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Safety of Combined Facial Plastic Procedures Affecting Multiple Planes in a Single Setting in Facial Feminization for Transgender Patients

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Abstract

Background The objective is to evaluate the safety of performing multiple combined facial plastic surgical procedures affecting various planes of the face including rhytidectomy, forehead contouring with browlift, cheek implants, rhinoplasty, and mandible contouring in a single setting.

Methods This is a retrospective study of patients undergoing facial plastic surgery with the senior author at Boston Medical Center from 2005 to 2017. Patients were included if they underwent all of the above procedures in one setting and had not had previous facial surgery. The primary outcome measure was local postoperative complications of tissue necrosis and wound dehiscence. The secondary outcome measures were general postoperative complications of venous thromboembolism and prolonged intubation.

Results A total of 25 patients met inclusion criteria. Four patients experienced an infection—two patients had cheek implant infections delayed by months, one had a facelift hematoma that became infected, and one had an intraoral incision infection. One patient suffered from pulmonary embolism 2 months after surgery in the setting of hormone replacement therapy. All patients were extubated at the end of the case and none required reintubation. All patients had good cosmetic results.

Conclusion Despite elevating multiple planes of the face at the same time, there were no complications related to vascular supply in any of the patients. Complications were limited to those known to occur with the individual procedures. This study demonstrates that concurrent procedures that elevate multiple planes in the face in a single setting may be performed safely and with good cosmetic outcomes.

Level of Evidence IV This journal requires that authors assign a level of evidence to each article. For a full description of these evidence-based medicine ratings, please refer to the table of contents or the online instructions to authors www.springer.com/00266.

Keywords Combined procedures · Facial plastic surgery · Multiple facial procedures · Face lift · Transgender · Concurrent procedures · Facial feminization

Introduction

Patients who are interested in multiple cosmetic facial procedures are increasingly interested in having them performed concurrently. Advantages are related to one anesthetic and recovery period as well as an earlier achievement of the desired aesthetic result. However, the surgeon may justifiably have concerns about the preservation of necessary blood supply to the various flaps created as well as about the prolonged operative time and associated anesthesia risks.

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Previous studies have assessed the safety of combined cosmetic procedures. However, these focus on combinations of two to three cosmetic procedures typically involving body (abdominoplasty and/or liposuction) and breast procedures sometimes combined with facial procedures. The risk of morbidity was found to be quite low, but venous thromboembolism risk was increased for combined abdominoplasty and liposuction procedures [1, 2]. As these procedures were performed on different parts of the body, they do not address performing procedures in multiple facial planes concurrently. This previous literature does not adequately address our question regarding the safety of multiple planes of facial dissection at a single setting. Additionally, the risk of venous thromboembolism for facial procedures alone is very low [3].

Studies in the facial plastic surgery literature demonstrate improved aesthetic results by combining procedures such as rhinoplasty and chin procedures or rhytidectomy and cheek or chin augmentation with alloplastic implants [4, 5]. It is also common practice to combine aging face procedures such as rhytidectomy, neck liposuction, and blepharoplasty. However, there is no evidence evaluating the safety of raising multiple planes in the face at the same time.

The purpose of this study is to evaluate the safety of performing multiple combined facial plastic surgical procedures including rhytidectomy, forehead contouring with browlift, cheek implants, rhinoplasty, and mandible contouring in a single setting.

Methods

Patient Population

A retrospective chart review was performed of patients undergoing facial plastic surgery with the senior author at Boston Medical Center from 2005 to 2017. The study included all patients within this time frame who were at least 18 years of age or older and had all of rhytidectomy, forehead contouring with browlift, cheek implants, rhinoplasty, and mandible contouring in a single setting. Patients were excluded if they did not undergo at least the five previously mentioned procedures and if they had had any previous facial procedures. There were 25 patients who met the inclusion criteria, some of whom had more than the required procedures. The Institutional Review Board of Boston Medical Center approved the study.

Outcome Measures

The primary outcome measure was local postoperative complications of tissue necrosis and/or wound dehiscence. The secondary outcome measures were general postoperative complications of venous thromboembolism and prolonged intubation. Postoperative complications were noted at follow-up visits.

Operative methods

Patients who underwent all procedures including rhytidectomy, forehead contouring with browlift, cheek implants, rhinoplasty, and mandible contouring in a single setting without a history of previous facial surgery were included. Incisions and extent of dissection are illustrated in Fig. 1. Patients on hormone replacement therapy were given guidelines by their endocrinologist and were typically required to be off for 2 weeks prior to surgery and restarted typically 1 week postoperatively if they were ambulatory and had completed their travel home. Patients were requested to stop smoking 1 month prior to surgery. Each patient was placed on prophylactic oral antibiotics and antiseptic mouth rinse for 1 week after surgery.

