

## 3 Dimensional Computer Simulated Cutting Guide for the Mandibuloplasty : A Preliminary Case Report

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The mandibuloplasty for the facial aesthetic reason has been the one of the most popular procedures in aesthetic facial bone surgery in East Asia. Most East Asian women prefer smaller-looking and smooth-shaped facial contour. Prominent mandible angle which are common in Asia would be the main problem for smooth facial contour. In addition, recently, the mandibular body and broad chin shape also are known to be remodeled in order to get the ideal smooth facial shape. However, mandibuloplasty is not that easy to cut because many patients has inward mandibular angle and the visual field in operation is limited. The aim of this trial is to try to provide the prefabricated cutting guide for the symmetric and appropriate mandibuloplasty with the surgeons. Preoperative computed tomography(CT) data were processed for the patient and computer simulation model was produced. Then, mandibuloplasty was done on the computer simulation screen. Based on this data, customized cutting guide was made. This prefabricated cutting guide was used in real mandibuloplasty bilaterally. Premade cutting guide for the mandibuloplasty based on the computer simulation turned out to be very successful in this patient. Individualized approach for each patient could be an ideal way to manage the patients in near future.

**Key Words** Mandibuloplasty · Three-dimensional surgery, · Pre-surgical simulation · Three-dimensional simulation · Facial shape · prominent mandible angle.

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### Introduction

Recently facial aesthetic surgery has been popularized in many East Asian countries such as blepharoplasty, rhinoplasty and aesthetic facial bone surgery. Among the aesthetic facial bone surgeries, the mandibuloplasty for the facial aesthetic reason has been the one of the most popular procedures (1).

Most East Asian women prefer smaller-looking and smooth-shaped facial contour. Prominent mandible angle which are common in Asia would be the main problem for smooth facial contour. In the past, the prominent mandible angle ostectomy was the standard for getting ideal smooth facial shape. Recently, the mandibular body and broad chin shape also are known to be remodeled in order to get the ideal smooth facial shape. Therefore, many surgeons need to correct the whole mandible at one time. However, mandibuloplasty is not that easy to cut ideally because many patients has inward mandibular angle

and the visual field in operation is limited (2).

Several complications can occur during the mandibuloplasty including the over-resection, under-resection, asymmetric contouring, condyle fracture, facial nerve damage, mental nerve paresis and severe bleeding owing to the damage of the retromandibular vein and facial vessels (3).

The aim of this trial is to try to provide the prefabricated cutting guide for the symmetric and appropriate mandibuloplasty with the surgeons. Preoperative computed tomography (CT) data were processed for the patient and computer simulation model was produced. Then, mandibuloplasty was done on the computer simulation screen. Based on this data, customized cutting guide was made. This prefabricated cutting guide was used in real mandibuloplasty bilaterally.

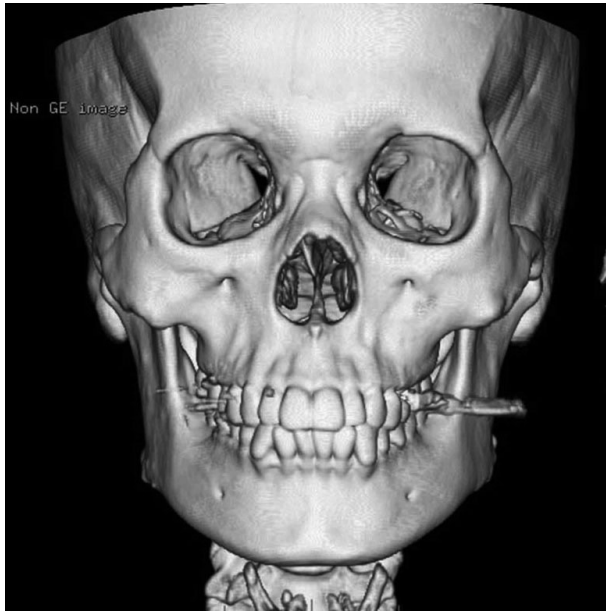


Fig. 1. Preoperative CT scan.

