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Complication Rates of Facelift Alone Versus Facelift in Conjunction with Temporomandibular Joint Replacement

Patrick J. Louis[1] and C Blake Smith[2]*

[1]*Department of Oral and Maxillofacial Surgery, University of Alabama, USA*

[2]*Department of Cosmetic and Facial Surgery, USA*

Abstract

Purpose: The aim of this study was to evaluate the complication rates of rhytidectomy alone as a primary procedure versus complication rates of rhytidectomy performed in conjunction with temporomandibular joint replacement (TJR).

Materials and Methods: This study was a retrospective cohort study and consisted of chart review only. The charts of all patients who had a superficial plane rhytidectomy procedure at our institution during the specified time period (July 2000- July 2009) were reviewed. After exclusions were determined, the patients were categorized into two groups, those that underwent the facelift operation as the primary procedure (Facelift group), and those that had it performed as an adjunctive procedure in conjunction with TJR (Facelift + TMJ group). After division of the two groups, the records were examined and data collected on demographics and the complication incidence. The complication categories were consolidated to include 1) Temporary facial nerve injury, 2) Permanent facial nerve injury, 3) Hematoma, 4) Infection and 5) Early Wound Healing Complications (unaesthetic scar, contour irregularities, and flap necrosis), 5) Minor Soft Tissue Complications (minor soft tissue complications that do not fit in the other categories) and 6) Revision rate. A Fisher's exact test was used to analyze the data. The statistical significance was set at $P<0.05$.

Results: There were 31 patients in the Facelift group and 31 in the Facelift + TMJ group. The mean age of the Facelift group and the Facelift + TMJ group was 58.6+10.82years (Range 30-79) and 46.0+12.73 years (Range 24-76) respectively. In the Facelift group, the majority of cases were bilateral rhytidectomies, with 2 unilateral cases for a total of 60 procedures. In the Facelift + TMJ group, there were 16 bilateral cases and 15 unilateral cases for a total of 47 procedures. No statistical significance was found between the two groups in any of these categories with the exception of temporary facial nerve injury. A statistically significant ($p<0.001$) increased incidence of temporary facial nerve injury was noted in the Facelift + TMJ group over the Facelift group.

Conclusion: Rhytidectomy can be safely performed in conjunction with temporomandibular joint replacement. We did not find evidence to support that performing a facelift as an adjunct procedure increased the complication rate. A much higher incidence of temporary facial nerve injury was found in our patients undergoing facelift as an adjunct procedure when compared to the Facelift group. The cause of this increased incidence is believed to be secondary to the simultaneously TMJ operation, which has a well-known association with facial nerve injury.

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Correspondence:
Patrick J. Louis, Department of Oral and Maxillofacial Surgery, University of Alabama at Birmingham, School of Dentistry, USA. Tel: 205-934-5334, 205-801-7703, 334-749-3436; Fax: 205-975-6671;
E-mail: plouis@uab.edu

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Introduction

Rhytidectomy, or facelift, is one of the most commonly performed surgical procedures for correction of age-related changes of the face. The surgical goals of the procedure are to restore aspects of a youthful appearance through correction of skin laxity, ptosis of the subcutaneous tissues, obliquity of the cervicomental contour, and deep nasolabial folds. A multitude of techniques have been described and are currently in use, from skin only flaps to a variety of SMAS combination procedures. The selection of technique is influenced by the patient's particular area of concern, surgeon preference, long-term stability, and complication rates.

While complication rates of rhytidectomy are relatively rare, certain major medical complications can result in significant morbidity and poor outcomes. Knowledge of the potential complications and proper management strategies can help the facial cosmetic surgeon avoid devastating consequences. A list of some of the most common complications has been provided in Table 1.

Table 1: Complications of Rhytidectomy.

