Special Topic

Chin Ups and Downs: Avoiding Bad Results in Chin Reoperation

Aesthetic Surgery Journal
2017, Vol 37(3) 257–263

DOI: 10.1093/asj/sjw208
www.aestheticsurgeryjournal.com
OXFORD
UNIVERSITY PRESS

Sammy Sinno, MD; and Barry M. Zide, MD, DMD

Abstract

The senior author (B.M.Z.) has performed 512 chin reoperations over the last 30 years. This paper will describe the usual errors in surgical planning regarding what seems to be a relatively straightforward operation. We will focus on: (1) assessment of the chin; (2) pitfalls with surgical approaches; and (3) problem cases. This paper will not focus on the large chin, but rather on the chin that needs augmentation. Some chins will do well with an implant, others will need an osteotomy or ostectomy, and even others need both. The surgeon is responsible for selecting the correct operation. Thus, it remains incumbent on the surgeon to become diligent in diagnosis and delivery.

Level of Evidence: 5

Editorial Decision date: September 30, 2016.

The untrained surgeon, like the untrained eye, tends to simplify. An implant taken off the shelf and inserted without adjustment will rarely yield a satisfactory result. The use of an intraoral approach in all cases will lead to more malposition, and the need to correct errors will force the surgeon down an uncommon path. Based on the senior author's (B.M.Z.) experience of 512 cases (80% of which were implant procedures) from 1986 to 2016, the following will expound on methods to alter patient assessment and judgment to guide the surgeon to a better result (Table 1). Unfortunately, many original preoperative photographs are unavailable as many patients were referred from outside offices. The correct thinking remains: some patients need osteotomies and others will do well with implants. The surgeon should be comfortable in making the decision on which will work better, or even whether both will work equally well.[1,2]

PATIENT ASSESSMENT

There are four crucial areas of physical examination that cannot be overstated.

1) Labiomental fold height.
2) Labiomental fold depth.
3) Vertical chin height.
4) Chin width.

We will explore each in detail. Please note that formal radiographic cephalometric analysis is not routinely performed by the senior author.

Labiomental Fold Height

The labiomental fold height remains the crucial determinant of the perception of chin size. When the fold is high or indistinct, the chin pad percentage is high, and on frontal view the chin looks larger than when the fold

From the Department of Plastic Surgery, New York University Medical Center, Department of Plastic Surgery, New York, NY, USA.

Corresponding Author:
Dr Barry M. Zide, Hansjorg Wyss Department of Plastic Surgery, New York University Medical Center, 305 East 33rd Street, New York, NY 10016, USA.
E-mail: barry.zide@nyumc.org

is lower. The reason for this is that the fold divides the sublabial area (which is from the lower lip to the labiomental fold) to menton into percentages, one for pad and one for sublabial.

Two chins with the exact same bony configurations will look different if the fold is high or low. The high fold chin will look larger. This also goes for the poorly defined fold (Figures 1-2).

On an anatomic note, what exactly is the labiomental fold? In the lip the orbicularis oris varies in height and thus may be distinct from the origins of the mentalis, or may drape over the upper mentalis origins. When there is a short orbicularis oris height the chin pad percentage is high. When the lower orbicularis drapes over the mentalis or the upper mentalis is hypoplastic, the fold looks non-existent.

Table 1. Patient Demographics

No. of patients	512
Females	320
Males	192
Age (years)	
Mean	42.2
Range	16-66
Follow-up (months)	
Mean	15.2
Range	3-39

Labiomental Fold Depth

The labiomental fold depth results from separation or overlap of the orbicularis oris muscle and mentalis. The depth of the fold can be adjusted at times with fillers, but the distinct or indistinct nature of the fold varies. As stated above, when the lower orbicularis oris fibers overlap the upper insertion of the mentalis, it will be indistinct. While some of the mentalis insertion occurs in the upper chin pad, the "takeoff" from the fold downward will make the fold become more distinct and the upper pad is fuller. The soft tissue forms much of the takeoff below the fold (Figure 3). However, the takeoff can also be bony, the so-called "spine of the symphysis," and this, too, may require adjustment (Figure 4). Great difficulty awaits the surgeon who places a full height implant in a patient with a high bony or soft tissue takeoff. The fold will be more acute, too acute (Figure 5).

