

Choosing the Best Procedure to Augment the Chin: Is Anything Better than an Implant?

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Abstract

The chin plays a very important role in overall facial appearance, and aesthetic procedures to augment the chin in patients with microgenia can improve overall facial balance. Many procedures exist to enhance the appearance of a small chin. Procedures include surgeries such as placement of an alloplast implant and bony osteotomy of the mentum (sliding genioplasty). The advantages and disadvantages of each surgical technique are well documented. Although surgical augmentation of the chin has been the gold standard of therapy, recent development of injectable filler products with lifting capacity has changed the way that many practitioners alter chin shape and size. Filler agents allow augmentation of the chin in horizontal (projection), vertical, and transverse dimensions. Injectable fillers are a simple, noninvasive procedure that causes minimal to no downtime, incurs minimal risks, and allows the practitioner to shape the chin in three dimensions. This procedure allows patients to enhance their chin size without requiring an operative visit. As more and varied filler products become FDA-approved, the versatility and application of these agents will increase.

Keywords

- ▶ chin augmentation
- ▶ chin implant
- ▶ genioplasty
- ▶ volume

The appearance of the face is largely defined by the underlying skeletal structure. The chin is an important component to lower facial appearance.^{1,2} An attractive face requires balance of multiple facial features. In the lower face, optimal appearance is found when the nose, lips, and neck are in this harmonious balance.³

Phylogenetically, it is interesting that the chin is not present in any four-legged animal. As evolution has occurred, and with the adoption of upright posture, the face has become more vertical in orientation and the chin has increased in prominence. As the human face has evolved, the gonial angle has become more acute and the chin has become more projected.

The importance of the chin in facial appearance can be best noted when the chin is of less than ideal size causing other facial areas to appear too large or small. If the chin projection or width is inadequate, the adjacent neck and jowl soft tissues appear prematurely aged. It is interesting to note that no United States president to date has had a horizontally deficient chin.⁴ This underscores the subtle importance of the chin in the overall appearance of the lower face.⁵

In general, when patients inquire about improving their facial appearance, they rarely ask about surgical correction of the chin. More commonly, requests focus on seemingly more obvious problems such as reduction of a large nose or correction of sagging skin of the neck and jowls. However, recognition, evaluation, and treatment of chin abnormalities often has a great impact on facial appearance.⁶

Appropriate treatment of aesthetic deformities of the chin will contribute to facial harmony and will often improve the appearance of the mouth, the lips, and the nose. To best treat aesthetic chin issues, a detailed and systematic analysis of the chin should be performed. Augmentation of the chin can be performed with injectable fillers or autologous fat, placement of an alloplast chin implant, or with a bony osteotomy of the chin (sliding genioplasty).⁷ This paper will outline the method to individualize chin deformities and will define an algorithm to choose between the available noninvasive and surgical chin augmentation procedures.

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Anatomy

The skin of the chin is thick, measuring between 2,000 and 2,500 μm in most adults. The subcutaneous or superficial fat of the chin is dense and is firmly attached to the overlying skin and underlying musculature. The muscles that provide mimetic movement of the lower lip and chin include the paired mentalis centrally, the depressor labii inferioris, and the depressor anguli oris. The major ligament that attaches the muscles laterally to the underlying mandible is the mandibulocutaneous ligament.

The mandible is the skeletal structure of the lower face. The most protruding central projecting portion of the chin is termed the pogonion. The inferior most chin point is referred to as the menton. The mental nerve, a sensory branch of the third division of the trigeminal nerve, exits the mandible through a foramen in the mandible beneath the first premolar tooth. In general, the configuration of the mandible determines the chin contour.

Patient Evaluation

Systematic evaluation of chin issues is important to perform prior to choosing the best procedure. Practitioners are often myopic, not individualizing the deformity, but analyzing the chin by what they can do to it. For this reason, surgeons who perform only chin augmentation with an alloplast chin implant may recognize isolated horizontal chin deficiency, which is a deformity well treated by surgical placement of an alloplast. On the other hand, surgeons who only treat microgenia with fillers may not recognize the contribution of the underlying hard tissues (both teeth and bone) to the chin deformity.

