Incorporating the Osseous Genioplasty Into Rejuvenation of the Lower Face

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Abstract

Background: The chin plays a critical role in the shape, projection, and soft tissue support of the lower face. Osseous genioplasty is a powerful tool in facial rejuvenation as it allows for optimal control of the resulting chin dimensions and improvement in submental and submandibular laxity. Osseous genioplasty can be used alone or in combination with other facial rejuvenation procedures to achieve an optimal result.

Objectives: The aim of this study was to present the senior author's approach to skeletal analysis of the lower facial third and propose an algorithm that can be used to optimize skeletal support of the overlying soft tissue laxity while maintaining an aesthetic facial shape and proportion of the chin.

Methods: All patients undergoing cosmetic osseous genioplasty for soft tissue rejuvenation of the lower face and/or perioral region with the senior author between 2010 and 2021 were retrospectively reviewed. Complications, including infection, numbness, and prolonged ecchymosis, were recorded.

Results: A total of 37 patients underwent cosmetic osseous genioplasty. The average age of the cohort was 44.5 years. Twenty-six patients (70.3%) were female. Eleven patients (29.7%) underwent genioplasty alone. In addition to genioplasty, 8 patients (21.6%) underwent orthognathic surgery, 5 patients (13.5%) underwent platysmaplasty and liposuction, and 2 patients (5.4%) underwent facelift. The authors propose an algorithm to guide evaluation of the lower facial third to help determine the possible role of osseous genioplasty for facial rejuvenation based on each patient's unique facial characteristics.

Conclusions: In properly selected patients, osseous genioplasty can improve lower facial projection, submandibular laxity, and perioral soft tissue support while also optimizing facial shape and proportion.

Level of Evidence: 4

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Mandibular retrognathia is the most commonly encountered dentofacial deformity in the Caucasian patient population.[1,2] The ideal treatment consists of lower jaw advancement to correct the occlusion, with or without genioplasty to augment mandibular projection. However, when seeking orthodontic treatment during adolescence, many patients perceive orthognathic surgery as overly aggressive. Instead, patients often prefer to avoid surgery, instead pursuing orthodontic treatment to achieve a Class I dental occlusion. When patients with skeletal retrognathia undergo dental compensation, the upper teeth are tilted posteriorly which leads to loss of upper lip projection, the appearance of an overprojected nose, and importantly, uncorrected skeletal support of the underlying soft tissue. Although this orthodontic treatment may achieve an excellent occlusion, this is often at the expense of aesthetic facial form. Over time, the inadequate skeletal support of underlying soft tissue leads to a prematurely aged appearance of the lower facial third.[3,4] Many of these patients will subsequently seek chin augmentation and/or rhinoplasty at a young age.

The chin plays a critical role in the shape, projection, and soft tissue support of the lower face. Although both a chin implant and an osseous genioplasty are capable of increasing sagittal projection of the chin, the osseous genioplasty offers several advantages over alloplastic augmentation. Osseous genioplasty allows the surgeon to move the genial segment in 3 dimensions, which allows for improved control of the height, width, projection, and shape of the chin, enhanced control of the labiomental crease, and improved soft tissue support relative to a chin implant. Additionally, several muscles originate from the genial tubercle and are stretched as the genial segment is advanced, resulting in improving submental and submandibular laxity.[5]

Patients who exhibit mandibular retrognathism with a Class I occlusion may present for lower facial rejuvenation earlier than patients who demonstrate normal mandibular and chin projection. In a middle-aged patient with retrognathia and retrogenia, a genioplasty either alone or in combination with submental liposuction and/or platysmal plication can provide an excellent result with less recovery than a traditional neck lift while also avoiding periauricular incisions. In patients who present with concerns of more pronounced jowl descent or rhytids, a genioplasty alone will not sufficiently address the patient's concerns but when performed in conjunction with a traditional neck lift, a genioplasty can enhance the overall result by improving the support of the underlying tissue and increasing the length from the anterior neck to the pogonion (anterior chin). Proper re-establishment of aesthetic skeletal harmony serves as a permanent foundation upon which all future soft tissue rejuvenation procedures will benefit. Little has been reported in the literature regarding the incorporation of osseous genioplasty in facial rejuvenation. This study presents the senior author's approach to skeletal analysis of the lower facial third, facial rejuvenation, and ideal aesthetic skeletal harmony. Specific focus is on the contributions of the chin to the soft tissue support in the lower facial third and an algorithm that can be used to determine the optimal position of the chin for soft tissue support in the patient with mild to moderate lower facial tissue laxity.