When the labiomental fold depth is minimal, any augmentation will look larger because the entire sublabial area will be viewed as chin. In such cases, an advancement or implant should be placed only at the lower border of the mandible. Silicone or porex implants should have the top one-third to one-half removed, and osteotomies must be tempered by moderation in height. That said, if any osteotomy of the symphysis is performed and advancement performed, the superior part here too can be adjusted.[3]

Vertical Height

When a sagittally deficient chin is of normal height, an implant of medium to large size will make it look longer. When long and sagittally deficient, often times the

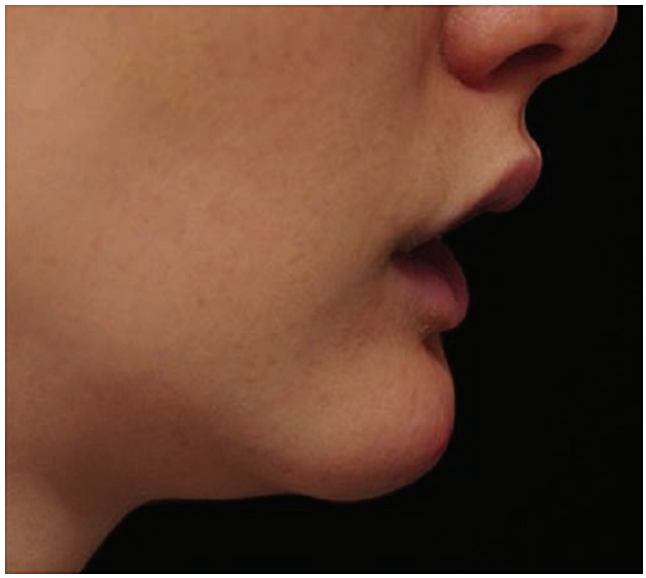

Figure 1. A 19-year-old man with a high labiomental fold.

Figure 2. A 42-year-old woman with an indistinct labiomental fold.

Figure 3. A 33-year-old man with soft tissue forming most of the takeoff below the fold. In asking the patient to pout, the mentalis is primarily in the upper pad (see Figure 8).

Figure 5. A 29-year-old man 8 months following implant placement causing too acute of labiomental fold.

surgeon may place an implant. In fact, there are only two choices: shorten the chin at the inferior border and place a fixed implant or advance the chin and perform a jumping genioplasty. The shortening procedure where a wedge is removed may work well, but the nerve injury rate for removal is inadvertently high.[4-7]

Figure 4. A 38-year-old woman with bony takeoff, or "spine of the symphysis."

Chin Width

Women do not want wide or overprojecting chins; men may be more accepting. A narrow chin that is advanced by osteotomy may appear too narrow (Figure 6). An implant with width may be a better choice. An absolute choice for bone or implant will set the surgeon up for failure.

PITFALLS IN SURGICAL APPROACHES

Both osteotomies and implant placement can be done from either an intraoral or extraoral approach. We have done them both, and often the external approach becomes a better choice, especially in secondary cases. The notion that there will be "no scar" from the intraoral approach works if the implant placement is perfect and the performer is skilled, and especially if the closure is correct. A single statement will suffice: an intraoral transmuscular approach requires closure of both muscle and mucosa and can be done twice without much repercussion. After that the mentalis attachment weakens and downward drift occurs. As for doing bony surgery from an extraoral approach, we remain in the minority. However, chin reduction surgery for long or projecting chins can be done from either route, and nerve injury can be much less from an extraoral approach via a submental incision.[3] Submental soft tissue excess after reduction can be dealt with from this approach much easier.

There are several indications for chin implants. When silicone implant surgery is performed intraorally, the surgeon usually stands at the patient's head. So when implant malposition occurs for the right-handed surgeon, the implant is usually too low on the left and too high on the right; the opposite occurs for the left-handed surgeon. It is crucial for the right-handed surgeon to perform the right side pocket dissection while standing in front of the patient, otherwise the surgeon will be working back-handed.