Physical examination of the chin should include *both* inspection and palpation of the chin, lips, nose, and teeth. The entire face should be observed at rest and during animation to evaluate the mentalis muscle, and the chin soft-tissue mound and its support. The chin should be observed in all dimensions, that is, *horizontal* (anteroposterior, AP), *vertical* (superoinferior), and *transverse* (side to side). This three-dimensional (3D) analysis can be aided by careful 2D or 3D photographs. The evaluation of all patients for possible chin surgery should include consistent and reproducible clinical photographs in three views: AP (frontal), lateral (profile), and oblique. Photographs allow analysis of the contour and projection of the chin as it relates to the lips, nose, labiomental groove, and soft tissues of the neck. For most chin deformities, radiographs of the chin and mandible are unnecessary. However, if the chin problem is complex, a panoramic radiograph (Panorex) and cephalometric radiographs in the AP and lateral views may aid in evaluation. The panoramic radiograph shows the cortical outline of the mandible and the vertical mandibular height, and delineates the position of the tooth roots and the inferior alveolar canals and mental foramina.

Chin Augmentation Options

There are four basic options possible to augment the chin: (1) surgical placement of an alloplast implant,⁸ (2) bony osteotomy with advancement of the chin, (3) augmentation with

injectable fillers, and (4) augmentation with autologous fat.⁹ Each procedure has advantages and disadvantages. The selection of the best procedure to correct a given deformity of the chin should be based on the type and extent of the deformity. Analysis of the relative advantages and disadvantages of each option should also be considered.

Augmentation of the chin with an implant is a simple procedure that provides excellent augmentation of the bony pogonion. It is thus a good choice for horizontal microgenia in patients with good chin symmetry and normal vertical chin height (—Figs. 1A–D and 2A–D). The procedure is generally not good for patients with vertical chin deficiency or excess, or in patients with any significant asymmetry of the chin. This technique is also limited by the availability of various sizes and shapes of alloplast implants. An infinite number of shapes and sizes of implants may be required. However, most implants are manufactured in only three or four sizes and one or two shapes.

Osteotomy of the bony mentum (osseous genioplasty) is a versatile and reliable procedure for correcting a variety of skeletal chin deformities. This procedure involves an intraoral incision and approach, and a subperiosteal dissection of the anterior mandible and bony mentum. First described by Hofer in 1942, this technique involves horizontal osteotomy and downfracture of the chin, with repositioning and fixation of the distal segment.¹⁰ Although the most invasive of all described chin augmentation procedures, osseous genioplasty allows 3D



Fig. 1 Preoperative (A) frontal and (C) lateral photographs of a 32-year-old patient with horizontal microgenia. (B, D) Three months postoperative photographs of the patient after augmentation with a Silastic chin implant.



Fig. 2 Preoperative (A) frontal and (C) lateral photographs of a middle-aged man who desires facial rejuvenation surgery. (B, D) One-year postoperative frontal and lateral photographs after facelift and chin augmentation with an Alloplast implant.

repositioning of the chin. Correction of both horizontal and vertical chin conditions can be performed (►Fig. 3A–D).¹¹ Additionally, if transverse issues exist, such as transverse asymmetry or narrowness of the chin, improvement can be gained to improve overall chin shape.¹²

Augmentation of the chin can also be accomplished with injection of soft-tissue fillers or autologous fat.¹³ Although these techniques are not permanent, they have the advantages of not requiring incisions and not resulting in scarring, which is the inevitable result of any surgery. Injectable fillers or autologous fat augmentation also allows correction of the chin in three dimensions. As such, injectable procedures are ideal for modifying chin shape (►Fig. 4A–F).¹⁴

Deciding on the Best Chin Augmentation Procedure

After systematic evaluation of the chin and adjacent structures, the options of chin augmentation should be discussed with the patient. The patient's tolerance of downtime, scarring, want for permanence, and general acceptance of surgery versus a less invasive procedure should all be considered when making the decision.

Another factor that impacts decision making in chin augmentation is practitioner bias. This bias is affected by training and experience. Surgeons tend to choose the procedure with



Fig. 3 Preoperative (A) frontal and (C) oblique photographs of a 65-year-old female who desired facial rejuvenation surgery. (B, D) Two months postoperative photographs of the patient after facelift, upper and lower blepharoplasties, autologous fat augmentation of the midface, and sliding genioplasty with advancement and lengthening.

which they have had the most experience. Facial plastic surgeons have been exposed to and have learned to augment chins by surgical placement of an alloplast implant. Oral surgeons have more experience with sliding bony genioplasty. Most dermatologists do not perform surgical chin enhancement; therefore, they tend to recommend fillers for chin augmentation. The ideal chin augmentation procedure would be effective, adjustable, predictable, and safe. ►Table 1 lists the relative advantages and disadvantages of each chin augmentation procedure. No technique is ideal, each with certain advantages. The practitioner should consider the patient's individual desires after explaining the augmentation options.