METHODS

Patient Selection

Two types of patients present to the senior author's practice who may benefit from the rejuvenative effects of an osseous genioplasty. The first is the patient who presents primarily for chin augmentation but also demonstrates perioral and submental laxity that will benefit from placing the chin in the position that provides maximal skeletal support of the soft tissue. Alternatively, a retrognathic patient may present for facial rejuvenation of the lower facial third-jowl descent, marionette lines, and submental laxity. In this patient if jaw advancement is not indicated or desired, an osseous genioplasty alone or in combination with adjunct procedures may achieve the patient's aesthetic goals.

Patient Evaluation

An analysis is performed to determine the chin position that will optimally address the patient's goals of projection and shape while also providing adequate support for the submandibular and perioral soft tissue. This analysis includes the vertical, transverse, and sagittal positions of the chin. By means of 3-dimensional (3D) digital imaging, the surgeon illustrates the anticipated results to determine if the patient is agreeable with the predicted postoperative chin position and soft tissue changes.

Frontal evaluation entails analysis of the vertical height of the facial thirds. In contrast to Asian patients, North American patients may tolerate a slightly longer lower facial third if the slight elongation reduces skin laxity. The author primarily elongates the chin in patients who present with a short lower facial third. Excessive vertical elongation should not be a substitute for procedures such as a facelift or neck lift. Facial shape and symmetry are also evaluated and the chin position is modified to optimize symmetry and to create the patient's desired facial shape.

Evaluation of the profile involves assessing the labiomental angle, the relationship between pogonion (most anterior point of the chin in the sagittal plane) and the labial inferior (the vermillion border of the lower lip in the sagittal plane), and the submental soft tissue support. An acute labiomental angle less than 110° may indicate a

Video. Watch now at http://academic.oup.com/asj/article-lookup/doi/10.1093/asj/sjac160

Figure 1. Surgical instruments used.

vertically short or prominent chin, and a more obtuse angle greater than 130° may indicate excessive vertical length or insufficient anterior projection. The author relates ideal chin projection to the labrale inferius (the most anterior projection of the lower lip): in females, the pogonion should be in line or just posterior to the labrale inferius, and in males it should be in line or just anterior to the labrale inferius. One method used to assess chin projection is Riedel's line, which connects the most prominent points of the upper and lower lips. In a chin with adequate sagittal projection, the pogonion will be situated as a third point along this line.[6] An alternative method is to drop a line from the mid-dorsum of the nose tangential to the upper lip. The pogonion should be about 3 mm posterior to this line. To determine whether the deficiency in chin projection is due to the chin, mandible, or both, one must examine the labiomental fold and chin-lip relationship. Deficient pogonion projection associated with a normal labiomental angle and lower lip relationship is usually due to isolated mandibular retrognathia. If the labiomental crease is obtuse and chin is posterior to the lower lip, then some or all of the deficiency is due to the chin. The submental soft tissues should be evaluated to predict how much laxity would be improved by anterior positioning of the chin. Anterior chin positioning will stretch and tighten the submental tissues, which will increase the cervicomental angle and rejuvenate the lower face.

Data Collection and Statistical Analysis

All patients undergoing cosmetic osseous genioplasty with the senior author between March 2010 and December 2021 were retrospectively reviewed and the subset of patients who underwent osseous genioplasty for soft tissue rejuvenation of the lower face and/or perioral region were selected. Data were collected regarding surgery performed, intraoperative and postoperative complications, and most recent follow-up. Continuous variables were described by means and standard deviations. Categoric variables were described by frequencies and percentages. Statistical analysis was performed with Microsoft Excel (Microsoft Corporation, Redmond, WA). This study was approved by the IRB of the MedStar Health Research Institute (Hyattsville, MD) (MHRI 2018-173). Written informed consent was obtained from all patients.

Surgical Technique

The senior author's surgical technique can be viewed in the video, available online at www.aestheticsurgeryjournal.com. The instruments used during surgery are shown in Figure 1. The mucosa is incised from canine to canine with needle tip electrocautery, 5 mm below the mucogingival junction. The mentalis is transected, being sure to leave enough muscle cuff to allow for reapproximation during closure. Failure to do so can result in a ptotic soft tissue envelope, or "witch's chin" deformity.

Next, the dissection is carried out in a subperiosteal fashion, using a periosteal elevator to dissect from the incision inferiorly to the inferior mandibular border. Once the inferior border has been reached, the elevator should be turned parallel to the inferior border of the mandible and lateral elevation of the periosteum is performed keeping the edge of the elevator palpable at the inferior border as it is passed posteriorly. This step can be performed quickly without risk of injuring the mental nerve by utilizing an elevator less than 10 mm wide, which still leaves several millimeters between the elevator and the mental foramen. Next, careful superior periosteal elevation should be performed laterally to identify the mental nerves.

