

Augmentation Mentoplasty: A Critical Analysis

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Abstract. An evaluation of the senior author's mentoplasty technique by use of inorganic silicone and acrylic implants is presented, encompassing 16 years of experience. The evaluation was chiefly concerned with the silicone implant and long-term followup observations of its survival and some of its extrusions and complications.

Key words: Hypogenia — Mentoplasty — Silicone implant — Median raphe of the chin

When analyzing the face's architecture, each structure and the overall balance of the ensemble must be studied in detail [43]. The reference point for analysis is the maxillary segment in the middle of the face. The nose projects planes and proportions that should be within the limits of normality.

There is ample literature [20-24, 35, 36, 42, 46] that discusses the effort to improve the quantitative and the qualitative principles used to evaluate the facial profile. Laymen and specialists have emphasized the chin-nose relationship in forming an adequate and harmonious facial contour. The chin is a definition structure of the lower third of the face and is of paramount importance in the overall appearance of the face [18, 19] (Fig. 1). To diagnose its sufficiency, the constituents of the chin's anatomy and the relationship of the latter with neighboring regions must be considered [44, 45].

Bone or soft tissue alterations disturb the proportionality and harmony of the face yielding an imbalanced appearance. Hypermentonism and hypomentonism are the most common deformities of facial

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The authors have used several techniques and materials have been used to reconstitute and enhance the silhouette of the chin.

Fig. 2. Lateral displacement of the implant

Fig. 3. Superior displacement of the implant



Fig. 1. Study of proportions by Leonardo da Vinci

bone, which plays a part in the ultimate development of the soft tissues [6]. When complex anatomic-functional deformities are present, such as a receding chin, laterognathism, and dental incongruity, osteotomy and orthodontic techniques should be the treatments of choice [8, 15]. Pitanguy's augmentation mentoplasty technique, with silicone inclusion prosthesis, yields improved and aesthetic results when used on a small or medium-sized chin [37-43].

The author, with 16 years of experience using Pitanguy's technique, not only tries to legitimize its use but, also, its adequacy in improving small and



Fig. 2. Lateral displacement of the implant

Fig. 3. Upper displacement of the implant

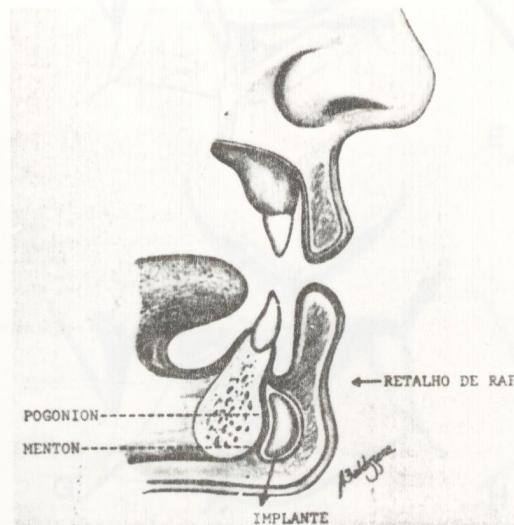


Fig. 4. The prosthesis placed in the compact aspect of the mandible



Fig. 5. Cadaver dissection showing in frontal view the dissected raphe and the adjacent musculature

Fig. 6. Cadaver dissection, profile view of the median raphe

to the lower edge. Below and laterally to the crista of the massive lower edge called the chin protuberance. Lateral to that is the chin tubercle where the muscles of the lower lips and the mouth.

History

An unbalanced face due to congenital or acquired defects is a serious handicap with somatic and psychosocial repercussions [7, 9, 10]. Improvements in craniofacial surgery through innovative procedures made it possible to cope with various congenital and acquired deformities [5, 16, 17]. Various surgical procedures can be used to alter the facial contour, with the goal of harmonizing its components [2, 3, 11, 12]. Several techniques and materials have been used to reconstitute and enhance the silhouette of the chin.

Individuals have a dimple at the median raphe used by the adherence of the skin to the bone as a consequence of local mesoderm.

These structures are fully developed in the mandibular osteotomies, because in the mandibular patient with severe jaw deformities, the adjacent underdeveloped soft tissues, constantly used for facial motion, would lead to bone extrusion.

The addition of substances of autolog, homolog, or heterolog origin and alloplastic substances are recommended, reported, or contraindicated according to the experiences of the individual author [14]. The evolution of the implantation material is a function of the patient's own tissues, such as derma, cartilage, and bone, widely used when there is an available donor area. Various inorganic materials were used; today, silicone is the most commonly used material [13, 52].