Surgical enhancement procedures, including chin augmentation with an alloplast and bony chin osteotomies, have the advantage of being permanent solutions, thereby obviating the need for additional treatment (should the surgical result be satisfying to the patient and safe). However, surgery on the chin produces a permanent change. If the patient is not satisfied with the surgical result or if postsurgical complications arise, additional surgery is often required. Surgical enhancement of the chin is perceived by the patient as a onetime alteration of chin form, after which minor adjustments are either not possible, or requiring a second procedure, which is not what the patient or doctor expected. A second surgical procedure after implant placement requires implant removal or adjustment, while postsurgical issues

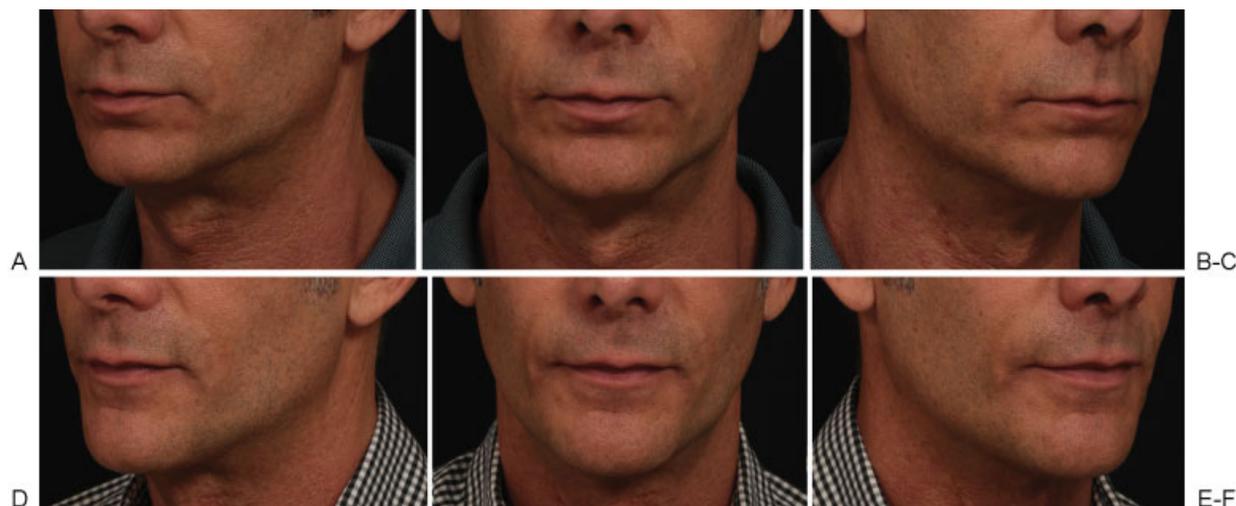


Fig. 4 (A–C) Preinjection photographs of a middle-aged male patient with a deep labiomental sulcus, horizontal microgenia, and a narrow chin shape. (D–F) Postinjection photographs of the same patient after injection with 2-mL JUVÉDERM Ultra Plus (1 mL centrally deep to the mentalis muscle and 0.5 mL to each lateral mandibular region; Allergan, Irvine, CA).

after chin osteotomies requires a second surgery and osteotomy to change chin contour.

Injection of autologous fat or injectable fillers is a relatively simple procedure that can occur under topical anesthesia (if filler is injected) or under local anesthesia (with or without sedation) with autologous fat transfer. These procedures have the advantage of allowing chin augmentation without surgical scarring. These techniques do not require protracted postoperative healing and have the advantage of being predictable and adjustable (→ Fig. 5A–F). An additional advantage of injectable filling to augment the chin is that filling with a

needle or canula allows 3D chin “shaping.”¹⁵ Augmentation with an alloplast limits the practitioner in that a finite array of implant sizes and shapes exist and the variations of underlying chin contours are vast.