The mandibular midline is scored with a reciprocating saw to create a reference for the midline of the chin. The transverse osteotomy is made at least 5 mm below the mental foramina to protect the intraosseous course of the mental nerves and the canine tooth roots. The trajectory of the osteotomy can be varied depending on the type of correction required. The osteotomy should be continued as far posteriorly as possible to preserve the contour of

the more anterior mandible as it transitions to the chin. The osteotomies should be completed with the sagittal saw, and one should avoid trying to complete the osteotomy manually because doing so can create bone spicules that may impair accurate seating of the chin segment. The muscles and other soft tissues attached to the genial segment should be left intact to maintain vascularity to the segment and improve the soft tissue profile of the neck as the segment is advanced and the tissue thereby tightened.

The mobilized segment is then fixed into the desired position with plates and screws, taking the midline mark as a guide. Specific movements will be discussed below. The mobile segment should be secured to the plate first with the midline of the segment aligning with the middle hole of the plate. A Kocher clamp or "L" retractor can be used to help stabilize the bone segment as it is fixed to the mandible. Fixation can be with 3 monocortical screws on each fragment. By inserting the first screw of the stepped plate on the mobile segment, the surgeon can rest the segment on the mandible to verify chin position before placing the remaining 5 screws. One should check the labiomental angle and chin-lip relationship before closure. It is important to make these determinations with the mouth closed because chin projection increases as a consequence of autorotation as the mandible is brought into occlusion. For this reason, the author recommends a nasal tube for genioplasties. The mentalis is then repaired, and the mucosa closed.

RESULTS

Thirty-seven consecutive patients who underwent cosmetic genioplasty for rejuvenation of the perioral and submandibular soft tissue were evaluated. The mean [standard deviation] age of the overall cohort of studied patients was 44.5 [13.14] years; 26 patients (70.3%) were female.

Eleven patients (29.7%) underwent genioplasty alone. The most common procedure to be performed in conjunction with genioplasty was orthognathic surgery (bilateral sagittal split osteotomy, Le Fort I osteotomy, etc) in 8 patients (21.6%). Simultaneous platysmaplasty was performed in 5 patients (13.5%) and each of these patients also underwent liposuction. Two patients (5.4%) underwent simultaneous facelift. A summary of procedures and the corresponding average age of patients undergoing each combination of procedures is presented in Table 1.

Patients from 2010 to 2015 who underwent an osseous genioplasty as an isolated procedure or in combination with liposuction or liposuction with platysmaplasty reported satisfaction as assessed with the FACE-Q[7] and patient satisfaction in the remaining patients was determined from the patient records. One patient who had an adjunct platysmaplasty required takeback for drainage of a hematoma, and 1 patient required drainage of an abscess in the OR about 3 weeks after surgery. None of the patients who underwent genioplasty alone reported postoperative edema or ecchymosis that prevented immediate return to activities of daily living. Patients who underwent adjunct procedures such as submental liposuction or platysmaplasty experienced bruising from 3 to 5 days postoperatively.

DISCUSSION

The facial skeleton is the foundation upon which the soft tissue is supported and should be a critical element in the treatment planning of every patient undergoing facial rejuvenation. In our experience, osseous genioplasty alone or in combination with minor adjunct procedures (submental liposuction, platysmaplasty) is capable of achieving a powerful rejuvenative result in the lower face in properly selected patients. A thorough facial analysis, including that of the underlying skeletal foundation, will allow the surgeon to educate the patient regarding the benefits and limitations of various treatment approaches as well as to guide preoperative discussions in order to achieve a result that adequately addresses the patient's goals and expectations.

When performing a facial examination of the lower facial third, the effects of several skeletal structures and relationships are evaluated: distance from anterior neck to pogonion, acuity of labiomental crease, vertical height of chin, occlusion, facial shape, and mandibular projection. The underlying facial skeleton plays a critical role in supporting the overlying soft tissue; therefore, repositioning a deficient chin will not only change the skeletal facial profile but can also improve soft tissue contours. The genial tubercle serves as the insertion point for the anterior digastric, geniohyoid, genioglossus, and anterior mylohyoid muscles. Advancing the osseous chin segment stretches and tightens these muscles, flattens the submental contour, and expands the overlying soft tissue, which results in a powerful rejuvenative effect on the perioral and submandibular soft tissue.[5] It is important to develop a treatment plan that results in a 3D net skeletal expansion of the chin to improve soft tissue laxity.