Infection
Hematoma
Alopecia
Hypertrophic Scar
Motor Nerve Injury
Sensory Nerve injury
Ear Lobe Deformities
Wound Contour Irregularities
Severe Edema
Seroma
Severe Ecchymosis
Fat Contour Irregularities
Residual Ptosis
Asymmetry
Patient Dissatisfaction
Skin Slough and Necrosis

This is a list of known complications of the facelift procedure

At our institution, we have a unique patient population who undergo rhytidectomy simultaneously with other major maxillofacial procedures, such as orthognathic surgery, temporomandibular joint procedures, or post-traumatic reconstructions of the hard and soft tissues. The majority of these patients are undergoing temporomandibular joint procedures, as the rhytidectomy approach affords superb access to the joint. The purpose of this paper is to determine whether facelifts performed simultaneously with temporomandibular joint arthroplasty procedures differ in their complication rates than those performed as a primary procedure. We postulate that complications of an adjunct facelift could be influenced by a number of factors. The inherent complication rate of the primary procedure, increased operative time, and patient expectations may all play a role. In regards to this latter point, the incidence of subjective complications such as contour irregularities and scar formation are biased by patient perception. Therefore it is reasonable to assume that a patient who seeks cosmetic surgery as a primary procedure for esthetic goals may have more discerning criteria of success than those who receive a facelift as a secondary or "bonus" procedure. In the latter, the functional goals of the primary procedure may eclipse their evaluation of esthetic outcomes.

While a large amount of literature on the common complications of rhytidectomy has been published, no known studies of the incidence of complications of rhytidectomy performed with a simultaneous temporomandibular joint replacement (TJR) procedure exist to the authors' knowledge. The purpose of this Facelift + TMJ is to determine the incidence of complication in patients undergoing a superficial plane rhytidectomy concomitantly with TJR, and to compare this data to a Facelift group of patients undergoing elective rhytidectomy as a primary procedure. The hypothesis is that the performing a rhytidectomy in conjunction with TJR does not increase the incidence of complications associated with rhytidectomy. Specific aims of this study are to identify the incidence of facial nerve injury, hematoma, and infection, early wound healing complications, minor soft tissue complications and revision rate associated with the facelift procedure in these two patient groups.

Materials and Methods

The office of the Institutional Review Board at the University of Alabama at Birmingham granted approval for this study in June 2010. To address the research purpose, the investigators designed and implemented a retrospective cohort study. The charts of all patients presenting for superficial plane rhytidectomy procedure at our institution during the specified time period (July 2000-July 2009) were reviewed. Patients were excluded if complete cervicofacial lift procedures were not performed (i.e. midface or neck-only rhytidectomy), if there was no follow-up, or if insufficient documentation at the time of the operation or follow-up existed. Patients were also excluded if facial nerve injury existed from a prior operation. Because of a change in patient information systems at our institution, several older procedures were excluded due to insufficient documentation.

The predictor variable in this study was operation type. After exclusions were determined, the patients were categorized into two groups, those that underwent the facelift operation as the primary procedure (Facelift group), and those that had it performed as an adjunctive procedure in conjunction with TJR (Facelift + TMJ group). After division of the two groups, the records were examined and data collected on demographics and the complication incidence. The primary outcome variable was postoperative complication. Complications included hematoma, infection, unaesthetic scar or wound, flap necrosis or sloughing, contour irregularities, other minor soft tissue complications and motor nerve deficits. Even though all of the patients in the Facelift + TMJ group underwent a bilateral rhytidectomy, some of them underwent a unilateral joint replacement. For this reason the face was divided into sides. Unilateral procedures counted as one side and bilateral procedures counted as two sides. For the Facelift + TMJ group, only the side undergoing a rhytidectomy in conjunction with TJR was included. The complication categories were consolidated to include 1) Temporary facial nerve injury, 2) Permanent facial nerve injury, 3) Hematoma, 4) Infection and 5) Early Wound Healing Complications (unaesthetic scar, contour irregularities, and flap necrosis), 5) Minor Soft Tissue Complications (minor soft tissue complications that do not fit in the other categories) and 6) Revision rate. The Fisher's exact test was used to analyze the risk of complications. The statistical significance was set at $P<0.05$. In addition the Mantel-Haenszel chi-square test was used to compare the total number of complications that occurred in each group of

Table 2: Demographics.

Demographics	Facelift	Facelift + TMJ	Total	Student's t test p- value
Age (Yr)	58.6 + 10.82	46.0 + 12.73	53 + 13.22	<0.001
Female	31	30	61	-
Male	0	1	1	-
Mean Follow up (Mo)	11.1 + 16.30	48.9 + 35.4.69	30 + 32.81	<0.001
Bilateral Procedures	29	16	45	<0.001

Comparisons of age, gender, mean follow-up and bilateral vs. unilateral procedures between the two groups

Table 3: Complications.

