding management of hypertension in patients undergoing facelift procedures.	Found a trend between higher hematoma rates in patients whose systolic blood pressure was greater than 139 after surgery.
Blood pressure management	Moreira et al[32]	1	Randomized controlled trial of 80 patients assigned to a perioperative atenolol group or a control group.	In the atenolol cohort, mean blood pressures and heart rates were lower, with 0 hematomas, compared to the control group hematoma rate of 7.4%.
Blood pressure management	Ramanadham et al[33]	3	Review of 1089 consecutive facelifts.	Postoperative hematoma 0.9% (10 patients). 8 of these patients had documented HTN in the PACU ($P = .045$) with male sex being a significant risk factor for hematoma formation ($P < .001$).
Drains	Huang et al[34]	1	Randomized trial of 46 female patients. 16 patients had a drain placed on the left, 14 patients with drain on the right, and 16 patients with no drain. Drains were removed after 24 hours.	No significant differences in postoperative swelling.
Drains	Jones and Grover[23]	3	Single-surgeon review of 910 patients.	Drains, fibrin, and dressings did not decrease hematomas. However, there was a significant reduction in the hematoma rate with *removal* of adrenaline from tumescence.
Drains	Jones et al[27]	1	Randomized controlled trial of 50 consecutive facelift patients. Drains were placed on 1 side of the face with the contralateral side serving as the paired control.	Hematoma and edema were not significantly influenced by drains.
Drains	Perkins et al[35]	1	Randomized trial of 222 consecutive facelifts. Two groups, 1 with drains and 1 without.	Drains decreased seroma formation (37% vs 15%) but did not significantly decrease hematomas.

HTN, hypertension; PACU, post-anesthesia care unit.

hematoma rate was 4%, compared to 0% hematoma rate in the clonidine group.[30] Other medications have been given for perioperative blood pressure control. The randomized controlled trial by Moreira et al assigned 80 patients to a perioperative atenolol group or a control group. In the atenolol cohort, mean blood pressures and heart rates were lower, with 0 hematomas compared to the control group hematoma rate of 7.4%.[32] Additionally, in a 30-year review of male patients undergoing facelift, Baker and colleagues found a significant reduction of hematoma rates from 8.7% to 3.97% after a strict blood pressure protocol was implemented.[2] However, the ideal blood pressure had yet to

be established. In a review of 1078 facelifts, Grover found that systolic blood pressures greater than 150 demonstrated a 3.6 increased odds ratio of hematoma.[12]

In a national consensus study, Trussler et al found a trend in higher hematoma rates in patients whose systolic blood pressure was greater than 139 after surgery.[31] Ramanadham et al supplemented these findings in their review of 1089 consecutive facelifts, which found a systolic blood pressure greater than 140 significantly contributed to the rate of hematoma.[33] In a recent retrospective study consisting of 502 patients, Bassiri-Tehrani et al showed that treating systolic blood pressure >120 mmHg reduced the risk of postoperative hematoma, with hematoma incidence of 3.76% in the loose control group and 0.5% in the strict (<120 mmHg) control group.[36]

Conclusion

Blood pressure is a well-known risk factor for hematoma after facelift. All causes of elevated blood pressure must be addressed, including pain, nausea and vomiting, anxiety, and bladder distension. The application of antihypertensive agents is advocated prophylactically with a goal of a systolic blood pressure <140 mmHg.

Hemostatic Net

The hemostatic net is gaining in popularity for controlling hematoma and redraping undermined skin. Proponents cite that the closure of dead space in the areas of undermined skin flaps allows for tissue apposition and theoretical decreased rates of hematoma and seroma. Skeptics point to the increased surgical time, unsightly appearance, and a theoretical increased risk for skin necrosis.[37] Internal quilting sutures have already been applied in our specialty, most commonly in abdominoplasty.[37,38] Expanding on this literature, Auersvald et al examined quilting suture use in the facelift population. In the study, they examined 405 consecutive patients and found no hematomas in the quilting net group compared to a 14.2% hematoma rate of the historic control group.[15] In addition, a retrospective review by Janssen et al of 304 patients who had a hemostatic net and 359 control patients found that placement of a hemostatic net significantly reduced hematoma rate, with 3.9% in the control group and 0.6% in the hemostatic net group ($P = .006$).[16]

The hemostatic net is not without risk. There have been reports of localized skin necrosis from the suture itself. If sutures are not removed in a timely manner after surgery (typically at 48 to 72 hours), the suture may leave behind lasting marks on the skin. Ironically, the hemostatic net itself can cause bleeding. The needle itself may injure a vessel at the time of placement in the operating room, however the pressure and tamponade effect of tying the suture prevents bleeding until the suture is removed days later in the office. Reports of delayed bleeding and hematoma after removal of the net have been described.

