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Research Article

Decrease in Hematoma Rate After Adopting Bloodless Atraumatic Technique (Bat): A Single Surgery Center Experience of 305 Face-lifts over 6 Years

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Abstract

Introduction

Facelift is the seventh most common aesthetic surgical procedure in Italy, and this procedure is gaining in interest and certainly represents a large portion of plastic surgery practice with more than 11.000 procedures. In this study we examine our single accredited outpatient surgery center experience transitioning from the use of classical facelift technique to the use of BAT facelift.

Methods

We performed a retrospective analysis of all facelifts cases performed over a 6-year period from January 2010 to April 2016 by multiple surgeons in the practice. In a predictable manner delivering BAT facelift results need that surgeons read carefully, practice cautiously, and implement closely all of the procedures that have been described and identified.

Results

Three of the most interesting findings were a significantly decreased rate of hematoma, bruising and long lasting edema (more than 14 days) in the BAT group, with 0% vs 9,1% for hematoma, 9.9% vs 31% for bruising and 3,48% vs 17,64% for long lasting edema.

Other sensitive elements were the decrease rate of seroma and nerve injury with 0% in the BAT patients and 3,92% in the TF group for the first and 0% in the BAT and 2,94% in the TF, although the lesions were always non permanent (lasting interval from 7 days to 90).

Discussion

Several key articles have presented support for the Bloodless Atraumatic Technique. Hematoma may be linked to several factors in facelift. All kind of trauma, bleeding and blood soaking into tissues, causing pain, swelling and inflammation could increase this risk and that of bruising and long term edema.

Conclusions

The use of Bloodless Atraumatic Technique significantly decreased the hematoma rate in our practice and our experience adds to the mounting evidence that surgeons should consider using the BAT and reduce classical technique. Bloodless Atraumatic Technique facelift offer objective improvements in recovery, complications, reoperation rates, and the overall patient experience, but do not happen in a predictable manner without substantial commitment of the surgical staff and effort primarily of the surgeon.

Introduction

Facelift is the seventh most common aesthetic surgical procedure in Italy, according to statistics released by the Italian Association of Aesthetic Plastic Surgery in 2014 [1]. This procedure is gaining in interest (16.9% more procedures than 2013) and certainly represents a large portion of plastic surgery practice with more than 11.000 procedures. Many Authors [2-7] in the literature have published the rate of hematoma in facelift in their experience with a mean of 7,24 % (Table 1).

Author	Hematoma Rate
Baker	5,85%
Pitanguy	6,6%
Grover	8,15%
Abboushi	7,8%
Lawson	9,6%
Rohrich	6,0%

Table 1: Rate of hematoma in facelift in their experience.

Despite mounting evidence that classical technique in facelift may actually have higher hematoma rates, many surgeons are reluctant to change their practice to adopting a procedure that can lower or totally eliminate this risk.

In October 2015 and June 2016, after more than a decade of work refining all of the processes, instruments, materials and techniques of facelift, the senior Author presented two lectures, in two of the most respected professional congress in cosmetic medicine and surgery, the International Congress of Aesthetic Medicine of the Italian Society of Aesthetic Medicine (AMIEST) in Milan (Italy) and the International Congress of the World Academy of Cosmetic Surgery (WAOCS) in Velden (Austria). These lectures represented one scientifically confirmed methodology that enabled 95% of 186 consecutive patients to resume full normal activities within 7 to 10 days of their facelift. The Authors first reported in the literature the use of the Bloodless Atraumatic Technique (BAT)7since then many have been interested in comparisons and outcomes with this technique. In their paper in 2016 with 186facelift cases, S. Noviello et al. reported a hematoma rate of 0% and overall local complications of 2,6%. Feldman, have noted decreased hematoma rates after converting from classical facelift technique to atraumatic technique [8].

Given the mounting evidence that the use of BAT is predictable, safe and could reduce our hematoma rate, we decided to implement the procedure in all facelifts in our private practice in Milan, Italy. In this study we examine our single accredited outpatient surgery center experience transitioning from the use of classical facelift technique to the use of BAT facelift.

