

Medpore versus osseous augmentation in genioplasty procedure: A comparison

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ABSTRACT

Background: Genioplasty deals with small area of craniofacial complex, namely, chin. Alloplastic chin implants and sliding genioplasty represent the two currently accepted methods of chin augmentation. Chin augmentation with medpore has become popular in the recent years. **Material and Methods:** The study comprised 16 patients having retruded chin, out of whom 8 patients underwent sliding genioplasty while the other 8 underwent chin augmentation using medpore. The versatility and benefits of the two techniques are discussed. **Result and Conclusion:** All the patients achieved satisfactory results with no complication. Both the techniques can be used for mild to moderate retrogenia, while in the case of severe retrogenia, sliding genioplasty is recommended. Medpore is especially used for revision of chin shape. Medpore can give the same satisfactory result as osseous genioplasty in cases of mild to moderate horizontal chin deficiency. All the patients from both the groups showed significant improvement in facial profile and high degree of satisfaction resulting in improved self-esteem.

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INTRODUCTION

The position of chin is important in establishing correct facial proportion. The chin gives the appearance of strength of face. Facial balance is critical for good facial esthetics. Surgery of the chin has been used for decades to achieve a balance of the lower third of the face. This balance is vital in the establishment of an acceptable esthetic outcome. Horizontal osteotomy for chin augmentation is an old and established procedure while medpore has become popular in the recent years for facial skeletal augmentation. The present study has been undertaken to compare the advantages and disadvantages of medpore and osseous augmentation in genioplasty procedure.

MATERIAL AND METHODS

The study comprised 16 patients with retruded chin, attending the outpatient department (OPD) of Oral

and Maxillofacial Surgery, Faculty of Dental Sciences, C.S.M. Medical University, Lucknow, India. Out of the 16 patients, 8 underwent medpore augmentation (group B) while the other 8 underwent osseous augmentation (group A). The patients were taken up randomly, irrespective of sex, caste and creed. Their ages ranged from 15 to 35 years. Informed consent was taken from all the patients. Initially, the overall balance of the facial relationships was examined. Frontal and profile photographs of each patient were taken for comparison.

Cephalometric Assessment

The cephalometric assessment is done for measurements required for different analysis. It contains those relations that are suitable for cases requiring advancement genioplasty and have been divided into soft tissue and skeletal relations [Gonzales Ullao, Rickettes, Steiner Epker and Fish, Dipaolo, quadrilateral analysis and Burstone, (COGS analysis)][Figure 1].

Lateral cephalometric radiographs were taken preoperatively and 1 week, 6 weeks and 3 months

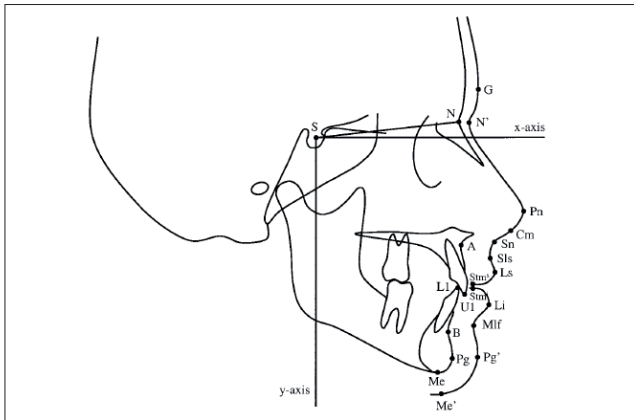


Figure 1: Cephalometric hard and soft tissue points and associated reference planes

postoperatively in a standardized fashion with teeth in centric relation and the lips in repose (i.e. no obvious strain). Radiographs were considered usable only after an assessment of image quality and clarity. All hard and soft tissue landmarks had to be readily identifiable. Each cephalogram was traced on acetate paper and the following landmarks were located on each tracing.

The horizontal reference axis was defined by registering on Sella (S) orienting 7° inferior to S-nasion (S-N) plane. The vertical axis was perpendicular to horizontal axis passing through Sella (S). All hard and soft tissue changes that occurred were evaluated relative to those axes. Pogonion line was taken to evaluate the deficiency of chin coupled with E-line of Ricketts, 0-meridian of Ulloa and facial contour angle was considered to obtain the millimeter deficiency present in chin preoperatively and changes postoperatively. The results so obtained were analyzed statistically. Normally, the anterior projection of the mentum approaches approximately the vertical line from the subnasale in the male and slightly anterior to the vertical line from the nasion in the female. The soft tissue relationships of the chin to the lip and nose are very useful for evaluation of chin projection. When the esthetic plane is formed from the nose tip to the pogonion, the upper and lower lips both lie 1–2 mm posterior to the esthetic plane. The ideal relationship between the chin and the lips are the same as those for Caucasians. The chin should rest slightly posterior to the lower lip, and the lower lip should rest posterior to the upper lip.^[1-6]