Finally, the cost analysis and return on investment (ROI) of the hemostatic net should be taken into consideration. If a surgeon's hematoma rate is low (1% to 3%), adding an extra 20 to 40 minutes (in the best of hands) on each side of the face not only subjects the patient to the potential morbidity of additional anesthesia, but also adds costs. For the hemostatic net to truly be cost effective, it would have to drastically reduce hematoma rates (as described in the original literature) to save money on costs of dealing with the complications, such as returning to the operating room, staff, and supplies. If no drastic improvement in hematoma rates is appreciated due to the low rate of hematomas in the first place, the hemostatic net affords little more than added surgical and anesthetic time in the operating room with costs. Despite this, judicious use of the hemostatic net in high-risk patients, for example, it may offer a male patient with hypertension on anticoagulants or antiplatelets an insurance policy for preventing a hematoma.

Conclusion

Transcutaneous quilting sutures may decrease the rate of hematoma and seroma formation if applied appropriately in selected patients, however placement of the net itself has risks of bleeding, skin necrosis, skin irregularities, and marks. Surgeons who have a low rate of hematoma after facelift may not appreciate the benefit of the hemostatic net while adding undue operative time, risk of anesthesia, and cost to the patient. Therefore, judicious utilization of the hemostatic net should be considered on a case-by-case basis.

Surgical Technique

Grover et al described that the single most important risk factor contributing to a hematoma during a facelift was open neck procedures such as the anterior corset platysmaplasty, with which patients are 4.3 times more likely to develop a hematoma.[12] Several perforators are at risk, particularly in the submental region. The added pressure from the platysmaplasty may hamper venous return, potentiating bleeding from the returning veins.

In a meta-analysis including 183 studies, Jacono et al found a higher rate of major hematoma in deep plane dissection facelifts and SMASectomy when compared to SMAS plication. The odds ratio of hematoma with deep plane facelift is 1.68 when compared to SMAS plication. The odds ratio of hematoma with SMASectomy is 2.64 when compared to SMAS plication. There was an increase in odds ratio of minor hematoma with SMASectomy vs SMAS plication. There was also a reduction of minor hematoma for a high lateral SMAS facelift compared to SMAS plication (odds ratio 0.07).[39]

Conclusion

Deep plane dissection in the face and neck may put the patient at a higher risk of bleeding due to the additional dissection required to raise the deep plane flaps. Blood vessels deep to the SMAS are at risk of injury and bleeding, and subsequent hematoma after surgery.

Compression Dressings

External compression has also been utilized in the forms of foam tape, plastic wraps, and customized garments.[16,28] A randomized controlled trial by Jones et al examined hilotherapy (cooling dressings) in 50 patients. However, this study revealed that although patients commented that the cooling garment was comfortable it came at the expense of a statistically significant increase in patient-reported postoperative swelling. No benefits in treatment of ecchymosis, hematoma, or pain were seen.[28] In Jones and Grover's review of 910 patients, with a hematoma rate of 4.4%, comparison of patients with standard postoperative compressive dressings to those without postoperative dressings found the hematoma rate to be the same (4.2% vs 4.6%).[23]

Conclusion

External compressive dressings, including hilotherapy, have not been shown to decrease the incidence of hematoma.

Tumescent, Tranexamic Acid, Epinephrine

For many surgeons, infiltration is a critical step before the facelift dissection. However, the composition of the infiltration fluid varies greatly from surgeon to surgeon. Jones and Grover retrospectively examined their series of 910 patients and concluded that drains, fibrin, and dressings did not decrease hematomas. However, they found that there was a significant reduction in the hematoma rate with *removal* of adrenaline from the infiltration fluid (7.4% vs 0%).[23] The authors described a rebound phenomenon, in which epinephrine acted as a potent vasoconstrictor during surgery but resulted in rebound vasodilation after the case was over. Interestingly, all of these patients had received low molecular weight heparin before surgery for deep vein thrombosis prophylaxis. The same authors also published a study of over 600 facelifts comparing tumescent and no tumescent and found no differences in hematoma formation.[22] Despite that, many other complications related to wound healing, alopecia, and scar hypertrophy were lower in the tumescent group. Most if not all surgeons, including one of the authors of that paper, infiltrated the face with a mixture containing epinephrine or another vasoconstrictive agent.

