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Cosmetic

Role of the Pedicled Mentalis Muscle Flap in Closure of Chin Implants in Genioplasty

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Summary: With the purpose of obtaining an aesthetically pleasing chin appearance, genioplasty or chin augmentation can be performed through osteotomy or chin implantation, with the latter available in different sizes and materials such as silicone and porous polyethylene. The implants are traditionally placed in a subperiosteal or supraperiosteal plane with different advantages and disadvantages to each. This procedure has evolved through time with many techniques and modifications; and this article is an addition to this ongoing refinement by advocating for closure of the mentalis muscle (a paired chin muscle originating from the incisor fossa to the chin skin) over the implant after securing its position with screws (in the case of porous polyethylene) or creating a snug pocket (in the case of silicone). In this retrospective analysis, 15 patients underwent this procedure with an excellent outcome. A single patient developed numbness in the mandibular nerve territory, while another one developed a fistulating radicular cyst that was unrelated to this technique. In addition to the simple learning curve, the potential advantages of this technique include less chances of fistula formation, implant exposure, infection, extrusion, or malpositioning. Prospective studies with more subjects are required to cement our findings. *(Plast Reconstr Surg Glob Open 2021;9:e3728; doi: 10.1097/GOX.0000000000003728; Published online 4 August 2021.)*

INTRODUCTION

Genioplasty or chin augmentation is one of the most common cosmetic procedures.[1] The American Society of Plastic Surgeons reported 44,603 genioplasties in 2019,[2] making this procedure among the commonly sought ones. A successful chin implant procedure can be a life-changing experience for patients, helping them overcome the insecurity of an eye-drawing imperfection. However, this joy could be short lived if complications develop. These may range from a simple hematoma or an obvious scar, to a devastating infection and extrusion of the implant.[3]

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Therefore, this article will describe a novel approach to implant-based genioplasty utilizing the pedicled mentalis muscle (a paired muscle originating from the incisor fossa to the chin skin that elevates, protrudes, or everts the lower lip) flap (PMMF), with the aim of limiting some of the undesired complications that may eventually prompt explantation, namely fistula formation, implant exposure, and infection.

The Surgical Technique and Methods

The procedure can be performed under local anesthesia with the patient in supine position and the neck slightly extended. It is imperative to mark the midline of the submental crease to assist in proper skin closure at the end. The operative field is prepared and draped to obtain strict sterility. Then, through a short submental incision that is 2.5- to 3.5-cm long along the submental crease, a skin flap is elevated subcutaneously in a cephalad direction, ensuring the skin is adequately lifted off the mentalis muscle for a minimum of 1 cm. This will reduce any tension on the muscle and will release attachments between the muscle and the overlying skin, allowing for better flap mobility and advancement at the end of the procedure, and enabling a tension-free reapproximation

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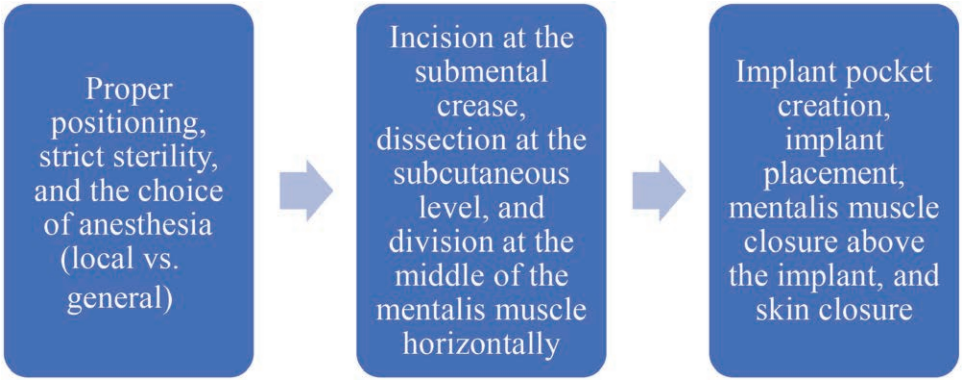

Fig. 1. Flowchart of the main steps in this procedure.

of the two ends of the skin and accommodation of the implant.[4] The underlying mentalis muscle is then divided transversely using a needle tip cautery (Colorado tip needle, Stryker) in the midsubstance of the muscle close to the mental protuberance at a slightly cephalic position to the skin incision location to stair step the incision down to the implant. The bone is then exposed, and a pocket for the implant is created in the usual manner, depending on the implant material used. At this point, two flaps of muscle that are detached from the periosteum and skin are available, and still maintain attachment to their origin and insertion points; the cephalic flap is more mobile and freed, as mentioned above. While extending the pocket laterally, caution should be taken not to injure the mental neurovascular bundle.[5] The implant is then stabilized on the mandibular symphysis and parasymphysis with screws on both sides (in the case of using porous polyethylene implants). This step assists in securing the implant position and eliminates any potential dead space between the bone and the implant.[6] The cephalad-based muscle flap is used to completely cover the implant. The divided muscle edges are carefully approximated with 3–5 inverted simple interrupted sutures using 4-0 absorbable material, leaving no gaps in between. Before the subcuticular closure of the wound, deep dermal 4-0 sutures are placed to facilitate a tension-free closure. Finally, the wound is covered with wound closure strips. (**See Video [online],** which displays the steps of performing implant-based genioplasty incorporating the pedicled mentalis muscle flap technique.) Figure 1 displays a flowchart of the main steps (a large implant was used with the following dimensions: 40 mm × 32 mm × 9 mm).