As noted, an intraoral approach through mucosa and mentalis muscle can be done twice with proper closure. As noted, after that the proximal remnant of the mentalis muscle becomes devascularized and de-innervated. The weight of the chin and motor use tends to cause the mentalis origin to drift downward, and the sulcus lowers. Additionally, age and periodontal bone loss contribute to mentalis drift.[8] The patient's complains will range as follows:

1) "I have to think to close my mouth."
2) "My lower teeth are exposed."
3) "When I close my mouth I get dimples on my chin."
4) "My chin is droopy."

Clinically, they will have a lower than usual sulcus as the proximal mentalis insertion has drifted downward (Figure 7). When the surgeon replaces silicone implants with other silicone implants, the chin soft tissue can now slide downward over the implant, and contraction of the capsule will lead to dimpling. These are assertions made from the senior author's experience.

PROBLEM CASES: WHAT TO DO

Incisor Show

The mentalis origin has drifted down after being divided and not reapproximated, or after the vestibular wound has been left to heal on its own after an infection.[9,10] The patient will need a mentalis resuspension; this technique involves, supraplatysmal submental undermining to allow neck and chin pad upward movement, a non-absorbable anchor to support the lowest mentalis fibers about 1 cm above the mentum, and sutures to the mentalis remnant at the lower central root apices.[8] In addition, a heavy tendon anchor is required to support the chin pad.

Low Sulcus

If the origin is lowered the lip will descend. Only in full-lipped patients will this not be a problem. The patient may complain of decreased lip volume. Fillers and/or mentalis suspension will correct this. Depending on how low the sulcus goes, the inferior chin pad may also descend and this may look obvious, as ptosis below the bony mentum level.

High Takeoff Below the Labiomental Fold

Takeoff refers to the projection of the chin pad directly below the labiomental fold. There are five main reasons for a high takeoff: (1) the mentalis is crowded into the upper chin pad (surgery not indicated) (Figure 8); (2) the implant is too high and needs to be lowered or the top one-half removed (especially true in short chins); (3) the symphyseal spine needs to be burred down above the symphysis; (4) the chin is vertically short with excess sagittal projection and in need of lengthening (and varying the inclination of an osseous genioplasty) (Figure 9); and (5) the chin is very thick and fatty (the usual chin pad thickness is 8-14 mm) (Figure 10).

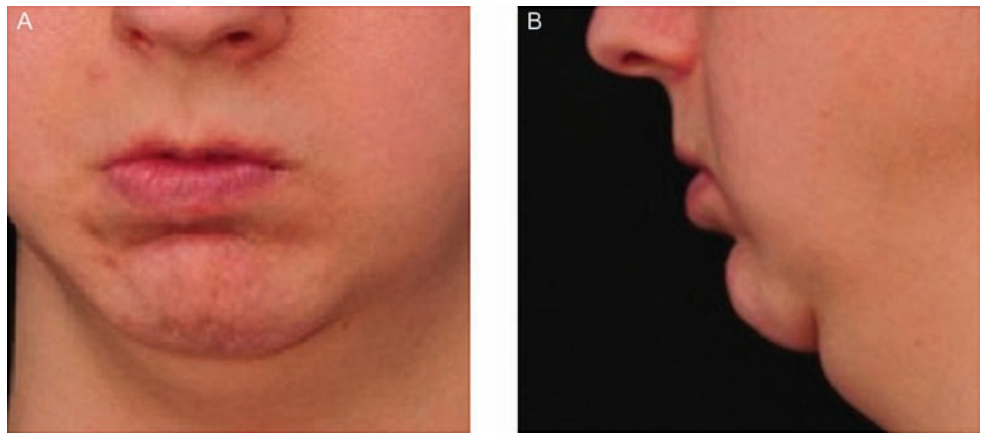

Figure 6. (A, B) A 21-year-old woman 12 months postoperatively with narrow chin advanced by horizontal osteotomy appearing too narrow.

Chin Pad Fasciculations/"Balling"

When a (usually) silicone implant has been placed and removed, and an inherent desire to close the mouth is present, the capsule of the former implant will contract and scar. If it contracts a small amount, dimpling and fasciculations occur; if contraction is considerable, a chin ball will form (Figure 11).