The role of tranexamic acid (TXA) within the infiltration fluid was examined in 2020 by Schroeder et al, comparing infiltration with and without TXA in a cohort of 76 patients. They did not find a difference in rates of minor or major hematoma with the addition of TXA.[24] The recent prospective, randomized, double-blinded trial by Cohen et al examined 44 patients undergoing facelift. The treatment group received 1 gm of TXA intravenously before incision and another 1 gm 4 hours later, and this group was compared to a saline control. They found a significant reduction in postoperative bruising as well as a decrease in fluid collections, but no hematomas occurred in the treatment or control group.[25] The safety profile of TXA has been well investigated, with no increased risk of thrombotic events.[25,40]

Conclusion

The infiltration mixture may aid in a surgeon's dissection but does not affect the rate of hematoma. Epinephrine within the fluid may increase the rate of hematoma through the rebound effect. Systemic TXA may decrease ecchymosis and small fluid collections.

Adjunct and Home Medications

Multiple other medications have been administered in facelift surgery. Although these may not affect the rate of hematoma directly per se, they may have downstream effects that possibly reduce hematomas. One of the most-used adjuncts in those undergoing general anesthesia is ondansetron for the avoidance of postoperative nausea and vomiting (PONV). Rates of PONV are higher in females and seen in 25% to 30% of patients.[41] A prospective, randomized controlled trial by Marcus et al included 120 patients. They showed that ondansetron significantly decreased rates of emesis and nausea (33% incidence in the control group vs 22% in the ondansetron group).[6] Episodes of emesis can lead to hematoma, so avoidance of PONV is crucial.[42,43] The series by Frojo et al found a rate of PONV of 45%, and that 3.6% had postoperative emesis following facelift.[7] Steroids have also been advocated as an adjunct to facelift, and in 2 randomized studies their role in managing edema was evaluated. The first, by Rapaport et al, included 50 patients and compared 6 mg of betamethasone given preoperatively to no steroids. They did not find any difference in postoperative swelling or hematoma.[8] The second randomized controlled trial was performed by Owsley et al; they examined 30 facelift patients.[9] They also did not find a difference in complications or postoperative swelling. The question of whether to administer adjunct medications prophylactically vs reactively was answered by Beer et al. In their retrospective study of 376 patients, they included clonidine for blood pressure control, ondansetron for PONV, and acetaminophen for pain. They then compared patients who were given these medications as needed (PRN; 7% hematoma rate)

with those that were given them prophylactically (0% hematoma rate) and found a significant difference ($P = .029$).[10]

There are medications that are commonly taken by patients that may affect hematoma risk. Aspirin is one of the most-cited medications that has an increased hematoma risk. In the study by Abboushi et al involving 630 patients, despite stopping aspirin 7 days before surgery, the rate of hematoma formation in the aspirin group was 18%, compared to 4.1% in those not on aspirin.[11] A history of taking aspirin was also found to significantly increase the risk of hematoma formation in a review of 1078 patients by Grover et al, despite patients stopping the medication 14 days before their procedure (risk ratio, or RR = 2.3, $P = .04$).[12] In addition, antidepressants have been discussed as a medication that may lead to increased bleeding after a facelift.[44] The proposed theory is that selective serotonin reuptake inhibitors (SSRIs) inhibit serotonin uptake in platelets and impair hemostatic response.[44] However, stopping antidepressants acutely carries an increased risk of rebound depression. Harirchian et al examined 250 consecutive patients, 22 of whom were taking antidepressants. They found a hematoma (minor or major) rate of 1.95% for the non-antidepressant group and a 1.72% hematoma rate for the antidepressant group.[13] These effects may be linked to patient age, because Kim et al demonstrated an increased rate of hematoma in patients over the age of 60.[45] However, overall, the evidence supports the continuation of these medications perioperatively, and the risks of abruptly discontinuing antidepressants are not insignificant.[13,14]

Conclusion

Adjunct medications to prevent postoperative nausea and vomiting may decrease hematoma rates if they are given prophylactically. Aspirin must be held preoperatively, and antidepressants should be continued through the perioperative surgical course.