Methods

We performed a retrospective analysis of all facelifts cases performed over a 6-year period from January 2010 to April 2016 by multiple surgeons in the practice. “Mini” facelifts, where small flap was only elevated and redraped, without any SMAS involvement, were excluded from this study. It should be noted that during the study surgeons adopted the BAT technique;however, one continued the use of classical techniques. Additionally, patients with PT, PTT, ATIII, S Protein and C Protein out of range were excluded. Moreover secondary facelifts were excluded.

During the 6-year period, there were 305facelifts performed by three attending surgeons. There was a gradual transition from the two techniques beginning in 2011 when one of the surgeons began utilizing the BAT technique. Over the course of the next three years, the overwhelming majority of the facelifts being performed in the practice were utilizing the BAT technique. In the final study a total of 303 patients were included. Overall, there were 201 patients with BAT and 102 with traditional facelift (TF). Two patients from the conventional facelift group were removed from the statistical analysis after their charts were found to lack data about follow up or postoperative care.

Patient demographic information was obtained from the chart, including age, gender, and body mass index (BMI). Comorbidities including hypertension, smoking and diabetes were obtained from the history and physical examination. The operative report was used to determine whether BAT was utilized vs TF technique, and whether any related concurrent procedures such as blepharoplasty and cervical liposuction were performed. Postoperative follow-up length and complications including hematoma, bruising, long lasting edema (more than 14 days), infection, seroma, nerve injury, hypertrophic scar, skin necrosis, need for revision surgery, and pulmonary embolism/deep venous thrombosis (PE/DVT) were noted.

The study was conducted in accordance with the guidelines of the Declaration of Helsinki and prior written consent was obtained from all of the patients who participated in this study.

How to achieve a BAT Facelift

In a predictable manner delivering BATfacelift results need that surgeons read carefully, practice cautiously, and implement closely all of the procedures that have been described and identified [9-12]. Many surgeons implement and adopt some of the methods, but prefer not to follow the entire process described. Evidence clearly shows that not implementing all of the identified processes results in a failure to deliver this level of healing.

Patients, Surgeons and Surgical Staff

Patients play a major role in achieving BAT facelift recov-

ery. We provide comprehensive and detailed educational materials. Patients must fully understand the entire method, and what their role and responsibilities are toward making it happen.The surgeon must carefully control all the surgical theatre and operate in a facility where is assured that he can uniformly and repeatedly expect to work with the same personnel. The surgical team including anesthesiologists, nurses and all recovery personnel, will follow prescribed and precise protocols in a severe manner [13-16]. Of paramount importance the constant and permanent training of the surgeon alone and with his personal staff. Each member of the surgical staff has his own specific role and defined movements in order to reach the most efficient surgical method.

Surgical Processes and Instrumentations

Surgical techniques and instrumentations have been refined and selected to reduce all kind of trauma to tissues, and to virtually eliminate bleeding and blood soaking into tissues, causing pain, swelling and inflammation and increasing risks of complications. Implementing detailed surgical methods and instrumentations allow to reach a prospective hemostasis. The surgeon has the possibility to create the flap used for different face-lift procedures while preventing over 95% of bleeding that would normally occur with traditional strategies [17] (No Blood Technique).

The 4.0 MHz generators (Radiofrequency Electrosurgical Systems - Ellman International Hicksville, NY - USA), at a frequency 7-10 times higher than standard generators, provide surgical precision and controlled hemostasis. This advanced technology produces minimal lateral thermal spread, reducing the injury to surrounding tissue. The clinical benefits are minimal scar tissue formation, enhanced healing, decrease nerve injuries and long lasting edema rate and minimal post-operative pain, all highly desirable features for cosmetic surgery.By preventing bleeding before it ever occurs using the 4.0 MHz generator and specially designed electrocautery forceps (micro monopolar forceps, Ellman International Hicksville, NY-USA) to create the plane of dissection, blood does not soak into adjacent tissues and cause pain, inflammation, and increased rates of adherence that are common with older techniques that cause much more bleeding. Implementing detailed surgical techniques and instrumentation allow dramatic reduction of mechanical and thermal trauma to tissues, pain and swelling that result from tissue trauma (No Touch Technique). Specific surgical instruments (blunt retractor-ASSI-Accurate Surgical & Scientific Instrument-Westbury, NY-USA)and equipments (shadowless head lamp-Dr. Kim-#213, Ace Gwangmyeong Tower, 108 Haanro, Gwangmyeongsi, Gyeonggido, 423-798 Korea) allow surgeons to obtain optimal visualization while minimizing pressure and trauma to tissues, and to create the plane of dissection with much less trauma compared to blunt or sharp dissection techniques used by many surgeons, in traditional facelift, that rip and tear skin and subcutaneous tissues with a finger, a blunt instrument, a lancet or a scissor and cause much more bleeding [18].