For fasciculations, small aliquots of botulinum toxin will suffice. For balling, the capsule will need removal with the muscle attached with anchors to a porous implant to spread out the lower muscle.

Long Chin After Augmentation

The sagittal augmentation of the chin will make it appear longer. In a chin already long, inferior border ostectomy with implant or jumping genioplasty work best. So if the chin is already slightly long, an implant will lengthen the face.

Figure 7. A 23-year-old woman with downward mentalis drift.

Figure 8. A 33-year-old man with mentalis crowding into upper chin pad.

Figure 9. A 45-year-old woman with vertically short chin with excess sagittal projection in need of lengthening.

Figure 10. A 41-year-old woman with thick chin pad (lateral cephalogram on this patient demonstrated the chin pad at 2 cm of thickness).

Figure 11. A 37-year-old woman with chin ball upon contraction of the mentalis muscle secondary to capsule that had formed around the implant placed 1 year prior.

Replacement of a Malpositioned Silicone Implant

Without nerve problems, the novice surgeon may attempt to recreate a correct pocket and use the same implant. This scenario may only succeed with screws, K-wires, or transbony sutures through the implant. The downside to this: trauma to a silicone implant with fixation may tear the implant. Simple removal will lead to capsular contracture, fasciculations, or balling.

Unfortunately, no paper has outlined in detail the incidence of nerve injury with primary chin surgery. The surgeon must palpate to assess whether the implant is riding high above the inferior border on the affected side. One can push the implant up to see if the pain worsens. If after 3 weeks the chin is still numb, some of the upper implant will need to be removed or totally repositioned. Removal of the top part of the implant may sometimes work. A better method is to replace with a new porous implant or perform a bony genioplasty. This must be addressed, if not the nerve damage could become permanent.[1] Numbness will typically then resolve at 6 weeks after adjustment.

Infection After Silicone Implant Placement

This occurs usually if there was bleeding into the pocket or if the intraoral closure was done poorly. If an intraoral route was chosen, check the quality of the closure. Herein with intraoral soiling the implant is harder to salvage, and just removal and leaving the intraoral incision open is a mistake; the sulcus will lower. It is better to check your closure after implant removal and drain from below after closure.

If the implant was silicone and placed from below, transcutaneous irrigation around the prosthesis with antibiotic solution for a couple of days may save it. Usually injecting with 5 to 10 cc of antibiotic or dilute Betadine solution works nicely, and this can be repeated as necessary.

Short Sulcus

When the lip to vestibular distance is short and the lip is tethered, a skin graft will not work. In these cases, additional tissue from the side or a facial artery myomucosal flap must be placed.[11,12] The lip may also need filling.

Asymmetry

The asymmetry that naturally occurs regarding the midpoint of the symphysis was recently described.[13] If noted, this asymmetry can be overcome by appropriately contouring an implant.

DISCUSSION

The continued complications of a seemingly simple operation attest to the true nature of the chin's variances. The reasons for this trend remain obvious:

1) The evaluation process of the surgeon is flawed.
2) The intraoral approach, while "scar-less" has pitfalls, including more difficulty in correct placement and when reoperated more functional problems.
3) Fewer surgeons are totally comfortable with bony surgery, and thus will choose an implant for a "bone" case.

Chin surgery has evolved. When some of the early osteotomy cases were examined in textbooks,[14] patients could not close their lips because a mucosal closure alone was done, leaving the mentalis origin unattached. Many early chin surgeons performed osteotomies without appreciating the need for proper closure methods.

There are two common sequelae that occur with placement of implants, particularly via an intraoral approach. First, the implant will be placed too high, usually on one side. The lower border of the implant should be at the most inferior part of the pogonion. As surgeons fear placing the implant too low, they frequently place it too high. The implant will be placed over a thinner area of bone where erosion is more common.[15] Additionally, the implant will likely impact the labiomental fold angle by making it more acute; it must be trimmed. Third, with smiling a bump will occur below the labiomental fold. Fourth, the incidence of nerve problems, especially with winged implants, will obviously increase problems precipitously.