Discussion

The usual cause of a small chin is a bony deficiency. The entire mandible can be small or positioned more posteriorly (retrognathia), or the chin itself can be small (microgenia) in the vertical or horizontal dimension. It is a common maxim that if bone is deficient, it should be replaced with bone. Facial plastic surgeons often state that “like should be replaced with like.” In patients with microgenia, the skeletal chin deficiency noted by patients and the surgeons who often treat them is to augment the small chin not with bone, but with an alloplast implant. Alloplasts are not composed of bone, but are solid and somewhat rigid. The relatively simple and partially reversible placement of a chin implant was at least replacing the hard tissue deficit with a solid, semirigid implant. For purists who don’t like to use facial implants, bony osteotomy of the mentum provides a permanent solution to the deficient chin.

However, with the advent of various facial fillers and then the popularity of autologous fat transfer, practitioners have augmented the small bony chin with other materials. It is clear that like does not have to be replaced with the like. Stated in another way, bony deficiency of the chin can effectively and safely be replaced with tissue or implants of softer consistency, such as fat or “off-of-the-shelf” fillers. The thick soft-tissue envelope of the skin makes the safety profile for injectable fillers quite good, with the relatively few complications. Vascular compromise in this region is rare, and the thick soft-tissue envelope makes contour irregularities from fillers very uncommon.

Although many surgeons may maintain the bias of performing a more lasting (or even permanent) surgical correction of the small chin, there is a compelling argument for a less

Table 1 Relative advantages/disadvantages of chin augmentation procedures

	Alloplast	Genioplasty	Filler injection
Corrects horizontal deformity	+++	+++	++
Corrects vertical deformity	0	+++	++
Corrects transverse deformity	0	++	+++
Corrects shape problems	0	++	+++
Difficulty of performance	–	– – –	0
Duration of recovery	–	– – –	0
Complications	– –	–	–
Need for revision/repeat	0	0	– – –
Difficulty of revision/reversal	–	– –	0

Notes: +, relative advantage; –, relative disadvantage; 0, relative neutrality.



Fig. 5 (A–C) Preinjection photographs of a 30-year-old female patient with facial and chin asymmetry, a deep labiomental sulcus, and a narrow chin. (D–F) Postinjection photographs of the same patient after injection with 1-mL JUVÉDERM Ultra Plus (0.5 mL centrally deep to the mentalis muscle and 0.25 mL to each lateral mandibular region).

invasive option to augmenting the deficient chin. Injections have the advantages of reversibility (if hyaluronic acid gels are used), minimal to no downtime (compared with surgical healing), and the ability to be performed in the office (not operating room) without anesthesia. Additionally, and possibly most importantly, injections into the chin allow 3D shaping of the chin. The ability to provide volume to the lateral aspect of the chin (adjacent to the central pogonion) is often overlooked when placing a chin implant or performing bony genioplasty. Improving chin shape, as well as augmenting the chin in profile, is important to overall attractiveness of the face. Chin shape is best enhanced by a procedure and substance that allows individualized 3D augmentation, rather than a 2D view of the chin that views the chin as only how far it projects from the facial plane.

Practitioners often observe things not as they really are, but in how they can easily treat them. This concept is quite true when considering the evolution of treating microgenia. When good off-of-the-shelf fillers did not exist, the surgical option was all that existed. Surgeons viewed the chin in profile, as implants made a discernible difference with the lateral view of the chin. Oblique views of the face often revealed a less than ideal appearance with a paragonial deficiency (prejowl sulcus). As fillers with good lifting ability have been developed, the potential to augment both the central pogonion and the lateral paragonial region exists. As this ability has developed, practitioners now observe the chin in three dimensions. The vision of the practitioner has increased, as has the ability to improve chin deficiency.

Summary

The chin plays an important role in overall facial appearance, and aesthetic procedures to augment the chin is extremely rewarding when performed in carefully selected patients. The options to enhance a deficient chin remain surgical, with either an implant or bony osteotomy, or injection, with either autologous fat or with fillers.

To best augment the chin, an individualized analysis should be performed. The choice of surgical enhancement

versus injection should be made by the patient after all options are considered. Although implants are the preferred method by many surgeons, injectable fillers are a simple, noninvasive procedure that causes minimal to no downtime, incurs minimal risks, and allows the practitioner to shape the chin in three dimensions. This technique should be considered by all patients and practitioners.

Disclosure

Dr. Sykes is a speaker and trainer for Allergan and Galderma. Dr. Fitzgerald is a speaker, trainer, and consultant for Allergan, Galderma, and Merz.

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