On frontal examination, the lower face is often subdivided into an upper one-third [extending between the subnasale and lip contact (stomion)], and a lower two third (measured between the stomion and mentum). In the Indians, the upper third is slightly shorter and the lower two-third is slightly longer. Other things

that need to be considered include the depth of the labiomenal fold, the thickness of the chin pad, and the labiomenal angle.

Procedure

Dissection was performed through a standard intraoral vestibular approach, where the paravestibular incision extending from first premolar on one side to the first premolar on the other, was given. The incision was carried down through the mucosa, submucosa, muscle and periosteum. The degloving procedure provides excellent exposure of the mandible's anterior position. The mental nerves were exposed bilaterally by dissecting posteriorly along the inferior border of mandible in the bicuspid region and mucoperiosteum was elevated.

Osteotomy for sliding genioplasty

Three vertical marks were inscribed to avoid transverse deviation and rotation of the inferior segment. Osteotomy lines were present 4–5 mm below the apices of the cuspids and 3–4 mm below the level of the mental foramina, so as not to jeopardize these structures.^[7-10] Care was taken to achieve sharp and straight cuts without creating curves. After mobilization of the lower segment, the chin was moved to the predicted position. Titanium miniplates and screws were used to achieve stabilization.

For medpore chin augmentation, the implant was inserted in the cavity made by dissection. The overlying soft tissue envelop was also inspected from the outside every now and then such that there is free mobility of the soft tissues surrounding the implant. The implant was stabilized using 2.0-mm titanium screws. The wound was irrigated and closed layerwise. A chin dressing with mild compression was placed after the operation to reduce swelling, to assist in mentalis closure, and to prevent hematoma or seroma formation. It was removed in 48–72 hours.^[11-13]

Suitable antibiotics and analgesics were prescribed. The patients were kept on a complete liquid diet for a week and progressed to a soft and then regular diet afterward. Oral hygiene was maintained.

RESULT

Sliding genioplasties were performed for seven female and one male adult patients presenting with a complaint of small or weak chins. The mean amount of horizontal chin movement was 10.75 mm. During the same period, eight chin augmentations with medpore were performed for five females and three males. The mean amount of chin augmentation was 8.5 mm. The esthetic

results, as determined by both the patient and surgeon, were satisfactory during the follow-up period of 3rd week to 6 months [Figures 2-9]. In medpore group, there was no resorption of hard tissue and soft tissue decreased by a mean value of 2.82 mm over a period of 6 months, while in osseous genioplasty group, there occurred a mean hard tissue resorption of 1.33 mm and soft tissue decreased by a mean value of 3.30 mm over a period of 6 months [Table 1 and 2].

Complications

In the medpore group, no infection or alloplastic reaction was found. No extrusion of medpore implant or fixation screws was observed.

The osseous genioplasty group experienced no infections, nonunion, or malunion. A mild and transient lower lip numbness developed in only one patient.

DISCUSSION

Medpore (high-density porous polyethylene) is a kind of porous polymer. It is a biologically inert polymer with regularly spaced pores measuring 100–300 μm in diameter. This pore size allows significant tissue ingrowth instead of surrounding fibrous tissue capsule formation, which results in rapid, strong implant fixation. This tissue ingrowth also makes it more resistant to bacterial infection. High-density porous polyethylene is noncompressible and hard. It has been used as an onlay graft for augmentation of the cranium, mandibular angle, orbital rim, malar region, and mental region. The material is easily carved and somewhat flexible. It can be shaped as required to create a new shape for the chin. Long-term follow-up evaluation demonstrated no problems related to bioincompatibility and a minimal complication rate (3% infection and 8% displeasing contours).^[13]

Advancement genioplasty with horizontal osteotomy of lower border of mandible is a versatile, commonly carried out orthognathic procedure. Horizontal osteotomy of lower border of mandibular symphysis through the intraoral approach was first introduced by

Richard Trauner and Hugo Obwegeser.^[14] Horizontal osteotomy of chin can correct a horizontal or vertical deficiency or excess of chin. Indeed, osseous genioplasty is a flexible and versatile procedure. The procedure is suitable for any chin, short or long, and for laterogenia.