In this retrospective analysis, all cases that were performed by the senior author using the PMMF in chin augmentation from January 2018 to December 2019 were included. Institutional review board approval was obtained from a local ethical committee (Fig. 1).

RESULTS

Fifteen patients underwent implant-based genioplasty using the PMMF (see Table 1 for further details). Only a single patient developed a fistula that was due to an underlying mandibular cyst that was not diagnosed preoperatively; further details about this rare case has been published in the case report by Mrad et al.[7] Another patient developed numbness in the territory of the mandibular nerve that was improved by trimming the edges of the silicon implant during a secondary operation. The remaining patients did not have any complications and required no additional treatment during follow-up (Table 1).

DISCUSSION

Chin augmentation remains one of the popular cosmetic procedures; even when COVID-19 struck, 43,900 cases were performed in 2020 according to the American Society of Plastic Surgeons, with only 2% decrease from the number of cases performed in 2019.[2] Classically, chin implants are placed in a subperiosteal or supraperiosteal plane.[1,8] The former is postulated to convey a higher probability of bone resorption but more reliable implant placement, either via screws or ingrowth of the periosteal tissue through the implant. While the bony resorption is negated in the later plane, micromotion could undermine the final results. Furthermore, the instability is further aggravated with external lateral pressure over the implant,

Table 1. Patient Data

Patient	Size of Implant	Type of Implant	Longest Follow-up (mo)	Complications
Patient 1	Large	PPE	6	None
Patient 2	Large	PPE	6	None
Patient 3	X-large	Silicon	6	Numbness in the mandibular nerve territory
Patient 4	Large	PPE	5	None
Patient 5	X-large	Silicon	6	None
Patient 6	Large	Silicon	6	Fistula due to a mandibular cyst
Patient 7	Large	Silicon	6	None
Patient 8	Large	PPE	4.5	None
Patient 9	X-large	Silicon	3	None
Patient 10	Medium	PPE	6	None
Patient 11	Large	PPE	5	None
Patient 12	X-large	Silicon	6	None
Patient 13	Large	PPE	3	None
Patient 14	Large	Silicon	3	None
Patient 15	Medium	PPE	3	None

Mean follow-up (in months): 4.77.
PPE: Porous polyethylene.

and in time may result in bone erosion.[9–11] In their review about postgenioplasty complications and their management, White and Dufresne commented on complications related to soft tissue such as dehiscence, fistula formation, capsular contracture, and skin necrosis.[3]

The PMMF closure is a simple technique that can be used in implant-based genioplasty. Moreover, it may reduce the chances of fistula formation and implant exposure, eventually preserving the implant from a possible infection, that takes place in 5%–7% of cases, and avoiding a catastrophic experience.[3] Apprehension from iatrogenic dysfunction of the mentalis muscle as a result of cutting its attachment from the periosteum was raised in previous studies;[12] from our experience, muscle reapproximation with sutures negates the damage to the function, as none of our patients presented with signs and symptoms suggestive of mentalis muscle dysfunction during follow-up. Moreover, we do not dissect the muscle attachment to the underlying bone; rather, we create our incision at the midsubstance of the muscle. Different innovations were introduced to implant-based chin augmentation, an example of which was published by Webster et al and Kim et al. They reported a satisfactory outcome with the dual-plane implantation, where the peripheries of the implant are imbedded in the mandibular subperiosteum while the central part is supraperiosteal.[9,12] However, the latter reported an unusual rate of postoperative infection (6.4%) possibly owing to the intraoral approach and implant exchange to a higher size.[12]

The submental incision was favored over the intraoral to prevent implant contamination with oral flora, implant sliding from its intended position, and possible lip protrusion.[8] It also offers better field visibility compared with the intraoral approach.[1] The main drawback is the visible scar, which can be camouflaged if the incision is well-placed over the submental crease.[3] While the intraoral incision is classically horizontal, involving the disruption of the mentalis muscle fibers attachment to the periosteum, Aynehchi et al advocated a slightly different technique, where the intraoral incision is made vertically at the gingivolabial sulcus. They concluded in their case series that this approach would circumvent the complications associated with the classic horizontal incision and provide an additional benefit of avoiding scar alopecia in men who undergo the same procedure through the extraoral incision.[13] Another modification to the vertical incision was proposed by Yin et al, where they added two lateral incisions, 1 cm before the canines, to the median incision. Likewise, they reported no incidence of complications or further surgical or nonsurgical correction.[14]

There is no restriction to the type of implant in this new technique, albeit porous polyethylene implants are preferred over the silicone implants due to the lower probability of displacement as a result of fixation with screws to the mandible. In case of the latter type of implants, prevention of displacement can be achieved by creating a snug pocket to hug the implant in place. Furthermore, any size, up to extra-large, can be implanted.

Although our initial results are encouraging, large-scale implementation of this technique require long-term follow-up in more appropriately designed, prospective studies. This could help in discovering other aspects that could influence the appeal of this modification, such as the extent of bone erosion.

CONCLUSIONS

Aiming to achieve optimal aesthetic outcome and patient satisfaction with minimal undesired effects, surgeons have been contributing with novel ideas and approaches leading to breakthroughs or innovative nuances in practice. This article presents the PMMF technique for implant coverage in genioplasty, hypothesizing that it leads to less fistula formation, implant exposure, infection, and removal. Notwithstanding, more evidence is required through large-scale prospective studies.

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This study conforms to the Declaration of Helsinki.

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