The analysis of 16 years of experience using Pintanguy's technique not only tries to legitimize its use but, also, its adequacy in improving small and

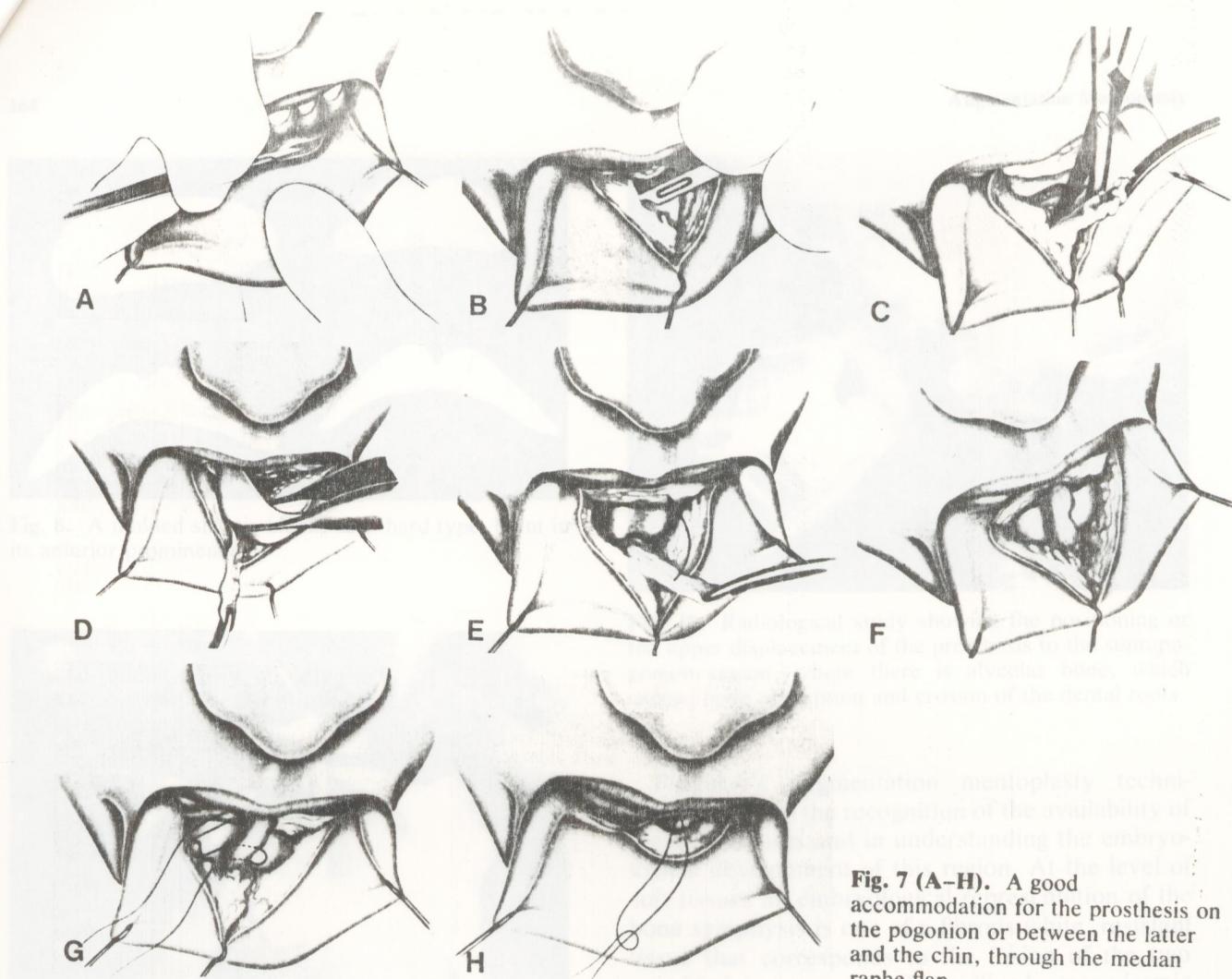


Fig. 7 (A-H). A good accommodation for the prosthesis on the pogonion or between the latter and the chin, through the median raphe flap

medium chin insufficiencies. This procedure aims at restoring the image of the patient, so that it adapts to its own time, social, and economic conditions [1, 4].

Anatomosurgical Considerations

Embryologically the jaw derives from two bones that join at the midline of the symphysis, represented by a sulcus, which extends from the alveolar to the lower edge. Below and lateral to the symphysis is the massive lower edge called the chin protuberance. Lateral to that is the chin tubercle where the muscles of the lower lips and chin reside.

In forming the chin, the two mandibular processes bind in the midline. Each process has equal quantities of mesoderm from which the lateral muscular group will emerge. The binding of the two processes leads to the formation of these muscles. They fuse in some cases but more frequently they fuse incompletely, yielding a fibrous medial raphe [53].

The chin is a small, triangular, bony structure on the mandibular aspect, between the pogonion and the menton, which is composed of compact cortical bone and can well form good chin projection [54]. The implant can be fixed in position by immobilizing the local tissues (Fig. 4).

Some individuals have a dimple at the median line. This is caused by the adherence of the skin to the deep plane as a consequence of local mesodermal insufficiency.