Each patient was taken to the operating room and placed under general anesthesia with paralysis. Patients were endotracheally intubated at the beginning of the case and extubated after all procedures were completed. All procedures lasted approximately 6–8 h. The patients were taken to the recovery room and then transferred to the floor for overnight observation.

Forehead contouring with browlift was performed first via either a bicoronal or pretrichial approach with dissection in a subperiosteal plane to the level of the lateral orbital rims anteriorly, and lateral dissection was deep to the temporalis fascia for facial nerve preservation [6]. Posterior dissection was also performed in a subgaleal plane for scalp advancement. Rhinoplasty was performed via either external or endonasal approaches. Tip work and osteotomies were performed on each patient, while other procedures such as septoplasty, dorsal hump reduction, and alar base reduction were performed on a case-by-case basis. Cheek augmentation was then performed via intraoral gingivobuccal incisions, and silastic implants were placed in subperiosteal pockets. Mandible contouring was performed via gingivobuccal incisions bilaterally and in the midline for a subperiosteal dissection to approach the bone. These flaps were elevated laterally and inferiorly to expose the inferior border of the mandible from angle to angle. A power rasp was used to shape the bone at the angles and along the inferior border laterally and at the chin taking care not to injure the mental nerves. Rhytidectomy was standardly performed as the last procedure. A SMAS plication or an optimum mobility technique as described by Fanous was used [7, 8]. Flap dissection was typically 6 cm anterior to the tragus.

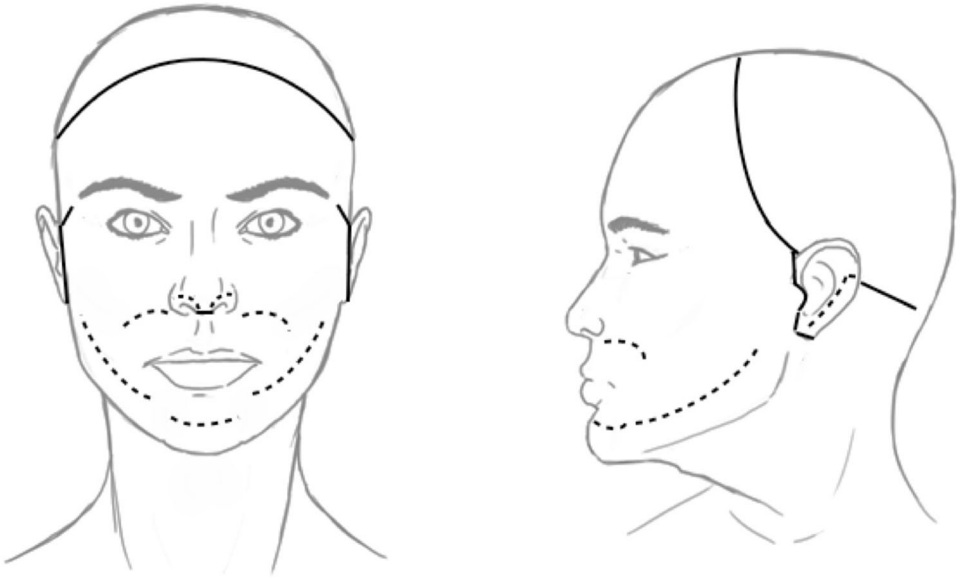

Fig. 1 External and intraoral/intranasal incisions for browlift, rhinoplasty, cheek augmentation, mandible contouring, and rhytidectomy

The patients were extubated in the operating room, and postoperative overnight observation was standard. A facial compression dressing was placed postoperatively, and patients were recommended to change daily until follow-up. Staple and suture removal was performed at 8 days postoperatively. All postoperative photographs in the chart were reviewed for this study.

Results

An initial query of patients undergoing facial plastic procedures with the senior author (J.H.S.) during the specified time period from 2005 to 2017 resulted in 25 patients who had undergone at least the combination of procedures including rhytidectomy, browlift with forehead contouring, cheek implants, rhinoplasty, and mandible contouring in a single setting. Patients were excluded if they had had previous facial surgery. Patients included in this study were relatively healthy, with nine patients having hypertension and two patients having hypothyroidism. Postoperative follow-up was up to 3 years.

Known complications included four patients who developed an infection—two patients had cheek implant infections each delayed by several months, one had a small facelift hematoma that became infected, and one had an intraoral incision with mild dehiscence which was attributed to local infection. One patient suffered from pulmonary embolism 2 months after surgery in the setting of resumed estrogen hormone replacement therapy. All patients were extubated at the end of the case, and none required reintubation. All patients were satisfied with their cosmetic results.