Analysis of the senior author's outcomes as outlined in this study led to the creation of an evaluation algorithm (Figure 2) that enables the surgeon to optimize the rejuvenative effects of genioplasty in the treatment plan based on dimensions and relationships observed during a thorough examination of the lower facial third. The algorithm incorporates a 3D approach to the lower facial third, considering not only the vertical and sagittal projection of the chin but also its shape and options for maximizing skeletal soft tissue support to achieve perioral and submandibular rejuvenation. Even in cases where the occlusion or

Table 1. Summary of Procedures Performed

Procedure	No. of patients	%	Mean age	SD
Genioplasty alone	11	29.73%	39.83	13.26
Genioplasty + rhinoplasty	5	13.51%	36.36	4.44
Genioplasty + facelift	1	2.70%	64.72	NA
Genioplasty + fat grafting	2	5.41%	40.15	7.76
Genioplasty + blepharoplasty	1	2.70%	52.62	NA
Genioplasty + lip lift	1	2.70%	50.44	NA
Genioplasty + orthognathic surgery	6	16.22%	43.96	16.68
Genioplasty + rhinoplasty + liposuction	1	2.70%	48.23	NA
Genioplasty + rhinoplasty + orthognathic surgery	1	2.70%	63.48	NA
Genioplasty + rhinoplasty + lip lift	1	2.70%	35.52	NA
Genioplasty + facelift + fat graft	1	2.70%	74.05	NA
Genioplasty + platysmaplasty + liposuction	2	5.41%	49.68	8.00
Genioplasty + platysmaplasty + liposuction + rhinoplasty	1	2.70%	51.18	NA
Genioplasty + platysmaplasty + liposuction + blepharoplasty	1	2.70%	46.05	NA
Genioplasty + fat grafting + blepharoplasty + rhytidectomy	1	2.70%	60.29	NA
Genioplasty + platysmaplasty + liposuction + orthognathic surgery	1	2.70%	36.40	NA
Total	37	100.00%	44.50	13.14
Genioplasty + rhinoplasty +/- other procedures	9	24.32%	42.24	10.39
Genioplasty + facelift +/- other procedures	2	5.41%	69.38	6.60
Genioplasty + platysmaplasty + liposuction ± other procedures	5	13.51%	46.60	7.22
Genioplasty + fat grafting ± other procedures	4	10.81%	53.66	17.18
Genioplasty + blepharoplasty ± other procedures	3	8.11%	52.99	7.13
Genioplasty + lip lift ± other procedures	2	5.41%	42.98	10.55
Genioplasty + rhitydectomy ± other procedures	1	2.70%	60.29	NA
Genioplasty + orthognathic surgery ± other procedures	8	21.62%	45.46	16.08

NA, not applicable; SD, standard deviation.

chin-lip relationship precludes sagittal chin advancement, clockwise rotation or vertical lengthening of the chin may be employed to improve soft tissue laxity.

The initial step in evaluation of the chin is a measurement of the lower facial third, which provides information about the vertical height of the chin. The lower facial third is measured as the distance between the subnasale and the menton and can be further subdivided based on 3 landmarks: the subnasale, stomion, and menton. The distance between the stomion and menton should be twice as long as the distance from subnasale to stomion.[5] In a patient who exhibits a short or normal lower facial third height, vertical elongation will expand soft tissue support and will also change the overlying facial shape. In patients with a round or square facial shape, vertical lengthening of the chin will taper the lower facial shape into a heart-shaped or oval-shaped face that is considered more aesthetically desirable.[8] Vertical elongation can also decrease the acuity of the labiomental crease or allow for more anterior movement while preserving an ideal labiomental angle in a patient who has a normal preoperative labiomental angle but requires sagittal chin advancement (Figure 3). An isolated sagittal chin advancement in this scenario will create an unaesthetic hyperacute labiomental crease.