When the facial structures are fully developed and there is a deficiency in the chin region, the implantation of a silicone prosthesis usually was a good procedure for forming a projection of the chin in these hypogenias. We correct more conspicuous microgenias by using orthodontic alterations and basilar mandibular osteotomies, because in the micrognathic patient with severe jaw deformities, the adjacent underdeveloped soft tissues, constantly used for facial motion, would lead to bone extrusion or intrusion [54].

Two basic principles should be followed to achieve a good result in chin augmentation:

1. Put the prosthesis in the lowest portion of the mandible (between the pogonion and mento).
2. Immobilize the prosthesis.

These principles aim at preventing implant displacement on extrusion and minimizing the effects

of the chin on the adjacent soft tissues. The prosthesis should be well immobilized and should be anchored to the fibers of orbicularis oris muscles. This helps to prevent implant extrusion by displacement

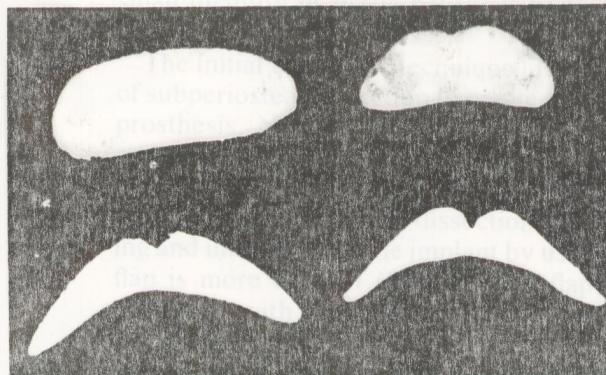


Fig. 8. A molded silastic block, soft-hard type, blunt in its anterior prominences

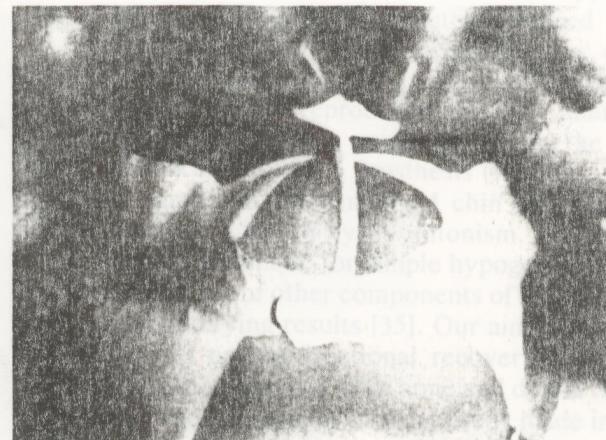


Fig. 9. The dressing compressive dressing is applied for the postoperative molding the unformed

of bone absorption which are considered to be the main complications of mentoplasty by inclusion of inorganic material. Displacement of the prosthesis occurs frequently when the technique used does not fix it in place. This displacement will lead to a partial loss of chin projection. Lateral displacement alters the mandibular contour. Inferior displacement alters the mentocervical angle sometimes yielding a double chin (Fig. 2). Upper displacement alters the lip-chin angle, determined by the perioral and mentalian muscles, whose anatomical and functional integrity is responsible for phonation, saliva contention, and deglutition [47]. In the suprapogonion position, the local soft tissues are tense and the constant pressure of this musculature on the implant and that of the implant on the alveolar bone causes bone absorption, damaging the dental roots (Fig. 3).

The ideal site for insertion of the implant is the lower mandibular aspect, between the pogonion and menton, which is composed of compact cortical bone. This will form good chin projection [49]. The implant can be fixed in position by immobilizing the local tissues (Fig. 4).

Table 1. Augmentation mentoplasty: the surgical approach and the flap with its pedicle

Augmentation Mentoplasty

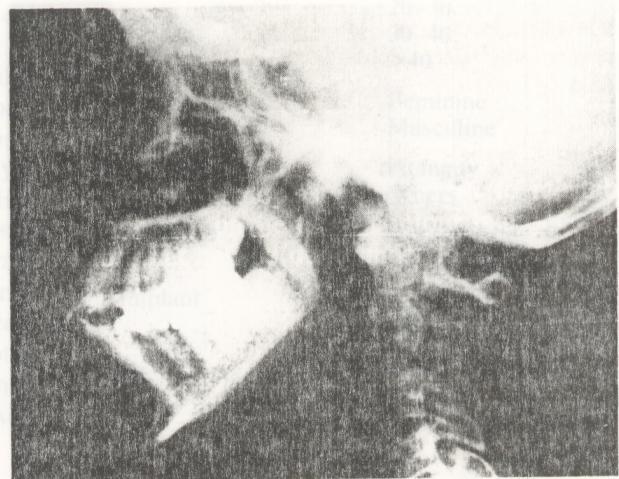


Fig. 10. Radiological study showing the positioning or the upper displacement of the prosthesis to the suprapogonion region, where there is alveolar bone, which caused bone absorption and erosion of the dental roots

Pitanguy's augmentation mentoplasty technique stems from the recognition of the availability of these structures and in understanding the embryological development of this region. At the level of soft tissues an embryological representation of the bone symphysis is one of a fibrous white, resistant tissue that corresponds to the fusion of the two mandibular processes in the midline by mesodermic penetration. This fibrous tissue is a true raphe which unites (binds) the musculature (Figs. 5 and 6).