The average patient age at the time of surgery was 53.9 years with an age range between 37 and 65 years. All patients were male-to-female transgender individuals. The anesthesia time ranged from approximately 6 h to just over 8 h, though charts prior to 2014 did not contain this information. Minimum follow-up was 1 week and average was 20.58 weeks. Many patients traveled for surgery and were unable to return for in-person routine follow-ups. While all patients underwent the listed procedures, many patients had additional procedures including chondrolaryngoplasty, lip lift, neck liposuction, dermal fat grafts to upper lip and/or nasolabial folds, upper/lower blepharoplasty, otoplasty, and chin implant in the same setting listed. Table 1 shows the patient characteristics including age, length of anesthesia, other procedures performed, complications, and length of total follow-up documented in the patient chart. Figure 2 shows example images of a patient preoperatively, 1 week postoperatively, and 6 months postoperatively.

Discussion

The benefits of combining facial plastic procedures include reducing the overall anesthetic and operative time and cost, having one recovery period, maximizing surgeon efficiency, and achieving optimal facial reconstruction in one setting. While patients are increasingly requesting concurrent procedures, safety is paramount. Concerns about combining procedures primarily include those about blood supply to various flaps created and prolonged operative time and anesthesia.

Table 1 Characteristics of each patient included in the study

Patient	Age	Anesthesia time	Additional procedures	Complications	Total follow-up time reviewed (weeks)
1	43	*	TS, LL	–	164
2	53	*	TS, LL, FG	–	9
3	52	*	LL	–	1
4	39	*	Oto	–	1
5	52	*	TS, LL, B	–	1
6	60	*	TS, LL, B	–	1
7	37	*	TS, LL, FG	–	1
8	44	*	TS, LL, FG, Oto	–	1
9	56	*	LL, FG, B	–	8
10	50	*	LL, FG	–	16
11	61	*	LL, FG, B	–	1
12	65	*	TS, LL, FG, B	–	2
13	55	*	LL, FG, B, FL	–	5
14	57	6 h 32 m	TS, LL, B	Right cheek implant infection	64
15	51	6 h 50 m	TS, LL, FG, B	Mandible incision infection	1
16	61	6 h 29 m	LL, FG, B	–	8
17	58	6 h 39 m	TS, LL, FG, B, Oto	Left cheek implant infection	60
18	53	7 h 55 m	TS, LL, FG	–	72
19	48	6 h 3 m	LL, FG, B, Oto	–	52
20	65	7 h 21 m	LL, FG, B, FL	Delayed bilateral PEs	34
21	57	7 h 44 m	TS, LL, FG	–	1
22	63	6 h 43 m	LL, FG, B	Facelift hematoma	8
23	58	8 h 15 m	LL, FG, B	–	1
24	61	7 h 22 m	TS, LL, FG, B	–	1
25	48	6 h 42 m	TS, LL, FG	–	30

*Prior to 2014, anesthesia records are not available in the chart review

TS tracheal shave (chondrolaryngoplasty), *LL* lip lift, *FG* fat (or dermal fat) grafting, *Oto* ear lob reconstruction or otoplasty, *B* blepharoplasty, *FL* forehead lipoma excision

While it is known that the facial blood supply is robust, there have been no previous reports of operating within multiple facial planes in a single setting. In this study, subperiosteal planes are elevated at the scalp and brow, midface, and mandible. Subcutaneous flaps are elevated for the rhytidectomy portion, and sub-SMAS and subperiosteal flaps are elevated to perform the rhinoplasty portion. Based on studies using ink injections and dissection, Whetzel et al. have demonstrated vascular supply of the face and oral cavity. The anterior face is supplied by small, densely populated musculocutaneous perforating arteries; the lateral face is supplied by large, sparsely populated fasciocutaneous perforators; and the scalp is supplied by small, densely populated fasciocutaneous perforators [9].

The area of the rhytidectomy flap is supplied by the transverse facial, submental, facial, and superficial temporal arteries with the transverse facial perforating artery providing major direct blood supply after surgery if preserved [10]. When these perforators are transected, the blood supply to the flap is dependent on indirect collateral flow from other nonundermined facial vessels.

The buccal artery, a small branch of the internal maxillary artery, supplies the buccal mucosal surface posterior to Stensen's duct, and the labial arteries, branches of the facial artery, supply the buccal mucosa anteriorly [11].

While this study utilized a subcutaneous face lift flap, a composite or sub-SMAS dissection would also likely be safe. Schaverian et al. use injection studies to demonstrate that the composite face lift flap revealed better perfusion in the preauricular region compared with subcutaneous dissection with the caveat that much of this area is routinely excised during rhytidectomy [12].