Complications	Facelift No. (%)	Facelift + TMJ No. (%)	Fisher's exact test p- value
Total Complications	12 (20)	25 (53.2)	<0.001
Temporary Nerve Injury	0 (0)	15 (31.9)	<0.001
Permanent Nerve Injury	0 (0)	3 (6.4)	0.082
Infection	1 (1.6)	2 (4.2)	0.327
Hematoma	4 (6.7)	0 (0)	0.094
Early Wound Healing Complications	6 (10)	4 (8.5)	0.254
Minor Soft Tissue Complications	1 (1.6)	3 (6.4)	0.188
Revisions	3 (3.3)	1 (2.1)	0.419

Comparison of total complications and various types of complications and revision rate between the two groups

Table 4: Nerve injuries by branch.

	Temporal	MM	Student's t test p-value
Temporary	9	3	0.011
Permanent	3	0	0.015

MM: Marginal Mandibular

Comparisons of temporary and permanent nerve injuries based on the branches of the facial nerve. Only the temporal and marginal mandibular branches sustained injuries

patients and a Student's t test was used to analyze the demographic data and follow-up period.

Results

The results of demographics are summarized in Table 2. After reviewing the records of over 200 patients that had prosthetic joint replacement and/or facelift, only 62 patients met the inclusion criteria for the study with adequate follow-up. There were 31 patients in the Facelift group and 31 in the Facelift + TMJ group. The mean age of the Facelift group and the Facelift + TMJ group was 58.6 + 10.82 years (Range 30-79) and 46.0 + 12.73 years (Range 24-76) respectively. A two-tailed Student's t test was used to compare the ages of the patients in the two groups and there was a significant difference between the groups. In the Facelift group, the majority of cases were bilateral rhytidectomies, with 2 unilateral cases fora total of 60 procedures. In the Facelift + TMJ group, there were 16 bilateral cases and 15 unilateral cases for a total of 47 procedures. There was a statistically significant difference in the number of bilateral cases between the two groups. The average follow-up period was significantly longer in the Facelift + TMJ group; 48.9 + 34.5 vs 11.1 + 16.30 months. This was a statistically significant difference. The vast majority of procedures were performed in female patients, with only one male, who was in the Facelift + TMJ group.

Complications including facial nerve injury are summarized in Table 3. All complications were infrequent except for temporary facial nerve injury.

Facial nerve injury

In the Facelift + TMJ group, there were 15 sides (31.9%) that had facial nerve injuries. There were no injuries in the Facelift group. A statistically significant ($p< 0.001$) increased incidence of temporary facial nerve injury was noted in the Facelift + TMJ group over the Facelift group. Only 3 injuries (6.4% of all procedures) were present at 1 year and considered permanent, which was statistically insignificant ($p = 0.082$).

Figure 1: Preoperative Frontal View.

Figure 2: Preoperative Lateral View.

Figure 3: Elevation of Skin Flap.

Of these facial nerve injuries, 12 involved the temporal branch and 3 involved the marginal mandibular branch. Only 3 of the nerve injuries were permanent, all of which involved the temporal branch of the facial nerve. There was a statistically significant difference in which branch of the facial nerve that was involved in both the temporary and permanent nerve injury categories (Table 4).

Of the 15 injuries, 5 sides required surgical intervention. Gold weight placement for lagopthalmos was performed in 3 patients. All of these were performed within a month of the initial procedure for corneal irritation. These were later removed around 6 months after placement due to resolution of the lagopthalmos. Endobrow lift for residual brow ptosis was performed in 3 patients. These were performed for brow ptosis that persisted for more than a year.

Hematoma

Hematoma occurred in 4 sides in the Facelift group only. All were small and managed conservatively, and only 1 required intervention by incision and drainage and pressure dressing at follow-up. No major or expanding hematomas were encountered and none required re-exploration in the operating room.

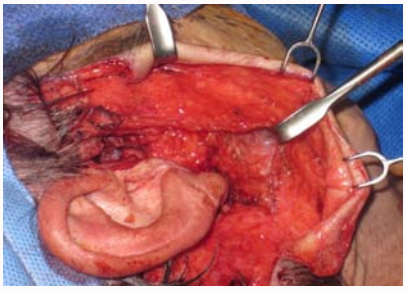

Figure 4: Facial Nerve Exposed.