Surgical Technique

Augmentation mentoplasty performed to reestablish equilibrium of the facial contour is a one-step operation that can be done under local anesthesia [37, 47, 55].

The approach is through an intra-oral transverse incision in the vestibule, 1 cm from the gingivobuccal sulcus. This facilitates the final closure and avoids saliva collection on the suture line. We dissect through the musculature in a caudal direction. At this level, the undermining can be supra- or subperiosteal, yielding a sufficient site to implant the prosthesis between the pogonion and mento. Once the pocket is formed, the median raphe can be identified in the midline, binding the musculature. A flap is created out of this raphe [42]. The flap is marked and raised, freeing its inferior insertion and rotating it 180°, thus forming a retaining belt over the prosthesis so as to put it on the external median face of the implant. The distal extremity of the flap is sutured to the fibers of orbicularis oris muscles. This stabilizes the implant to prevent its displacement

and keep it in the lower portion of the symphysis [41]. The traction of the flap on the prosthesis augments the mentolabial sulcus and gives rise to a dimple on the skin in the midline after removing a small quantity of tissue between the two muscular groups.

The initial use of this technique [37] indicated use of subperiosteal dissection to create a pocket for the prosthesis. Nowadays we prefer a suprperiosteal approach which we and others think seems to yield a lesser degree of bone absorption [43, 57]. However, the suprperiosteal dissection is time consuming and immobilizing the implant by use of the raphe flap is more difficult (Fig. 7). This flap, originally described with a superior base, can also have an inferior base, according to each case. We do not see an advantage with the external incision even in patients with a small mandibular symphysis, since even in these cases the flap holds the implant in a lower position.

The silicone used is a "soft-hard" type, molded in a silastic-block, "buttock-shaped" model, slightly blunt in its anterior prominences, compared with the model described in the original article. The central dimple reproduces the chin anatomy and serves as a fixation point, preventing the posterior displacement of the prosthesis (Fig. 8).

Small and medium-sized chin deficiencies indicate correction of hypomentonism. We used the Pitanguy technique for simple hypogenias without involvement of other components of the mandible and had gratifying results [35]. Our aim is the aesthetic as well as the functional recovery of the patient through osteotomy with bone and dental repositioning when necessary. The suture is made in two layers, muscular and mucosa, with absorbable stitches. A compressive dressing is applied for ten days postoperation, molding the undermined tissues and avoiding serosanguineous collections. Oedema, hematoma, temporary hypoesthesia, and other minor complications accompanied some cases but did not compromise the final results (Fig. 9).

Casuistry

Over the past 16 years this technique has proven to be reliable and aesthetically gratifying. It gives a better labial posture because it enhances the mentolabial sulcus and its low implantation yields a good chin projection.

Six hundred two of 612 patients were subjected to mentoplasty by an inorganic implant. In ten patients the approach was through a submental incision for the concomitant treatment of cervical flaccidity. Three of these patients needed reintervention to correct prosthesis displacement. This was done by

Table 1. Augmentation mentoplasty: 16 years of experience with Pitanguy's technique

Augmentation Mentoplasty		
Age	15-20	119
	20-30	202
	30-40	205
	>40	186
Sex	Feminine	572
	Masculine	40
Technique	Pitanguy	602
	Others	10
Inclusion	Subperiosteal	543
	Suprperiosteal	69
Implant	Acrylic	11
	Silicone	601
Size	Small	387
	Medium	225

Table 2. Augmentation mentoplasty and associated procedures

Facial surgeries	
Rhinoplasty	296
Rhytidoplasty	164
Rhino-rhytidoplasty	35
Otoplasty	3
Lip (macrocheilia)	3
Blepharoplasty	17
Others	11
Surgeries of the body contour	
Mentoplasty (unique procedure)	59

intra-oral access; the implant was fixed with the median raphe flap.

We used the same procedure on 11 patients from other sources who complained of displaced implants. In the 602 cases that underwent the Pitanguy technique, there were no lateral, superior, or mixed displacements of the implant.

Prosthesis extrusion was observed in four patients, two caused by trauma immediately after the operation. The extrusion was corrected by surgical incision. The rejection of the implant in one case was not established. Another patient operated on by us developed the extrusion concomitant to the rejection of the bone implant because of osteomyelitis due to a sequence of multiple fractures. The implant was eliminated by the osteomyelitis drainage area at the cutaneous level.

Some cases required the surgical removal of the implant. One patient returned after 6 months and asked for the removal of the implant because it caused him undefined discomfort. During clinical examination, no anatomical, physiological, or radiological alterations were observed (Fig. 10).