Local Anesthesia

PONV and rebound hypertension postoperatively have been a hematoma concern for decades.[46] This has led some surgeons to avoid general anesthesia altogether and perform facelifts under local anesthesia. Two recent studies have considered the safety of facelift under local anesthesia. Frojo et al analyzed 174 patients, and found a very high hematoma rate of 13.2%, however these were largely managed by percutaneous needle aspiration and the reoperation rate for hematoma was 1.1%.[7] They also discovered that there was no increased risk of hematoma in their patients with a history of hypertension or in patients with an intraoperative systolic blood pressure over 140 mmHg. They concluded that local anesthesia and the elimination of nothing by mouth (NPO) decreases the rates of postoperative emesis and rebound hypertension. The same year, Moris et al reviewed 1500 patients who underwent facelift under local anesthesia. They reported a hematoma rate of 0.6%, which they attributed to enhanced perioperative blood pressure control with local anesthesia.[26]

Conclusion

In the correct patient, facelift surgery can be performed safely under local anesthesia. Local anesthesia may decrease the rate of hematoma formation in populations that are at increased risk.

Tissue Sealants

Tissue sealants, fibrin glues, and platelet gels utilize the common pathway of the coagulation cascade to convert fibrinogen into fibrin. These sealants typically consist of mixing 2 components: fibrinogen, calcium chloride, and various coagulation factors with thrombin and an antifibrinolytic agent. Varying the concentration of thrombin alters the polymerization time and time to hemostasis. Multiple studies and many randomized controlled trials have described analysis of tissue sealants' role in facelift surgery. In 1994, Marchac compared 200 sides of faces to the contralateral and found a hematoma rate reduction of 9% to 2% with fibrin glue.[17] But the randomized controlled trial in 2013 by Hester et al that included 75 patients did not show a hematoma reduction.[18] Subsequently, 2 meta-analyses have been published, the first by Killion et al, which demonstrated hematomas were 4 times less likely with fibrin glue, and the second meta-analysis by Giordano et al, which described a decrease in hematoma with a risk reduction of 0.37.[19,20] However, it should be noted that the average cost of tissue sealant is $500 to $600 minimum, and the ROI does not justify this expense.

Edema/Ecchymosis

Oliver's randomized controlled trial of 20 patients found a decrease in drainage (10 cc vs 30 cc) with fibrin sealants but no hematoma reduction.[21] The same year, Powell also performed a randomized trial of 8 patients treated with autologous platelet gel and cited benefits to edema and ecchymosis.[47] The meta-analysis by Killion et al did not show a reduction in seroma formation, and the meta-analysis by Giordano et al did not show a reduction in seroma or ecchymosis. They did however show a statistically significant decrease in edema (RR 0.30).[19,20]

Conclusion

Fibrin sealant may decrease the rates of hematoma, wound drainage, and edema. They do not appear to affect ecchymosis or rates of seroma formation.

Drains

Closed-suction drains minimize dead space and encourage tissue apposition. Multiple studies have described their effect on hematoma, seroma, ecchymosis, and edema. Huang et al were the first to study drain use during facelift surgery over 30 years ago.[34] They examined 46 female patients who had drain placement either on the right side of the face, left side, or no drain and found there was no decrease in hematoma with drain placement. Ironically, the only hematoma in their study was found after 1 of the drains was removed. Ten years later, in a single-surgeon study of 222 consecutive patients, Perkins et al demonstrated that drains decreased seroma formation (37% vs 15%) but did not decrease hematomas.[35] Jones et al also performed a retrospective review of 678 facelift patients with a 4.4% hematoma rate and also did not find a benefit to drain placement.[22] Jones et al then performed a randomized controlled trial involving 50 patients in whom the drains were randomized to a side of the face and the contralateral served as a control.[27] They found edema and hematoma were not changed by drain placement, but did decrease bruising by clinical assessment and patient assessment. The hemostatic net has been utilized by some surgeons to eliminate dead space and obviate the placement of drains.

Conclusion

Drains do not decrease incidence of hematoma. Drain placement decreases the incidence of seroma and may also decrease ecchymosis.

CONCLUSIONS

The various SMAS facelift techniques have been studied in the meta-analysis by Jacono et al and have not demonstrated a statistically significant difference between techniques.[39] Rather, the sine qua non for hematoma prevention in facelift surgery is meticulous hemostasis performed by the surgeon intraoperatively. Adjunct measures described in this article include vigorous blood pressure management, the judicious use of quilting sutures in high-risk patients, the prevention of PONV, local anesthesia, and the consideration of tissue sealants. These measures are likely additive and together can minimize hematoma rates after facelift. Of course, the most important adjunct may still be appropriate patient selection. Additionally, a few manuscripts mentioned have smaller sample sizes and present a limitation that further research would help to strengthen.

Disclosures

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