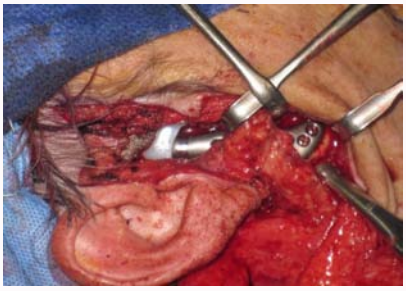

Figure 5: Insertion of Temporomandibular Joint Prosthesis.

Figure 6: Excess Skin for Resection.

Infection

There was 1 infection in the Facelift group and 2 in the Facelift + TMJ group. These infections were managed with surgical intervention and antibiotics. There was no statistical difference between the two groups.

Early wound healing complications

Unaesthetic scar formation including hypertrophic and widened scars was noted in 4 sides (3 in the Facelift group), which usually required localmanagement with steroid injection or scar revision. Various contour irregularities were included under the heading and were noted in 4 sides (2 in the Facelift group), most of which required minor revisions. One of these cases represented a change in earlobe position. Flap necrosis was noted in 2 sides (1 in the Facelift group) and included only the flap tip in the postauricular region. This was managed by observation and healed satisfactorily without intervention. Due to the small number of sides, these three categories were combined under the Early Wound Healing Complicationscategory. There were a total of 10 sides in this category, 6 in the Facelift group and 4 in the Facelift + TMJ group.

Minor soft tissue complications

Four sides were classified as Minor Soft Tissue Complications and included 1 postauricular stitch abscess in the Facelift group, 2 instances of preauricular hypoesthesia in the Facelift + TMJ group, significant enough for patient complaint and 1 instance of protuberant granulation tissue in the postauricular region in the Facelift + TMJ group. In this category there were 1 side in the Facelift group and 3 sides in the Facelift + TMJ group.No statistical significance was found between the two groups in any of these categories.

Revisions

A few patients did require revisions after the initial procedure yielded less than satisfactory outcomes. All were performed approximately 1 year after the initial procedure. There were 3 sides revised in the Facelift group and 1 side in the Facelift + TMJ group. Similarly, this finding was not statistically significant.

Total complications

The total numbers of complications in each group were compared. The total number of complications in the Facelift group was 12 out of 60 sides. In the Facelift + TMJ group the total number of complications per side was 25 out of 47 sides. When the two groups were compared, there was a statistically significant increase in the occurrence of complications in the Facelift + TMJ group ($p < 0.001$). In addition, the number of complications per patient in each group was evaluated.

Using the Mantel-Haenszel chi-square test, in which the independent unit of analysis is the patient, there was a statistically significant increase in the number of complications in the Facelift + TMJ group ($p = 0.0257$).

Discussion

The purpose of this study was to determine the incidence of complication in patients undergoing a superficial plane rhytidectomy concomitantly with TJR, and to compare this data to a Facelift group of patients undergoing elective rhytidectomy as a primary procedure. We specifically identified the incidence of facial nerve injuries, hematoma, infections, wound healing complications and other minor soft tissue complications in these two patient groups. The incidence of temporary facial nerve injury in the Facelift group was 0%. In contrast, the incidence of temporary nerve injury was 31.9%, which was statistically significant. The incidence of permanent facial nerve injury was 6.4%. The branches that were injured included the temporal and the marginal mandibular. Only the temporal branch of the facial nerve sustained permanent injury in the Facelift + TMJ group. The incidence of hematoma, infection, early soft tissue complications and other minor soft tissue complications were not statistically significant among the patient groups. This study demonstrates that there the TJR significantly increases the risk of temporary nerve injury during the facelift procedure but does not increase the risk of other complications associated with the superficial plane facelift.

Facial nerve injury is an uncommon complication in facelift surgery, with an incidence of probably less than 1 percent [1]. Nerve insult can result from a multitude of factors, including sutures encircling the nerve, stretch injury, hematoma compression, heat from electrocoagulation, crush injury from forceps, inflammation or infection, or transection. In a review of over 7,000 superficial plane rhytidectomies performed by multiple surgeons, Baker found an incidence of 55 cranial nerve VII injuries (0.7%), only 7 of which were permanent (0.1%). The most commonly injured branch was the marginal mandibular (40%), followed by the temporal (33%), and then the buccal (13%) [2].

Figure 7: Final Closure.

Figure 8: Postoperative Frontal View.

Figure 9: Postoperative Lateral View.