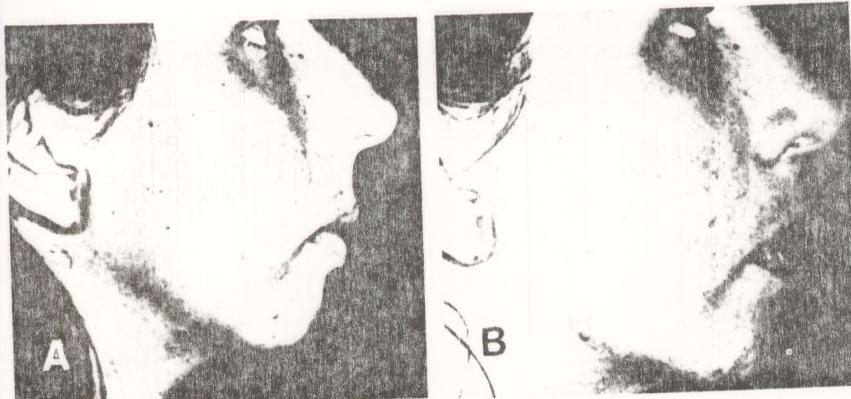


Fig. 11. Patient with unsatisfactory chin projection (A). At reoperation, we observed that the prosthesis was implanted in an upper position. Repositioning and fixation with the raphe flap obtained a better definition of the chin and of the mentolabial angle. The combined rhinoplasty balanced the profile (B)

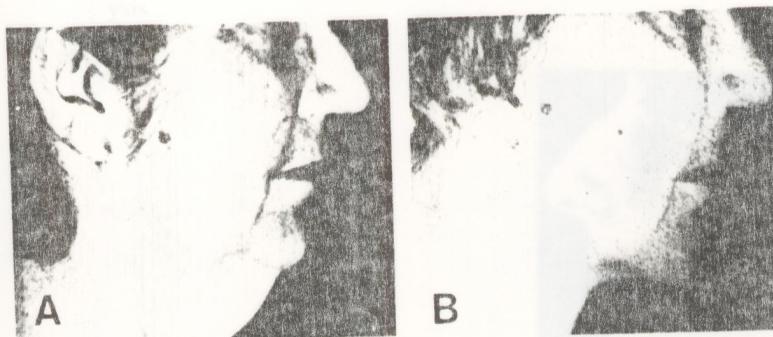


Fig. 12. Cervicofacial flaccidity and hypomentonism (A), which was corrected by association of rhytidectomy and rotation of submental fat flap, without inorganic implant (B)

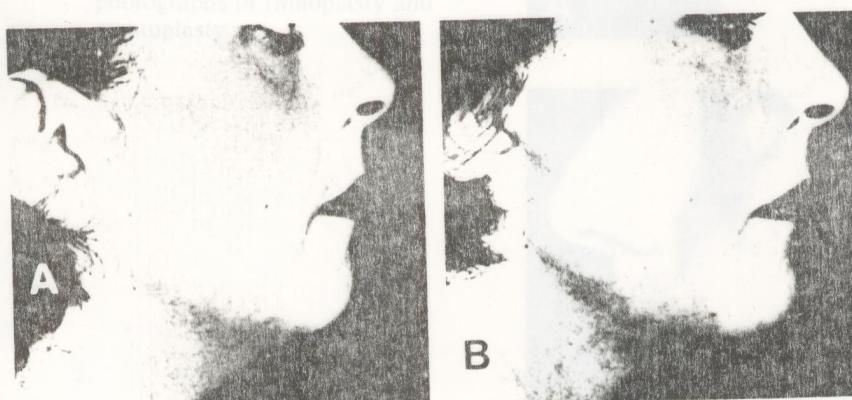


Fig. 13. Correction of small hypogenia (A) by silicone implant, combined with a cervicofacial rhytidoplasty for a better definition of the cervicomandibular angle (B)

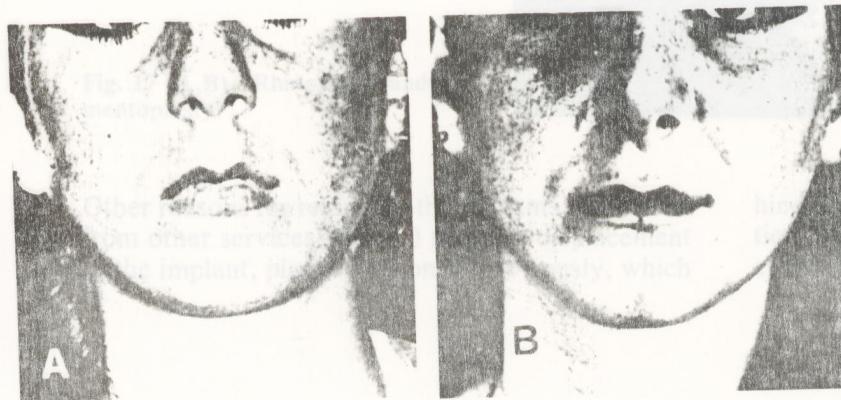


Fig. 14. Although combining a rhinoplasty with a mentoplasty was favorable, the hypogenia was the patient's only complaint; (A) preoperative; (B) postoperative