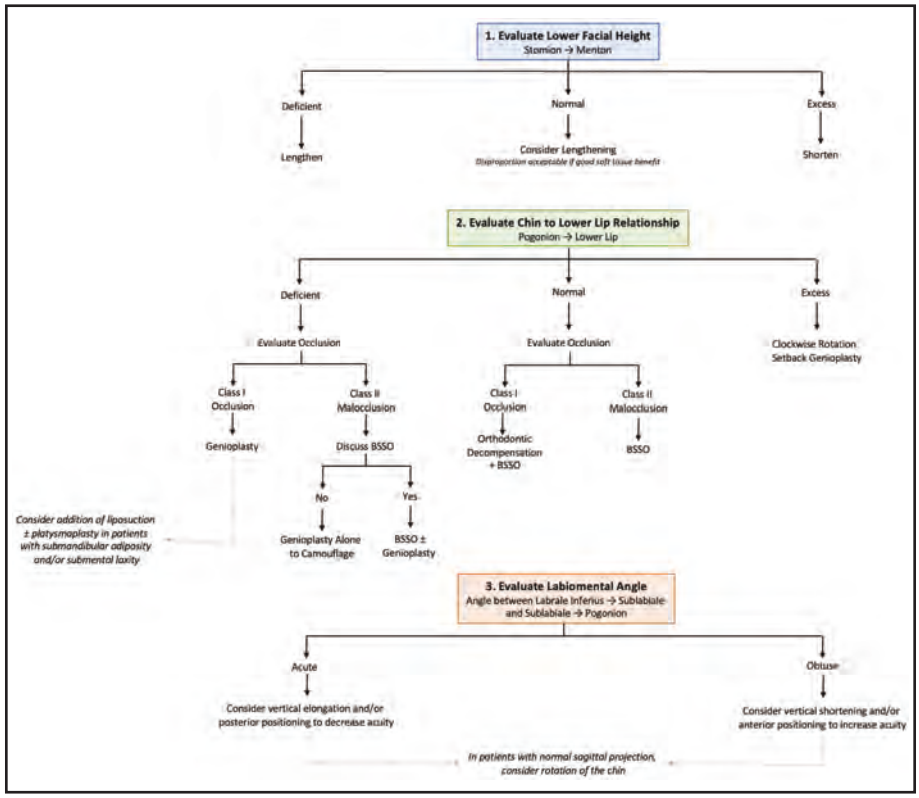

Figure 2. This algorithm can be used to guide a 3-dimensional approach to evaluation of the lower facial third and to determine the possible utility of osseous genioplasty in facial rejuvenation procedures.

The transverse position of the chin is evaluated for midline positioning, and any transverse asymmetry can be addressed to improve lower facial third aesthetics. Chin asymmetry is typically due to an asymmetric position on a symmetric mandible, a symmetric position on an asymmetric mandible, or a combination of the previous two etiologies. When only the chin is being centered on an asymmetric mandible, fat grafting is a useful tool that can be used to optimize residual soft tissue asymmetry after a centering genioplasty. In comparison to vertical and sagittal adjustments of the chin, changes in transverse positioning of the chin are less powerful movements to improve tissue laxity.

The labiomental angle is also a critical component of an aesthetic chin. Reyneke described the normal labiomental angle to be 130°,[9] whereas Farkas et al described gender-specific normal values of 121° for females and 114° for males.[10] Anterior and superior movements of the chin will increase the acuity of the labiomental angle, whereas elongation and posterior positioning of the chin will decrease its acuity. When planning a genioplasty, it is important to balance the final movements with respect to the labiomental angle to avoid excessively acute or obtuse angles postoperatively. If the sagittal position of the chin is in a desirable position but modification of the labiomental angle is desired, a rotation of the chin can achieve an isolated change in the labiomental angle without altering the chin's sagittal projection (Figure 4).

The sagittal projection of the chin can be assessed by several methods.[5] Gonzáles-Ulloa propose the use of 2 imaginary lines on the face: the first, known as the Frankfort line, is a line that extends horizontally from the upper margin of the external auditory meatus to the lower orbital ridge.[11] The second extends downwards from the nasion and should intersect with the Frankfort line at a right angle. A chin with ample sagittal projection will be just posterior to this line in females and at or just slightly anterior to it in males.[5] Byrd and Burt describe an alternative method whereby an imaginary line extends inferiorly from the mid-dorsum of the nose to the upper lip.[12] In patients with a nose of normal length, the chin should be approximately 3 mm posterior to this line. A third and final method employs Riedel's line, which connects the most prominent points of the upper and lower lip. In a chin with adequate sagittal projection, the pogonion will be situated as a third point along this line.[6] The senior author typically uses the relationship between the pogonion and the labrale inferius (most anterior point of the lower lip) when assessing sagittal projection, incorporating aspects of all 3 aforementioned

Figure 3. This 55-year-old female patient presented with primary concerns of submandibular laxity and deep marionette lines. (A, C, E) She also exhibited a deep labiomental crease, deficient lower facial height, a square facial shape, and retrogenia. An advancement and vertically lengthening genioplasty restored chin projection and facial height while improving the acuity of the labiomental crease and improving skeletal support of the perioral and submandibular tissue laxity. The vertical elongation also created a more feminine oval facial shape. (B, D, F) The patient is shown at approximately 16 months postoperatively.

methods in his analysis. In women, the pogonion should be in line with or just posterior to the labrale inferius, whereas in men it should sit in line with or just anterior to the labrale inferius.