A much higher incidence of facial nerve injury was found in our patients undergoing facelift as an adjunct procedure when compared to the Facelift group. Closer examination of the 15 nerve injuries revealed that all cases occurred during TMJ replacement procedures. There were no injuries in the Facelift group, which is consistent with the literature. The cause of this increased incidence is believed to be secondary to the simultaneously TMJ operation, which has a well-known association with facial nerve injury. This is usually a temporary neuropraxia secondary to excessive retraction around the joint. This was supported by a significantly higher incidence of temporal division weakness when compared to other potentially affected branches. The vast majority of these resolved within 6 months of the surgery. This is consistent with the literature in patients undergoing TJR. Sidebottom reported on 74 patients undergoing TJR. Of these, a total of 31 patients had partial, and 2 had total weakness of the facial nerve. They reported that all resolved fully except weakness of the temporal branch in one patient, which required a brow lift [3]. Though the surgical access for total joint replacement requires retromandibular dissection to access the ramus, the incidence of marginal mandibular involvement was low.

Hematoma is well-recognized as the most common complication associated with rhytidectomy, with rates most commonly published in the range of 1-9% [1,2,1-8], and may represent up to 70% of all rhytidectomy complications [1]. In a literature review of 9969 cases, Baker noted a major or expanding hematoma incidence of 3.6% (range 0.9-8.0%). Within this same study, he also stated the incidence of small hematomas to be as high as 15% [2]. Poor perioperative blood pressure control has been cited as the major cause of hematoma occurence[1,8-10]. Male gender, the use of platelet-altering medications, and inadequate intraoperative hemostasis are also major contributing factors [8]. Multiple local measures to control the incidence of hematoma have been described, and their use varies from practitioner to practitioner. In a large retrospective series of 910 patients treated by the same surgeon, Jones and Grover found no change in hematoma rate with the use of dressings, fibrin glue, drains, or tumescence. They did however note a statistically significant increase in incidence in those patients who were administered epinephrine by tumescence compared to those without epinephrine, which they contributed to reactive vasodilation in the post-operative period which masked intraoperative recognition of potential bleeding points [6].

In our study, an increased incidence of hematoma was noted in the Facelift group (6.7% vs 0%). All of these hematomas were minor and managed conservatively, and only 1 required intervention in the form of drainage. The finding was not statistically significant, and due to the low patient numbers, it is difficult to determine if a true trend exists. One possible explanation is that although all patients underwent superficial plane rhytidectomies, in the Facelift + TMJ group deeper planes were often entered as a part of the concomitant operation, for TMJ access. This may have served to provide a path of drainage or masked the true incidence of hematoma due to increased facial edema. Grover, et al [8] found no change in hematoma rate when comparing various facelift techniques of different planes of dissection. In contrast, in a review of 1236 consecutive facelifts, Rees et al. found that the extent of SMAS dissection and elevation influenced the rate of hematoma formation, with decreased incidence with deeper planes of dissection. The incidence was 3.67% for SMAS plication, 3.41% with moderate SMAS elevation, and 1.03% in extensive SMAS elevation techniques (p=.002). The overall incidence was 3.83% [7].

Perhaps the most feared complication in facelift surgery is flap necrosis. This can range from a minor area of necrosis at the flap tip, often in the postauricular area, to extensive tissue death requiring debridement and skin grafting. Fortunately, this complication is rare. Possible causes include unrecognized or undertreated hematoma, pressure dressings that are too tight, and excess wound tension, which can result in vascular compromise and tissue death. Smoking [11,12] and poorly controlled diabetes can result in small blood vessel disease and therefore contribute. There was only one incidence of flap necrosis in our study, which occurred in the Facelift group. This occurred in the tip of the postauricular flap bilaterally. This healed by secondary intention without intervention and with satisfactory cosmetic results.

Excess wound tension at closure can result in widened or hypertrophied scar formation. This complication can usually be managed by intralesional steroid injection, which result in softening

and atrophy of the lesion. Occasionally, scar revision may be required. With either intervention, it is recommended to wait as long as 6 months for the wound to stabilize. Some patients will develop scarring, however, despite meticulous closure and postoperative wound care. In our Facelift + TMJ, 4 cases of excess scarring occurred (3 in the Facelift and 1 in the Facelift + TMJ group). There was no statistical significance between the two groups. However, the increased incidence noted in the Facelift group does invite the interesting discussion of whether a true trend exists and what that may represent. It could be argued that the primary cosmetic group may include a larger percentage of esthetically conscious individuals who may be more concerned with wound appearances. Therefore, as with any retrospective study, the documentation of minor wound problems may increase with patient complaint.The increased expectation of patients in the cosmetic group would be expected to also influence the "unaesthetic wound" category if it is truly an influencing factor. This however was not found in our study, with 2 cases noted in each group. Three of these represented contour irregularities requiring minor revision or observation. One case of changed earlobe position was noted in the Facelift + TMJ group. An alteration in the position of the earlobe is a well-documented complication of rhytidectomy and strategies to prevent its occurrence have been described [13-15].