Fig. 15. Note the ideal positioning of the implant, without any sign of bone absorption, in a patient with discrete hypogenia; radiologic postoperative analysis



Fig. 16 (A,B). Pre- and postoperative photographs of rhinoplasty and mentoplasty

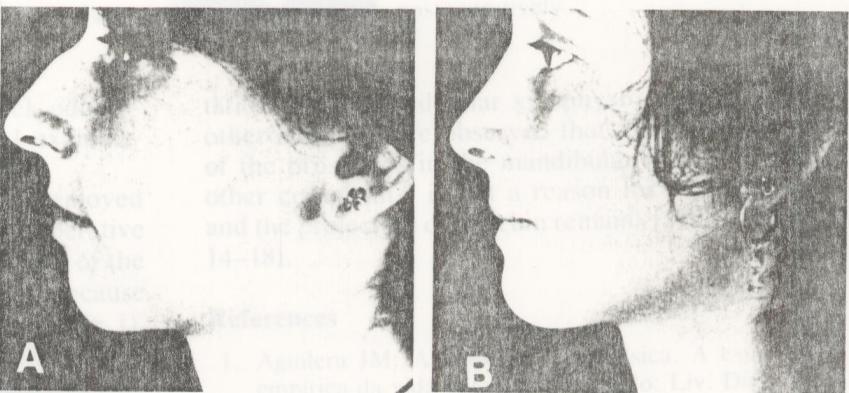
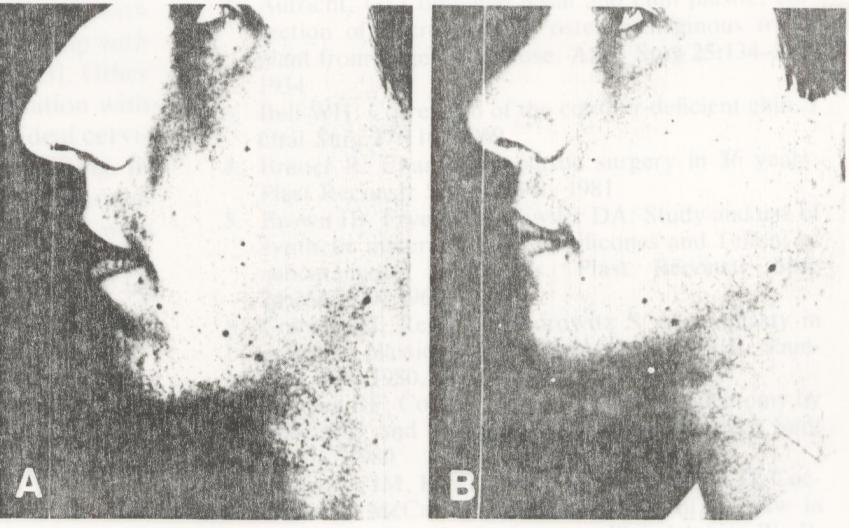


Fig. 17 (A,B). Rhinoplasty and mentoplasty



Other reasons for removing the implants of patients from other services were (1) superior displacement of the implant, placed 14 months previously, which

hindered phonation, saliva contention, and deglutition, and (2) superior displacement with dental root compression.

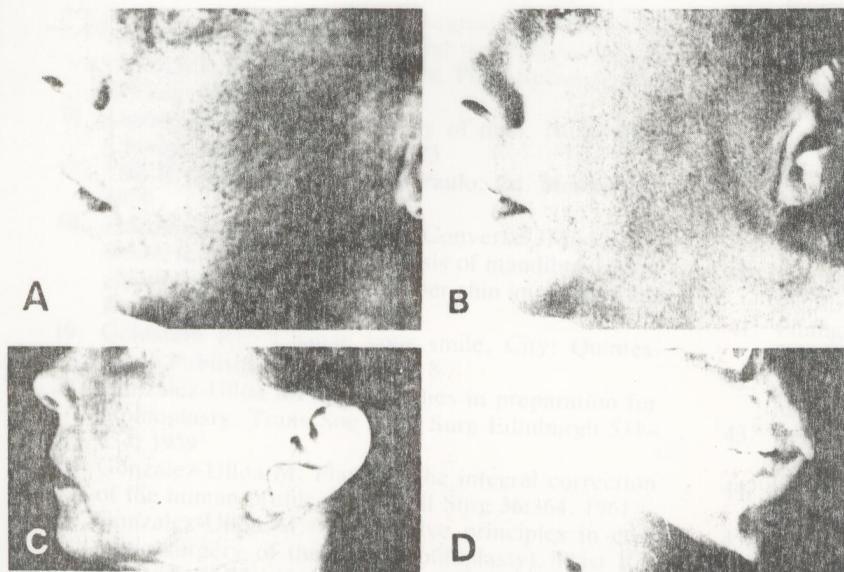


Fig. 18. Fourteen-year followup, showing the maintenance of the improved facial profile, without soft tissue alterations; (A) preoperatively; (B) postoperatively; (C,D) 14 years postoperatively

A toothache caused one patient to seek odontological consultation when a radiological examination showed erosion of the alveolar bone.