The second sequella is that surgeons often place implants right out of the box. The process of "from package to person" leads to a multitude of problems in size. For short chins and chins with a deeper fold, the upper one-third to one-half of the implant must be trimmed, otherwise the chin in many cases (particularly women) will be too broad and too large. For women, the lateral elements of the implant may need to be thinned.[16]

There remain still a few situations where both bone and implant surgery may be required together. An obvious answer to these situations has not been forthcoming. A few of these situations include excess mentalis muscle, short projecting cases, and thick fat pad. Additionally, implants are tapered laterally; any deflation that subsequently occurs on top of the implant is due to cheek ptosis and must be addressed at a later time with a formal cheek/face-lift.

CONCLUSION

Chin augmentation surgery seems simple but remains complex. The number of reoperative cases remains a testament to this. The surgeon should be comfortable with bony surgery as well as implant methods. Using the nuances mentioned in this paper, the surgeon can avoid many common pitfalls.

Disclosures

The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

Funding

The authors received no financial support for the research, authorship, and publication of this article.

REFERENCES

1. Zide BM, Pfeifer TM, Longaker MT. Chin surgery: I. Augmentation—the allures and the alerts. *Plast Reconstr Surg*. 1999;104(6):1843-1853; discussion 1861-1842.
2. Wolfe SA, Posnick JC, Yaremchuk MJ, Zide BM. Chin augmentation. *Aesthet Surg J*. 2004;24(3):247-256.
3. Warren SM, Spector JA, Zide BM. Chin surgery V: treatment of the long, nonprojecting chin. *Plast Reconstr Surg*. 2007;120(3):760-768.
4. Karas ND, Boyd SB, Sinn DP. Recovery of neurosensory function following orthognathic surgery. *J Oral Maxillofac Surg*. 1990;48(2):124-134.
5. Lindquist CC, Obeid G. Complications of genioplasty done alone or in combination with sagittal split-ramus osteotomy. *Oral Surg Oral Med Oral Pathol*. 1988;66(1):13-16.
6. Nishioka GJ, Mason M, Van Sickels JE. Neurosensory disturbance associated with the anterior mandibular horizontal osteotomy. *J Oral Maxillofac Surg*. 1988;46(2):107-110.
7. Posnick JC, Al-Qattan MM, Stepner NM. Alteration in facial sensibility in adolescents following sagittal split and chin osteotomies of the mandible. *Plast Reconstr Surg*. 1996;97(5):920-927.
8. Garfein ES, Zide BM. Chin ptosis: classification, anatomy, and correction. *Craniomaxillofac Trauma Reconstr*. 2008;1(1):1-14.
9. Zide BM, McCarthy J. The mentalis muscle: an essential component of chin and lower lip position. *Plast Reconstr Surg*. 1989;83(3):413-420.
10. Zide BM. The mentalis muscle: an essential component of chin and lower lip position. *Plast Reconstr Surg*. 2000;105(3):1213-1215.
11. Pribaz JJ, Meara JG, Wright S, Smith JD, Stephens W, Breuing KH. Lip and vermilion reconstruction with the facial artery musculomucosal flap. *Plast Reconstr Surg*. 2000;105(3):864-872.
12. Pribaz J, Stephens W, Crespo L, Gifford G. A new intraoral flap: facial artery musculomucosal (FAMM) flap. *Plast Reconstr Surg*. 1992;90(3):421-429.
13. Aston SJ, Smith DM. Taking it on the chin: recognizing and accounting for lower face asymmetry in chin augmentation and genioplasty. *Plast Reconstr Surg*. 2015;135(6):1591-1595.
14. Converse JM. *Plastic and Reconstructive Surgery*. New York, New York. Saunders; 1977.
15. Friedland JA, Coccaro PJ, Converse JM. Retrospective cephalometric analysis of mandibular bone absorption under silicone rubber chin implants. *Plast Reconstr Surg*. 1976;57(2):144-151.
16. Zide BM, Boutros S. Chin surgery III: revelations. *Plast Reconstr Surg*. 2003;111(4):1542-1550; discussion 1551-1542.