Protocols for Patient Recovery

Defined protocols have been created for patient recovery both in the surgery facility and after returning home. The favorable reduction in tissue trauma and bleeding using the processes, the techniques and the instruments described results in decrease in pain, edema and ecchymoses, and return to normal activities within 7 to 10 days. Except for the first five days (24 Hours) and first 10 nights (12 Hours) patients do not have to tolerate the inconvenience of many commonly used postoperative devices, compressive bandages, drain, pain pumps, and rigid instructions to remain immobile and restrict activities [19-20].

Anesthesia Protocols

Only rigid adherence to fixed and defined technique of local anesthesia, employing materials and instruments selected appositely and developed to reduce mechanical trauma (i.e. cannula instead of needle),sedation and post-anesthesia recovery protocols that minimize the amount of medicines a patient receive and reduce the possibility of venous thromboembolism, allow BAT facelift. These protocols require the anesthesiologists to strictly follow the guidelines and surgeons to be able to perform facelifts in 120 minutes or less eliminating useless, unproductive, time-wasting steps and decision making in the operating theatre [21-23].

Local anesthetic injection with percutaneous blunt cannulae is likely one of the most important development in local anesthesia injection technique. Fine 22 gauge cannulae (lenght 10 cm) introduced through skin perforation created by 21 gauge special needles (Softfil-France) allow to infiltrate the entire area of the face through one or two needle holes in the superior and inferior cheek skin with the greatly added benefits of minimal pain and more important less bruising. The negligible downsides of blunt cannulae are the higher cost of cannulae versus sharp needles and the technical maneuver of getting the cannula in a needle hole [24].

Surgical Technique

The facelifts were performed as an outpatient procedure with the patient under local anesthesia and minimal sedation. A total of 10 mg of diazepam has been given intramuscularly before preparation and draping. This provided a comfortable relaxation, with low diminished consciousness. Tumescent infiltration with local anesthesia has been provided with a 22-gauge blunt spinal needle in BAT and with a 22-gauge sharp spinal needle in traditional facelift, by using a diluted solution of 0.3% lidocaine, 1:650,000 adrenaline, and 2 mEq of sodium bicarbonate [25].

Anesthetic Infiltration Solution

20 ml of 2% lidocaine solution
100 ml of 0.9% sodium chloride solution
0.2 mg of adrenalin
2 ml of 8.4% sodium bicarbonate

Table 2. Infiltration Solution.

An average of 80 ml of this infiltration solution has been used on each side of the face. At least 10 minutes was allowed for adequate blanching of the infiltrated skin. In both traditional and BAT facelift, an inverted L-shaped preauricular incision started at the most caudal end of the earlobe,directed upward, following the earlobe crease, crosses the incisura intertragica perpendicularly, made a little indentation to go on the tragal rim, followed the anterior border of the helical crus, further followed the hairline in the nonhair-bearing recess in front of the ear, and then turned anteriorly along the inferior limit of the sideburn. A retroauricular and an occipital incision has been used to create the posterior part of the skin flap. In both BAT and TF we marked the skin within the area of the parotid gland in order to be conscious of the higher protection of the branches of the facial nerve in this area. A skin flap was undermined in an oval area extending from above the zygomatic arch to the mandibular angle caudally and about 5 to 8 cm in the anterior direction. Only in the BAT the undermining of the skin flap has been performed for the first 2 centimeters with the needlepoint electrocautery pencil (4.0 MHz generators-Ellman International Hicksville, NY-USA); for the undermining of the subcutaneous tissue in the area of the parotid fascia with facelift scissors in the vertical spreading mode, connecting tunnels with micro monopolar forceps; for the rest of the dissection with Trepsat facial flap dissector scissor (ASSI-Accurate Surgical & Scientific Instrument-Westbury, NY-USA) leaving any possible tunnel intact in order to reduce any trauma, bleeding and necessity of hemostasis in this danger zone. In the traditional technique the plane of dissection has been created with blunt or sharp dissection, with a finger, a blunt instrument, a lancet or a scissor, with ripping and tearing of the skin and subcutaneous tissues and consequently more trauma and more bleeding.