The patients who had their prosthesis removed were reevaluated and observed in the postoperative period to have suffered no loss of projection of the chin (the longest followup was four years) because of the remaining tissue fibrosis [31, 32] (Table 1). We also observed that augmentation mentoplasty was performed more frequently as a combined procedure (Table 2 and Fig. 11).

Rhinoplasty is most commonly associated with mentoplasty because of the nose's relationship with the chin in the facial profile balance [29, 33]. Other surgical techniques performed in combination with mentoplasty are those that search for an ideal cervicomandibular angle, such as cervicofacial lifting, lipectomy, and submandibular liposuction, and muscular layer techniques that model the platysma with plication and/or rotation of flaps [26, 27, 35]. Thus, the improved overall appearance of the face may be obtained with a better chin projection [25, 28, 48].

When the idea of an inorganic implant is not accepted by the patient with a hypoplastic chin, a flap with submental fat is rotated 180° to promote chin prominence (Figs. 12 and 13).

Conclusion

The satisfaction of a selected patient who undergoes augmentation mentoplasty is recognized and justifies the use of the technique. In the past 16 years, Pitanguy's augmentation mentoplasty technique has proven to be a simple and reliable approach to small and medium hypogenias. It is of clinical interest that there is no anatomical or functional damage subsequent to the prosthesis implan-

tation in the mandibular symphysis [56]. We and other authors have observed that the implantation of the prosthesis in the mandibular bone, without other complaints, is not a reason for its removal, and the projection of the chin remains [50, 57] (Figs. 14-18).

References

1. Aguilera JM: *Antropologia metafísica. A estrutura empírica da vida humana*. São Paulo: Liv. Duas Cidades, 1971.
2. Aufricht, G: Combined nasal and chin plastic, correction of microgenia by osteocartilaginous transplant from large hump nose. *Am J Surg* **25**:134-292, 1934
3. Bell WH: Correction of the contour-deficient chin. *J Oral Surg* **27**:110, 1969
4. Brauer R: Changes in plastic surgery in 36 years. *Plast Reconstr Surg* **67**:341, 1981
5. Brown JB, Fryer MP, Ohwiler DA: Study and use of synthetic materials, such as silicones and Teflon, as subcutaneous prostheses. *Plast Reconstr Surg* **26**:264-279, 1960
6. Coburn RJ, Rees TD, Horowitz S: *Mentoplasty in aesthetic plastic surgery*. Philadelphia: W. B. Saunders Co., 1980, pp 770-832
7. Connell BF: Contouring the neck in rhytidectomy by lipectomy and a muscle sling. *Plast Reconstr Surg* **61**:376, 1980
8. Converse JM, Kawamoto HK, Wood-Smith D, Cuccaro PJ, McCarthy JG: *Deformities of the jaw in reconstructive plastic surgery*. Philadelphia: W. B. Saunders Co., 1977, pp 1384
9. Costa EA, Pitanguy I et al.: Reconstrução da Mandíbula com Arco Costal. *Rev Bras Cir* **67**:62, 1977
10. Costa EA, Pitanguy I et al.: Auto-reconstrução mandibular. *Rev Bras Cir* **68**:43, 1978
11. Cronin TD, Biggs TM: The T-Z plasty for the male "turkey gobble" neck. *Plast Reconstr Surg* **47**:534, 1971
12. Davis D: Obligations in the consideration of meloplasties. *J Int Coll Surg* **24**:568, 1955