In the medpore group, i.e. group B, no infection or alloplastic reaction was found. Physically, medpore is a pure, biocompatible, strong substance that does not resorb or degenerate. It is stable in the long term with a good tensile strength, resistance to stress and fatigue, and a virtual lack of surrounding soft tissue reaction.^[15] Encapsulation and predisposition to movement are responsible for the majority of late complications reported for smooth surface implants (nonporous implant). Screw application of the implant to the underlying skeleton allows precise predictable contouring, thus limiting the need for revisional surgical procedure.^[13]

When the hard tissue and soft tissue changes were compared, it was found that the hard tissue to soft tissue ratio was 1:0.87, 6 months postoperatively in group A, while in group B the hard tissue to soft tissue ratio was 1:0.78. This shows that horizontal osteotomy of lower border of mandible, i.e., osseous genioplasty gives better soft tissue predictability than alloplastic augmentation.^[16-19]

Another aspect of this study has been to evaluate the ease of technique while using medpore biomaterial implants. Out of the 16 cases, 8 underwent osseous genioplasty, whereas the other 8 underwent medpore augmentation. The average time of the surgery beginning from the placement of incision to closure of the site were noted. The average time of operation in the cases treated by medpore was 45 minutes to 1 hour, and for those treated by osseous genioplasty, it was 1.5–2 hours.

CONCLUSIONS

- Medpore produces the same satisfactory result as osseous genioplasty in cases of mild to moderate horizontal chin deficiency. All the patients from both the groups showed significant improvement

Table 1: Analysis of changes in hard and soft tissues (group A) (n = 8)

Follow up	Mean ± SD	t	P
Hard tissue changes			
1 st week	10.75 ± 4.67	6.51	<0.001
6 th week	9.67 ± 1.03	22.99	<0.001
6 th month	9.42 ± 1.26	17.49	<0.001
Soft tissue changes			
1 st week	12.13 ± 1.96	17.50	<0.001
6 th week	9.50 ± 3.01	7.73	<0.001
6 th month	8.83 ± 3.43	6.30	<0.001

Table 2: Analysis of changes in hard and soft tissues (group B) (n = 8)

Follow up	Mean ± SD	t	P
Hard tissue changes			
1 st week	8.88 ± 0.99	25.37	<0.001
6 th week	9.00 ± 1.41	14.27	<0.001
6 th month	8.57 ± 1.13	20.07	<0.001
Soft tissue changes			
1 st week	11.25 ± 1.04	30.59	<0.001
6 th week	8.60 ± 1.32	14.56	<0.001
6 th month	8.43 ± 1.39	16.05	<0.001



Figure 2: Preoperative full face photograph of a patient of medpore chin augmentation group (group B)



Figure 3: Preoperative profile photograph of a patient of medpore chin augmentation group (group B)



Figure 4: Postoperative full face photograph of a patient of medpore chin augmentation group (group B)



Figure 5: Postoperative profile photograph of a patient of medpore chin augmentation group (group B)



Figure 6: Preoperative full face photograph of a patient of osseous augmentation group (group A)



Figure 7: Preoperative profile photograph of a patient of osseous augmentation group (group A)

in facial profile, high degree of satisfaction and the resulting improved self-esteem from both procedures.

- Because of good fixation, medpore is quite different from traditional alloplastic implant. It did not depress into underlying bone, so the result was maintained, i.e., showed no resorption of underlying bone.
- Surrounding tissue has shown biocompatibility

to medpore biomaterial implant, which remains nonimmunogenic, nonallergic and nontoxic, with no evidence of resorption or alteration.

- More invasive nature of osteotomy in case of osseous genioplasty leads to the potential for more complications, more significant swelling and longer postoperative recovery.
- Medpore implant can be given when only straight advancement is indicated and no vertical or



Figure 8: Postoperative full face photograph of a patient of osseous augmentation group (group A)



Figure 9: Postoperative profile photograph of a patient of osseous augmentation group (group A)

asymmetric movement is indicated.

- In this advancement procedure, the soft tissue follows the skeletal framework of the chin. Hard tissue to soft tissue relation in case of osseous genioplasty was 1:0.88, while in the case of medpore augmentation it was 1:0.77, i.e., soft tissue predictability of osseous genioplasty was better in comparison with medpore augmentation.

In brief, medpore is indicated for mild to moderate horizontal chin deficiency and to modify chin shape, i.e., for minor contour irregularity, while osseous genioplasty is recommended for any chin, i.e., short, long or for laterogenia.

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