The SMAS has been treated both in the BAT and classical technique by SMAS-ectomy and plication based on individual facial analysis, as previously described by Rohrich R.J [26]. If neck contour was not optimal after SMAS and platysmal plication, a 3-0 polyglactin spanning suture was placed from submental fascia to mastoid fascia, but this has not been a frequent occurrence [27]. In the BAT facelift was spent more time intraoperatively on hemostasis than in classical technique. We preferred to wait until the epinephrine has worn off before closing. While it may seem obvious, the greater the diligence in intraoperative hemostasis, the lower the postoperative hematoma rate. As stressed before in the BAT facelift surgical techniques and instrumentations have been refined and selected to reduce all kind of trauma to tissues, and to virtually eliminate bleeding and blood soaking into tissues. Implementing detailed surgical methods and instrumentations allowed to reach a prospective hemostasis (No Blood Technique). Of paramount importance in the BAT the constant rinsing of the surgical field with saline water in order to eliminate blood traces and to reduce the local temperature after performing hemostasis, thus decreasing the possibility of nerve injury and long lasting edema. Also the neck and cheek skin flaps were suspended in a mostly vertical or oblique vector in the cheek and neck skin was suspended in a slightly tighter and more posterior superior vector, both in BAT and traditional technique, as the excess skin was redraped in a cranial direction, marked, and resected [28]. The skin was sutured with no difference between the BAT and classical technique under strong vertical tension with three key points subcutaneous sutures of 3-0 Vicryl. There was no traction in the horizontal direction. The preauricular incision has been sutured under minimal tension. The earlobe, which was pulled cranially by putting vertical tension on the skin flap, was simply set back without tension as a little transposition flap. This avoided the risk of creating an unnatural, pulled-down earlobe [29]. Sometimes small skin folds appeared behind the ears along the retroauricular sulcus. The patients were informed preoperatively about the possibility of these small skin folds and about their spontaneous disappearance within 2 months. A further closure of the skin was performed with 4-0 Nylon intradermal in the preauricolar area and with 4-0 Vicryl as interrupted skin sutures along the rest of the incision. Although resorbable the Vycril has been removed after seven to ten days. Ice cooling was always applied for 2 hours after the procedure, and a light compressive dressing left on for 2 day. The patients could leave the office 4 hours after surgery. Also the dressing were removed after two days, and the patients could shower and wash their face and hair from then on. During the first 48 hours after surgery, patients were allowed to take limited amounts of soft food together with oral antibiotics and pain medication (paracetamol 1000mg twice a day). All patients were offered the opportunity of having daily facial lymphatic drainage massage during one week, starting on postoperative day 4.

Results

The demographics of the groups showed similar age with a mean BAT patient age of 52.5 years (range 40-65 years) and a mean TF patient of 55.5 years (range 44-67 years) (Table 3).

	BAT	TF
Number of Patients	201	102
Mean Age (years)	52.5 years (range 40-65 years)	55.5 years (range 44-67 years)
Mean BMI (Kg/m2)	21 (range 19-23)	21.5 (range 20-23)
Hypertension	18 (8.9%)	10 (9.8%)
Smoking	20 (9.9%)	12 (11.7%)

Diabetes	2 (0.99%)	1 (0.98%)

Table 3: Patient Demographics.

There were also similarities in mean BMI BAT 21 (range 19-23) and in mean BMI TF 21.5 (range 20-23); and in rates of hypertension BAT 18 (8.9%) TF 10(9.8%), smoking BAT 20 (9.9%) TF 12 (11.7%) and diabetes BAT 2 (0.99%) and TF 1 (0.98%) (see Table). There were 199 (99%) female and 2 (0.99%) male patients in the BAT group. 100 (98%) female and 2 (1.96%) male patients in TF group. Numerous patients also had superior and lower blepharoplasty: 98 (48.7%) patients BAT and 45 (44.1%) TF patients. Some patients had cervical liposuction 18 (8.9%) patients BAT and 10 (9.8%) TF patients. Average follow-up time BAT was 24 months (range 12 to 60 months) and TF was 22 months (range 12 to 54 months).