13. De Grazia LE, Nawl AM: Rino-Mentoplastias Perfiloplastias. *Rev AMRIGS* **14**:149, 1970
14. Dingman RO, Grabb WC: Costal cartilage homografts preserved by irradiation. *Plast Reconstr Surg* **28**:562-567, 1961
15. Dingman RO, Grabb WC: Surgical anatomy of the mandibular ramus of the facial nerve based on the dissection of 100 facial halves. *Plast Reconstr Surg* **29**:266, 1962
16. Dixon RB: The racial history of man. New York: Charles Scribner & Sons, 1923
17. Fith R: Tipos humanos. São Paulo: Ed. Mestre Jou, 1978
18. Friedland JA, Coccaro PG, Converse JM: Reconstructive cephalometric analysis of mandibular bone absorption under silicone rubber chin implants. *Plast Reconstr Surg* **57**:144, 1976
19. Goldstein RE: Change your smile. City: Quintessence Publishing Co., 1984, p 8
20. Gonzalez-Ulloa M: Basic studies in preparation for profiloplasty. *Trans Soc Plast Surg Edinburgh* **531**-534, 1959
21. Gonzalez-Ulloa M: Planning the integral correction of the human profile. *J Int Coll Surg* **36**:364, 1961
22. Gonzalez-Ulloa M: Quantitative principles in cosmetic surgery of the face (profiloplasty). *Plast Reconstr Surg* **29**:186, 1962
23. Gonzalez-Ulloa M: A quantum method for the appreciation of the morphology of the face. *Plast Reconstr Surg* **34**:241, 1964
24. Gonzalez-Ulloa M: La tétrade básica para la belleza de la cara moderna. *Cir Plast Iberolatinoam* **1**:13, 1975
25. Gruzkova E: Plastic materials in restorative surgery of the lower jaw. *Br J Plast Surg* **18**:97-104, 1964
26. Guerrero-Santos J, Espaillat L, Morales F: Muscular lift in cervical rhytidoplasty. *Plast Reconstr Surg* **54**:127, 1974
27. Johnson JB: The problem of the ageing face. *Plast Reconstr Surg* **15**:117, 1955
28. Lash H, Zimmerman DC, Loeffler RA: Silicone implantation. Inlay method. *Plast Reconstr Surg* **34**:75-79, 1964
29. Hinderer UT: La rinoplastia y técnicas adicionales de perfiloplastia. *Cir Plast Iberolatinoam* **1**:245, 1975
30. Kazanjian VH: Tratamiento de las deformidades consecutivas e resecciones en la cara y la mandíbula. *Rev Lat Am Cir Plast* **IX**:89, 1965
31. Landazuri H: Profiloplasties: Rinoplasties et mentoplasties. *Ann Chir Plast* **8**:191, 1963
32. Landazuri H: Profiloplastias: Trib Med Per **1**:1, 1965
33. Millard R: Adjuncts in augmentation mentoplasty and corrective rhinoplasty. *Plast Reconstr Surg* **36**:48, 1965
34. Millard DR Jr: Augmentation mentoplasty. *Surg Clin North Am* **51**:333, 1971
35. Millard R et al.: Submental and submandibular lipectomy in conjunction with face lifts in the male or female. *Plast Reconstr Surg* **49**:385, 1972
36. Mitz V, Peronio M: The superficial musculoaponeurotic system (SMAS) in the parotid and cheek area. *Plast Reconstr Surg* **58**:80, 1976
37. Pitanguy I, Franco T, Gomez E: Mentoplastia. *Hospital* **6**:1745, 1968
38. Pitanguy I: Augmentation mentoplasty. *Plast Reconstr Surg* **42**:460, 1968
39. Pitanguy I, Cansanção A, Ramos H: Hipomentonismo. *Rev Bras Cir* **61**:213, 1971
40. Pitanguy I: Mento senil associado à adiposidade submentoniana. *Rev Bras Cir* **63**:217, 1973
41. Pitanguy I: Ancillary procedures in face lifting. *Clin Plast Surg* **5**:51, 1978
42. Pitanguy I: Tratamento das deformidades submentonianas. *Rev Bras Cir* **69**:291, 1979
43. Pitanguy I: Aesthetic plastic surgery of head and body. Heidelberg: Springer-Verlag, 1981
44. Psillakis JM: Perfiloplastias. An 10 Congr Bras Cir Estética. Porto Alegre, 1976
45. Psillakis JM: Perfil Facial. Método de análises e técnicas que o midificam. An Paul Med Cir **105**:37, 1978
46. Quetglas J: Estética del perfil. Libro resumenes. Congr Nac Cir Plast, 1972
47. Rish BB: The aesthetic plastic profile. *Trans Penn Acad Ophthalmol* **18**:78, 1965
48. Robertson JG: Chin augmentation by means of rotation of double chin fat flap. *Plast Reconstr Surg* **3**(4):471, 1965
49. Robinson M, Shuken R: Bone resorption under plastic chin implants. *J Oral Surg* **27**:116, 1969
50. Robinson M: Bone resorption under plastic chin implants. Follow-up of a preliminary report. *Arch Otol* **95**:30, 1972
51. Safian J: Progress in nasal and chin augmentation. *Plast Reconstr Surg* **37**:446-452, 1966
52. Skoog T: Plastic Surgery. Stockholm: Almquist & Wiksell, 1974
53. Testut L: *Traité d'anatomie humaine*. Paris: Doin, 1904
54. Tessier P: Definitive plastic surgical treatment of the severe facial deformities of cranial dysostosis, Crouzon's and Apert's diseases. *Plast Reconstr Surg* **48**:419, 1971
55. Toranto IR: Mentoplasty: A new approach. *Plast Reconstr Surg* **70**:875-878, 1982
56. Velasques HC: Ensayo valorativo de los principios cuantitativos de Gonzales-Ulloa en la perfiloplastia. *Cir Plast Iberolatinoam* **1**:367, 1975
57. Wilde NJ, Tur JJ: Use of polyethylene plate in plastic surgery. *Plast Reconstr Surg* **33**:349-359, 1964