With the use of current perioperative antibiotics and skin preparation techniques, the incidence of infection is fortunately very low. When infection does occur, it is usually managed with oral antibiotics without undue sequelae. More serious infections, however, may require IV antibiotics or local drainage if abscess occurs. In a large series by Leroy et al., 6166 consecutive facelifts were performed resulting in 11 cases of infection requiring hospital admission (0.18%). Seven required drainage of an abscess and 4 were treated with antibiotics alone for cellulitis. Past medical history, the use of perioperative antibiotics, surgical equipment used, complexity of the surgical dissection, drains, or hematoma formation did not influence the infection rate. In our Facelift + TMJ, 3 total infections(4.92%) were noted between the two groups, all of which required some type of intervention. Only 1 case, however, appeared to be strongly related to the facelift procedure, which resulted in an accumulation of purulence beneath the subcutaneous flap requiring drainage. This occurred in the Facelift + TMJ group. One case in the Facelift group appeared to be localized to a hemoclip in the submandibular region from a previous procedure, and the other case was associated with an infected total joint prosthesis placed simultaneously. In either of the latter two cases, it is assumed that the facelift procedure was only associated with the infection secondarily, and were considered for exclusion entirely. They remained included, however due to the difficulty in separating out causality in the case of infection. Regardless, the incidence remained low.

Due to its superficial location in the posterior aspect of the flap, the greater auricular nerve is the most common sensory nerve injured during rhytidectomy. This can result in paresthesia, numbness, and even pain of the postauricular region, which can be quite troublesome. Careful superficial dissection under direct vision, particularly over the sternocleidomastoid muscle can help prevent this complication. If transection of this nerve occurs, direct repair under magnification is recommended. In contrast, the small nerve fibers in the preauricular region are often transected, which usually results in numbness of the cheek and preauricular area. This is often transient due to the small caliber fiber regeneration and arborization in this area. Two patients were documented with this complaint, both in the Facelift + TMJ group. However, since no objective method of evaluation of sensory innervations was used in our Facelift + TMJ, the true incidence is unknown. It is assumed that all patients likely have some sensory nerve deficit after rhytidectomy.

Only three major revisions (repeat full facelifts or focused surgical revisions) were required in our Facelift + TMJ. This can be viewed as a complication or general barometer of patient satisfaction, but either way, the incidence was low, and required in two patients in the Facelift and one in the Facelift + TMJ group. These were performed for residual ptotic tissue requiring various levels of skin and SMAS recontouring for correction. All three were performed after 1 year from the previous rhytidectomy, and no third revisions were required.

There are several weaknesses to this study worth discussing. First is the inherent problem of a retrospective design, some of which was discussed previously. The true incidence of complications cannot be ascertained with this type of Facelift + TMJ, which depends upon strict documentation for accurate results. The use of a prospective study with strict observation and measurement criteria would be more desirable. In addition, the small patient numbers make true trends and statistical analysis problematic. This information could be valuable, however, to notice potential trends to develop prospective studies in the future.

In conclusion, we did not find evidence to support that performing a facelift as an adjunct procedure increased the complication rate. However, due to the retrospective design and small patient sample, we were unable make a definitive comparison of the two groups. While we feel that empiric evidence supports our finding, further research is required. A large study would be ideal for comparing complications with low overall incidence, and a prospective design a stronger level of evidence. We do recommend that any patient undergoing TMJ surgery simultaneously with rhytidectomy be fully aware of the potential for facial nerve injury associated with access to the temporomandibular joint, and at the same time educated about its likely transient nature. Proper education can help alleviate post-operative anxiety associated with facial nerve weakness in a patient with cosmetic objectives, and thus improve subjective outcomes. While we feel the evidence supports our findings, further work would be required, preferably a prospective study with a large patient sample.

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