Chin deficiency in the sagittal plane is frequently a contributing etiology in patients who present for neck lifts, particularly in middle-aged patients who do not yet have pronounced jowl descent but have concerns of marionette lines, submental laxity, and a short neck-to-chin distance. In patients with sagittal deficiency, the next step is to assess dental occlusion. Patients with sagittal deficiency and Class I occlusion should consider genioplasty alone,

Figure 4. (A, C, E) This 42-year-old female patient presented with a prominent but vertically deficient chin that exhibited a hyperacute labiomental crease. Posteriorly positioning the chin to a normal relationship would decrease skeletal support and the patient was not interested in a neck lift to correct the resulting laxity. A plan was made to lengthen and rotate the chin in a clockwise manner to slightly move the pogonion posteriorly while increasing the vertical height and improving the labiomental crease, lowering the facial height, and enhancing the facial shape. The resulting net skeletal expansion resulted in improvement of her perioral soft tissue laxity while also improving her prominent chin projection. (B, D, F) The same patient shown at approximately 13.5 months postoperatively.

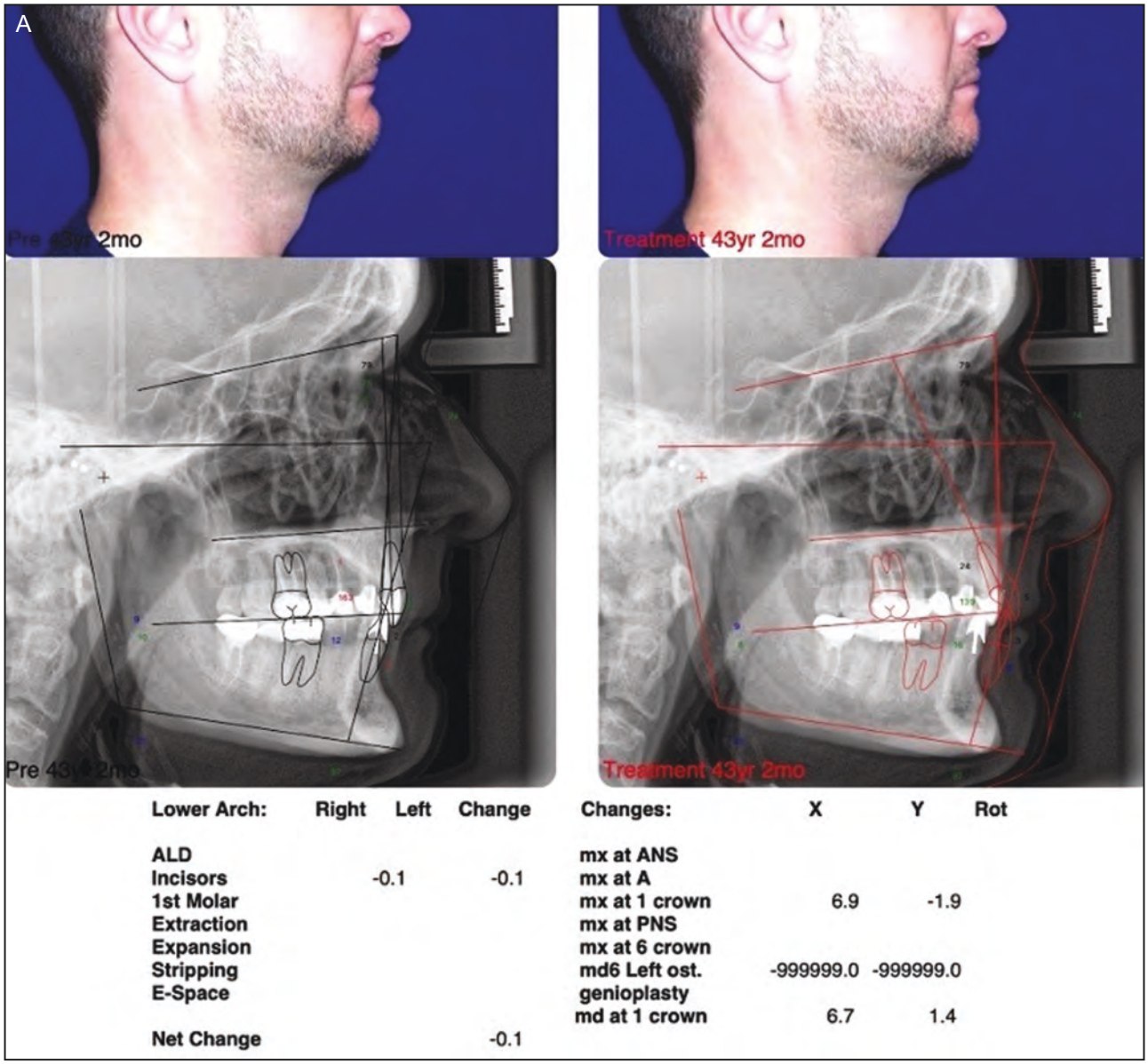

Figure 5. This 44-year-old male patient presented for a neck lift with a primary complaint of a short neck to chin distance and an obtuse cervicomental angle. His profile was a result of compensatory orthodontic therapy that corrected a skeletal Class II occlusion without mandibular advancement. An advancement genioplasty was not an option given that the pogonion was anterior to the lower lip and he exhibited a deep labiomental crease. (A) He was referred to an orthodontist to be evaluated for orthodontic decompensation followed by mandibular advancement and his preoperative cephalometric analysis and his prediction cephalometric analysis are shown. The orthodontic prediction is based on recreating the patient's original Class II occlusion to make room for the necessary mandibular advancement. Ultimately, the patient declined jaw surgery and orthodontics for financial reasons. He was treated successfully by slightly lengthening and clockwise rotation genioplasty with submental liposuction and a corset platysmaplasty. (B-D) The same patient shown at approximately 9 months postoperatively.

whereas the addition of jaw advancement in conjunction with genioplasty should be discussed with patients who have Class II malocclusion. In the senior author's experience, few patients opt for jaw surgery and instead proceed with chin advancement alone, but it is important to document the consideration and discussion of this treatment option.