Ten main end points were examined in the BAT vs TF groups. These included rate of hematoma, bruising, long lasting edema, infection, seroma, nerve injury, hypertrophic scar, skin necrosis, need for revision surgery, and pulmonary embolism/deep venous thrombosis (Table 4).

	BAT	TF
Number of Patients	201	102
Hematoma	0 (0%)	9 (9,%)
Bruising	20 (9,9%)	32 (31%)
Long Lasting Edema	7 (3,48%)	18 (17,64%)
Infection	0 (0%)	0 (0%)
Seroma	0 (0%)	4 (3,92%)

	BAT	TF
Nerve Injury	0 (0%)	3 (2,94%)
Hypertrophic Scar	3 (1,49%)	1 (0,98%)
Skin Necrosis	1 (0,49%)	0 (0%)
Need for Revision Surgery	0 (0%)	0 (0%)
Pulmonary Embolism/DVT	0 (0%)	0 (0%)

Table 4: Complication Rates for the Different Groups.

Three of the most interesting findings were a significantly decreased rate of hematoma, bruising and long lasting edema (more than 14 days) in the BAT group, with0% vs 9,1% for hematoma, 9.9% vs 31% for bruising and 3,48% vs 17,64% for long lasting edema. Other sensitive elements were the decrease rate of seroma and nerve injury with 0% in the BAT patients and 3,92% in the TF group for the first and 0% in the BAT and 2,94% in the TF, although the lesions were always non permanent (lasting interval from 7 days to 90).

Infection, hypertrophic scar, skin necrosis, need for revision surgery and pulmonary embolism were similar between groups and were not significant.However, hypertrophic scar was slightly higher in the BAT group at 1,49% vs 0.98% in traditional facelift. We sought to identify whether there was any correlation between hypertension and hematoma formation, bruising and long lasting edema (Table 5).

Hypertension	BAT	TF
Number of Patients	18	10
Hematoma	0 (0%)	5 (50%)
Bruising	14 (77%)	8 (80%)
Long Lasting Edema	12 (66%)	8 (80%)

Table 5: Hypertension.

There were 18 (8.9%) patients who had hypertension in BAT group and 10 (9.8%) in the TF group. Of these groups, 0 (0%) hematoma occurred in BAT patients and 5 (50%) in TF; 14 (77.7%) patients reported bruising in the BAT group and 8 (80%) in the TF; 12 (66.6%) patients showed long lasting edema (more than 14 days) in the BAT and 8 (80%) in the TF. These correlations were significant except for hematoma formation in the BAT group (Table 6). We also looked for independent correlations between smoking and hematoma, bruising and long lasting edema. Actually We found that 0 (0%) hematoma occurred in BAT and 1(8.3%) occurred in TF, thus there was no evidence here that smoking increased the rate of hematoma. But 16 (80%) patients reported bruising in the BAT group and 10 (83.3%) in the TF; 14 (70%) patients showed long lasting edema (more than 14 days) in the BAT and 9(75%) in the TF; thus there was evidence that smoking increased the rate of bruising and long lasting edema in both the BAT and TF (Table 6).

Smoking	BAT	TF
Number of Patients	20	12
Hematoma	0 (0%)	1 (8,3%)
Bruising	16 (80%)	10 (83,3%)
Long Lasting Edema	14 (70%)	9 (75%)

Table 6: Correlations between smoking and hematoma, bruising and long lasting edema.

We investigated also for any correlations between concurrent surgical procedures like blepharoplasty (Table 7) and cervical liposuction (Table 8) and hematoma, bruising and long lasting edema. Actually we found for blepharoplasty that 0 (0%) hematoma occurred in BAT patients and 4(8.8%) occurred in TF patients, thus there was no evidence here that blepharoplasty increased the rate of hematoma. But 18 (18.3%) patients reported bruising in the BAT group and 21 (46.6%) in the TF; 40 (40.8%) patients showed long lasting edema (more than 14 days) in the BAT and 25 (55.5%) in the TF; thus there was evidence that concurrent surgical procedure as blepharoplasty increased the rate of bruising and long lasting edema in both the BAT and TF.