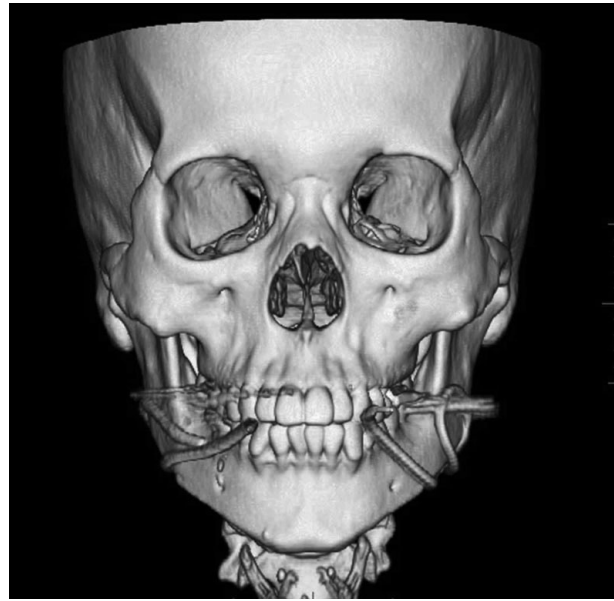


Fig. 3. Postoperative CT.

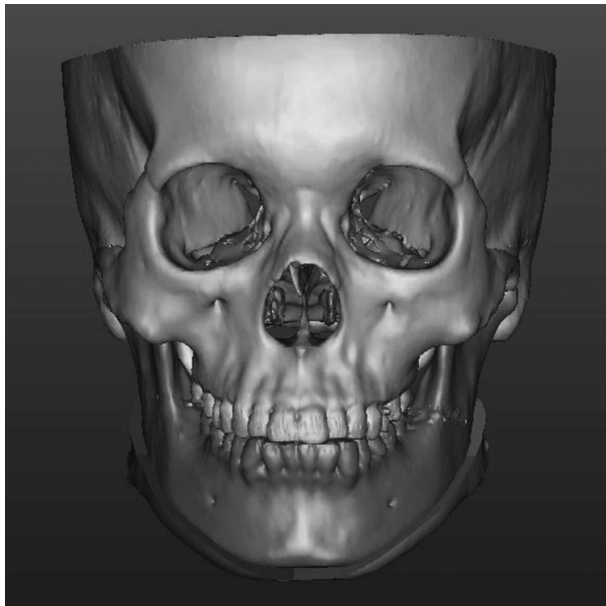


Fig. 2. Cutting guide for mandibuloplasty.

## Case Report

23 years old women addressed the prominent mandible body and angle as well as the broad chin (Fig. 1). She wanted to have smoother facial shape. The mandibuloplasty including the resection of the angle, body and the part of the chin seemed to be possible using conventional method. However, in order to get the more precise resection of the mandible in terms of symmetry and the shape, we planned the adoption of the cutting guide for the mandibuloplasty procedure based on the three dimension-

al computer simulation. After the 3D CT scan from the patients, the dicom data was extracted and used for the three dimensional volume rendering. Using the Simplant software (Materialize Inc, Belgium), ideal ostectomy lines were designed on the model (Fig. 2). The symmetry and mandibular contour were considered and compared bilaterally from the posterior mandibular ramus to the chin. Based on this data, plastic mold for the mandibular cutting was made. Before the operation, these molds were sterilized in advance. During the operation, the periosteal dissection was done using the buccogingival incisions. After the insertion of the cutting guide, it was fitted onto the mandibular border. Then mandibulotomy was done according the margin of the cutting guide. The operation was straightforward as the cutting lines were designed preoperatively given the symmetry and contour of the mandible. The mandibuloplasty turned out to be successful without any complications (Fig. 3). The patient was satisfied with the result.

## Discussion

Computer simulation has been evolving the medicine so far. Most importantly, the craniomaxillofacial surgery have benefited from the evolution of the CAD-CAM based technique such as orthognathic surgery (4). However, the aesthetic facial contouring surgery has not been focused mostly as the most surgeons have performed these kinds of surgeries without this technique.

As such, the most facial aesthetic surgeons have depended on their experiences. However, the experience of one surgeon doesn't

work all the time. Computer simulation can help the surgeon retain their skill levels constantly. In addition, for the beginners, it could be a great help (5).

The problems include the mild bulkiness of the cutting guide. In order to fit the cutting guide on the mandibular border correctly, it seems to need a little more dissection. It can be cumbersome. But if we make the cutting guide smaller, this obstacle appears to be overcome.

In our experiences, the mandibuloplasty can be done with conventional technique without this cutting guide, of course. But, for the patient with the very severe facial asymmetry in terms of the mandibular contour, this CAD-CAM based cutting guide could be very beneficial for making the ideal symmetric mandibular contour.

## Conclusion

Premade cutting guide for the mandibuloplasty based on the

computer simulation turned out to be very successful in this patient. Individualized approach for each patient could be an ideal way to manage the patients in near future.

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