A patient who appears to present with increasing frequency is the patient who inquires about a neck lift, submandibular liposuction, or chin augmentation to improve their facial appearance. However, on physical examination they do not exhibit jowl descent, marionette lines, or excess submandibular fat. In the senior author's experience the true etiology of their concern is that of a short

Figure 5. Continued.

neck-to-pogonion distance; however, examination of the chin shows normal projection relative to the lower lip negating the ability to advance the chin to correct their concern. The diagnosis in these patients is that they have an uncorrected mandibular retrognathia, yet previous orthodontic therapy has resulted in a Class I occlusion leaving no room for mandibular advancement. The only recourse for these patients is to undergo orthodontic therapy to reverse the dental compensation and recreate the original overbite to create room for the mandibular advancement (Figure 5). When 3D imaging is used to show patients the anticipated result, there is an "a-ha" moment where they state that is exactly what they want but did not know how to describe it. Before the introduction of clear aligner orthodontics such as Invisalign (Align Technology, San Jose, CA), the need for metallic orthodontic brackets would be a deal-breaker for these patients. In this select group of patients, decompensation followed by mandibular advancement is the only way to treat their concerns. With advances in clear aligner orthodontic therapy and virtual surgical planning, this is becoming an increasingly popular approach for young professionals who previously underwent orthodontic treatment and are now unhappy with their facial appearance.

Frequently, an osseous genioplasty alone is capable of excellent results in patients with mild submandibular laxity and marionette lines (Figures 6, 7). However, in patients with moderate submental laxity, jowl descent, marionette lines, or adipose tissue, adjunct procedures such as liposuction and/or platysmaplasty can be incorporated to augment the soft tissue benefits of the genioplasty. Excess subcutaneous fat in the submandibular region may blunt mandibular definition and is best addressed with liposuction. In the patient who exhibits moderate to severe submental fullness, the etiology may include prominent digastric muscles and subplatysmal fat. Addressing these problems requires a submental approach to allow direct fat removal and reduction of the anterior belly of the digastric muscles; platysma plication can also be performed when indicated (Figure 8). When these procedures are combined, the senior author prefers to perform liposuction first followed by the platysmaplasty and, finally, genioplasty. Liposuction is performed initially to reduce the chance of a cannula interfering with the platysma sutures. Performing the liposuction and platysmaplasty initially maintains sterility until the skin incision is closed prior to entering the oral cavity. Additionally, the imbricated platysma is enhanced by genial advancement to further tighten the platysmaplasty.