Blepharoplasty	BAT	TF
Number of Patients	98	45
Hematoma	0 (0%)	4 (8,8%)
Bruising	18 (18,3%)	21 (46,6%)
Long Lasting Edema	40 (40,8%)	25 (55,5%)

Table 7: Correlations between concurrent surgical procedures like blepharoplasty and hematoma, bruising and long lasting edema.

Cervical Liposuction	BAT	TF
Number of Patients	18	10
Hematoma	0 (0%)	1 (10%)
Bruising	3 (16,6%)	3 (30%)
Long Lasting Edema	3 (18,8%)	2 (20%)

Table 8: Correlations between concurrent surgical procedures like cervical liposuction and hematoma, bruising and long lasting edema. For the cervical liposuction group We found for that 0 (0%) hematoma occurred in BAT patients and 1(10%) occurred in TF patients, thus there was no evidence that the liposuction increased the rate of hematoma. 3 (16.6%) patients reported bruising in the BAT group and 3 (30%) in the TF; 3 (18.8%)patients showed long lasting edema (more than 14 days) in the BAT and 2 (20%) in the TF; thus there was evidence that concurrent surgical procedure as cervical liposuction slightly increased the rate of bruising and long lasting edema in both the BAT and TF.

Discussion

Several key articles have presented support for the Bloodless Atraumatic Technique, including the Feldman paper of 2014. We have also reported a dramatic decrease in the rate of hematoma from 7.24% to 0% with the use of BAT in our study of 2016.

Hematoma may be linked to several factors in facelift [5,18,19]. All kind of trauma, bleeding and blood soaking into tissues, causing pain, swelling and inflammation could increase this risk and that of bruising and long term edema. Implementing itemized surgical methods and instrumentations, as realized in BAT, allow to reach a prospective hemostasis, it means the surgeon has the possibility to create the flap for different facelift procedures while preventing bleeding before it ever occurs (No Blood Technique); and allow dramatic reduction of mechanical and thermal lesion to tissues (No Touch Technique). Specific surgical instruments and equipments permit surgeons to obtain optimal visualization while minimizing pressure and trauma to tissues, and to create the plane of dissection with much less trauma compared to blunt or sharp dissection techniques that rip and tear skin and subcutaneous tissues with a finger, a blunt instrument, a lancet or a scissor and cause much more bleeding [25]. Another contributing factor may be the time We spent intraoperatively on hemostasis, longer in the Bloodless Atraumatic Technique than in Traditional Facelift. As We have highlighted before while it may seem obvious, the greater the diligence in intraoperative hemostasis, the lower the postoperative hematoma rate. Bloodless Atraumatic Technique facelift offers also objective improvements in complications, reoperation rates, recovery and the overall patient experience, but do not happen in a predictable manner without substantial commitment of the surgical staff and effort primarily of the surgeon.

Obvious limitations in our study include the retrospective nature as well as having multiple surgeons involved. Since it is retrospective there could have been bias in the one surgeon who transitioned from TF to BAT in choosing low risk patients at the beginning of their experience and thus skewing the results in favor of the BAT. However, having multiple surgeons adds variables which we did not examine but it did also add some constants as 2 surgeons treated every patient with BAT and one surgeon treated every patient with TF. Hypertension, smoking, BMI, or concomitant surgical procedures like blepharoplastyor cervical liposuction did not increase the complication rate or hematoma in the BAT group.

Conclusions

The use of Bloodless Atraumatic Technique significantly decreased the hematoma rate in our practice. Unfortunately, there is no level one evidence that proves that the use of BAT has a lower hematoma rate than using Traditional Facelift procedure. A well powered, thus likely a multicenter, randomized controlled study is needed in order to definitively lay this question to rest. However, our experience adds to the mounting evidence that surgeons should consider using the BAT and reduce classical technique.

Bloodless Atraumatic Technique facelift offer objective improvements in recovery, complications, reoperation rates, and the overall patient experience, but do not happen in a predictable manner without substantial commitment of the surgical staff and effort primarily of the surgeon. Offering this redelineated level of patient journey needs that surgeons study all the entire method and strictly follow the processes and techniques.

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