The face is robustly supplied by several branches of the external carotid artery. While elevating the face lift flap may involve transection of perforators, there is indirect collateral flow from other facial vessels, and these are not

Fig. 2 Example of patient photographs. **a**, **b** preoperative frontal and lateral views, **c**, **d** 1-week postoperative frontal and lateral views, **e**, **f** 6-month postoperative frontal and lateral views

compromised by the incisions or elevation of planes in other procedures performed. This is clinically significant as blood supply to these flaps should not be a deterrent to concurrent procedures. It was previously reported by the senior author that external rhinoplasty and lip lift could be performed concurrently without adverse aesthetic or vascular outcomes [13]. Another group specializing in facial feminization procedures for transgender patients stages multiple facial procedures [14]. While individual patients and surgeons may opt to stage procedures, we believe and demonstrate that it is safe to perform them concurrently.

The adverse outcomes encountered in this study included two patients with delayed cheek implant infections, a presumed intraoral infection, a small face lift hematoma, and delayed venous thromboembolism in the setting of hormone replacement. Each of these events occurred in different patients. While any adverse event is unfortunate, each individual procedure performed has inherent risks that are discussed at length with the patient preoperatively. Cheek implant infection is discussed with each patient with the understanding that the implant may need to be removed and replaced at a later time. One occurred 4 months postoperatively after a dental procedure in the area, and the other occurred 2 months after surgery. Of note, both postoperative infections occurred with the Implantech Conform implant which is no longer used by the senior author. Intraoral infections are minimized with oral antibiotics and oral rinses which in this specific case the patient did not utilize despite being counseled as to the necessity of these preventative measures. Face lift hematoma is a known risk and monitored closely postoperatively. This was discovered and treated appropriately without wound healing sequelae.

In this particular population of transgender patients, there is an additional risk of venous thromboembolism in the setting of hormonal replacement therapy (HRT). This risk is present prior to surgical intervention at which point the risk is increased even more. With the guidance of the patients' endocrinologists, HRT is held prior to and immediately after surgery and only restarted after the patient is ambulatory and has completed any travel for surgery. One of our patients had a pulmonary embolism 2 months after surgery and was subsequently taken off HRT and placed on anticoagulation without additional issues.

Facial feminization for transgender patients often includes several procedures to attain the desired result. These patients are also pursuing other body procedures, so the ability to perform facial procedures concurrently is particularly appealing in this population. Raffaini et al. discuss evolution of staging patients for facial procedures [14] to perform them concurrently [15]. In one setting, the procedures they performed include forehead contouring, mandibular and malar reshaping, chondrolaryngoplasty, and upper lip shortening and were performed on patients with an average age of 21 years [15]. Patients pursuing facial feminization can present at a younger age than those presenting solely for aging face, and this could contribute to reduced morbidity in our study. However, the average age of patients in this study was 53.9 years likely due to the inclusion criterion of a rhytidectomy which is not included in previous studies. Additionally, as this study only includes transgender patients, we cannot ascertain whether factors such as thicker skin with more robust blood supply may affect outcomes. Future studies are needed to address this issue.

Prior to proceeding with any single surgical procedure, the risks inherent to that operation must be evaluated and discussed at length with the patient. Each procedure evaluated in this study has known inherent risks. For rhytidectomy, a risk highlighted with patients before and after is hematoma. For implant placement, the risk of infection, and possible removal, is imperative to discuss.

Previous studies have assessed the safety of combined cosmetic procedures such as combinations of two to three procedures including body and breast procedures and sometimes facial procedures. The risk of morbidity was found to be quite low, but venous thromboembolism risk was increased with abdominoplasty and liposuction procedures [1, 2]. Furthermore, surgeon experience is a factor related to operative time that should be considered when undertaking several procedures concurrently. Risks of anesthesia must be considered, and these are also discussed with the patient. In these patients, the longest anesthesia time was 8 h 15 min and is not believed to have been associated with morbidity.

Additional concerns may include performing the correct combination of procedures on a given patient and toxicity of local anesthesia. As it is the practice of the senior author to perform multiple procedures in a single setting, several safety measures have been employed. These primarily focus on clear communication with the entire operating room team. The operating room white board is used to list the procedures as well as the approximate time they will require [16]. To avoid toxicity of local anesthesia, a solution of 1:100,000 epinephrine is made and used without lidocaine for most of the procedures. This is important as excessive levels of lidocaine could otherwise be administered [17].

Conclusions

The results of this retrospective review demonstrate that it is safe to perform multiple facial plastic procedures in multiple planes in a single setting. There were no issues with tissue necrosis or wound healing, and patients were happy with their aesthetic results and the ability to combine procedures. The adverse outcomes found include known risks of the individual procedures and for the individual patients that had been discussed with the patients preoperatively. Prior to proceeding with any single surgical procedure, the risks inherent to that operation must be evaluated and discussed at length with the patient.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. This study was approved by the Institutional Review Board of Boston Medical Center.

Consent For this type of study, formal consent is not required.

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