Figure 6. (A, C, E) This 42-year-old female patient presented for a neck lift to address her marionette lines, jowl descent, submandibular laxity, and cervicomental angle. The contribution of her chin to these findings was reviewed and she elected to undergo an osseous genioplasty which improved her marionette lines, submandibular laxity, perioral tissue support, and facial shape. (B, D, F) The same patient shown at approximately 3 months postoperatively.

Figure 7. (A, C, E) This 52-year-old female patient inquired about a neck lift to her orthodontist who referred her for evaluation of neck lift vs genioplasty. After been presented with both options presented, the patient underwent a genioplasty and was very happy with the improvement of her submandibular tissue laxity, chin projection, and cervicomental angle. (B, D, F) The same patient shown at approximately 4 months postoperatively.

Figure 8. (A, C, E) This 55-year-old female patient presented for a neck lift to address submental fullness, marionette lines, an obtuse cervicomental angle, and a lack of definition in the lower face. After a discussion of neck lift vs genioplasty with liposuction and a corset playsmaplasty, the patient selected the former option and was very happy with her results. She has an improvement in mandibular definition, marionette lines, cervicomental angle, and soft tissue support enhanced from the skeletal expansion of the genioplasty. (B, D, F) The same patient shown at approximately 7.5 months postoperatively.

An osseous genioplasty is one of the most powerful procedures available to the surgeon to alter facial form, and it is important that the surgeon's approach to chin modification is that of a 3D repositioning of the chin and associated perioral soft tissue, not merely a 2D advancement of the pogonion. Only an osseous genioplasty is capable of 3D movement without compromising an aesthetic labiomental crease.

Many patients are concerned about an increased recovery for osseous genioplasty vs that of a chin implant. In isolated genioplasty procedures (no platysmaplasty or submental liposuction), there is rarely ecchymosis evident at any point in the postoperative period and edema is minimal. Patients are informed the chin is a small button of bone in the lower jaw that is mobilized and secured with a titanium plate. Because jaw continuity is not osteotomized, there are no dietary restrictions and patients can resume any noncontact activity as tolerated immediately after surgery. The patient is informed the plate is made of titanium which is the same material as a dental implant. Titanium has an excellent safety record that has been established in osseointegration for over 50 years. Titanium does not inhibit a patient's ability to undergo MRI nor does it set off metal alarms. Our practice also uses titanium screws to secure chin implants so the need for titanium fixation is similar for both implants and osteotomies.

In patients with moderate to severe jowl descent and rhytids, there is no substitute for a traditional facelift or neck lift; however, in middle-aged patients with retrogenia whose concerns are submental laxity, marionette lines, or a short neck-to-chin distance, a genioplasty with possible liposuction or platysmaplasty offers an alternative approach that is capable of excellent results in properly selected patients. The genioplasty has an invisible intraoral incision and a platysmaplasty is limited to that of a 3-cm submental chin implant incision. Patients experience minimal discomfort and frequently do not require the use of narcotics postoperatively. Edema and ecchymosis are minimal: all but one of the patients in the studied cohort returned to work within 1 week of surgery.

As a retrospective review of a single surgeon's experience, there are several inherent limitations to this study. Our findings represent the experience and approach of a single plastic surgeon and may therefore not be generalizable to other practice settings and patient populations. Furthermore, aesthetic results are largely subjective; however, we believe our patient satisfaction scores as measured by the FACE-Q serve as evidence of a high level of patient satisfaction in the studied cohort. Our study also does not include a direct comparison to patients who underwent other facial rejuvenation procedures such as facelift and/or neck lift without osseous genioplasty. Despite these limitations, we believe that a careful review of the senior author's approach to incorporating osseous genioplasty into facial rejuvenation for properly selected patients, and in particular the algorithm that was developed as a result of this review, may be useful for surgeons considering osseous genioplasty in their own patients.

CONCLUSIONS

The osseous genioplasty is an excellent procedure that not only increases chin projection but can also improve submandibular laxity, perioral soft tissue support, facial shape, symmetry, and facial proportion. In the senior author's experience, osseous genioplasty performed in the properly selected patient can improve both facial form and rejuvenation of the lower face with minimal recovery and no visible scars. When employed in patients in whom a formal neck lift is not yet indicated, the improved skeletal support will enhance subsequent facial rejuvenative procedures. We acknowledge that a genioplasty is not the ideal approach in patients whose primary goals are correction of jowl descent and anterior neck laxity; however, the principles described can be incorporated as adjunct procedures in traditional neck lift and facelift procedures to obtain a superior result compared to soft tissue procedures alone.

Supplemental Material

This article contains supplemental material located online at www.aestheticsurgeryjournal.com.

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