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Usefulness of bilateral sagittal split osteotomy with posterior bending osteotomy fixed by absorbable systems for facial asymmetry

KEYWORDS
Sagittal split ramus osteotomy;
Absorbable implants;
Three-dimensional imaging;
Facial asymmetry

Bilateral sagittal split osteotomy (BSSO) is a common technique in orthognathic surgery.[1–5] However, when BSSO is performed for facial asymmetry, strong bone interference between the proximal and distal fragments may be observed on the deviated side after osteotomy. Fixation of the proximal fragment in a lateral position without adequate removal of bone interference results in a new asymmetry, and fixation with the proximal fragment pressed tightly against the distal fragment results in lateral deviation of the condyle and affects postoperative stability.[3]

Herein, we presented the case of a 30-year-old Japanese woman who presented with facial asymmetry. The overbite was 0 mm, the over-jet was −3 mm, and the menton was deviated 6 mm to the left. The patient was diagnosed with facial asymmetry accompanied by mandibular prognathism (Fig. 1A). Preoperative surgical simulation of Le Fort I osteotomy (LFI) and BSSO was performed using ProPlan CMF 3.0.1 (Materialise, Leuven, Belgium) (Fig. 1B). Since the simulation suggested strong bone interference between the proximal and distal fragments on the left mandible, additional posterior bending osteotomy (PBO) was planned (Fig. 1C and D). LFI and BSSO combined with PBO were performed under general anesthesia. PBO of the left mandible was performed using VarioSurg3 (Nakanishi Inc. Kanuma, Japan) (Fig. 1E and F) and bone interference was eliminated completely. SuperFIXSORB-MX (Teijin Medical Technologies Co. Osaka, Japan) was used to fix the bone fragments in both the maxilla and mandible (Fig. 1G, H and I). One year after the surgery, no temporomandibular joint abnormality, relapse, or paresthesia in the lower lip and tongue were observed.

Common methods to eliminate bone interference between the proximal and distal fragments include shaving the inner surface of the proximal fragment or performing short lingual osteotomy; however, both procedures are unreliable.[1,2] Ellis et al.[3] reported a technique to eliminate bone interference after BSSO by adding a vertical osteotomy directly behind the most posterior tooth in the distal fragment. The technique is called PBO and has the advantage of less torque to the condyle.[4,5] Because titanium miniplates are used for fixation, a second surgery for removal is required. When using absorbable screws for the fixation, bicortical fixation with sufficient bone contact is required. However, a major problem with using absorbable screws for bicortical fixation in the presence of an anterior gap is that they act like lag screws and cause lateral deviation of the condyle. Herein, PBO was performed slightly

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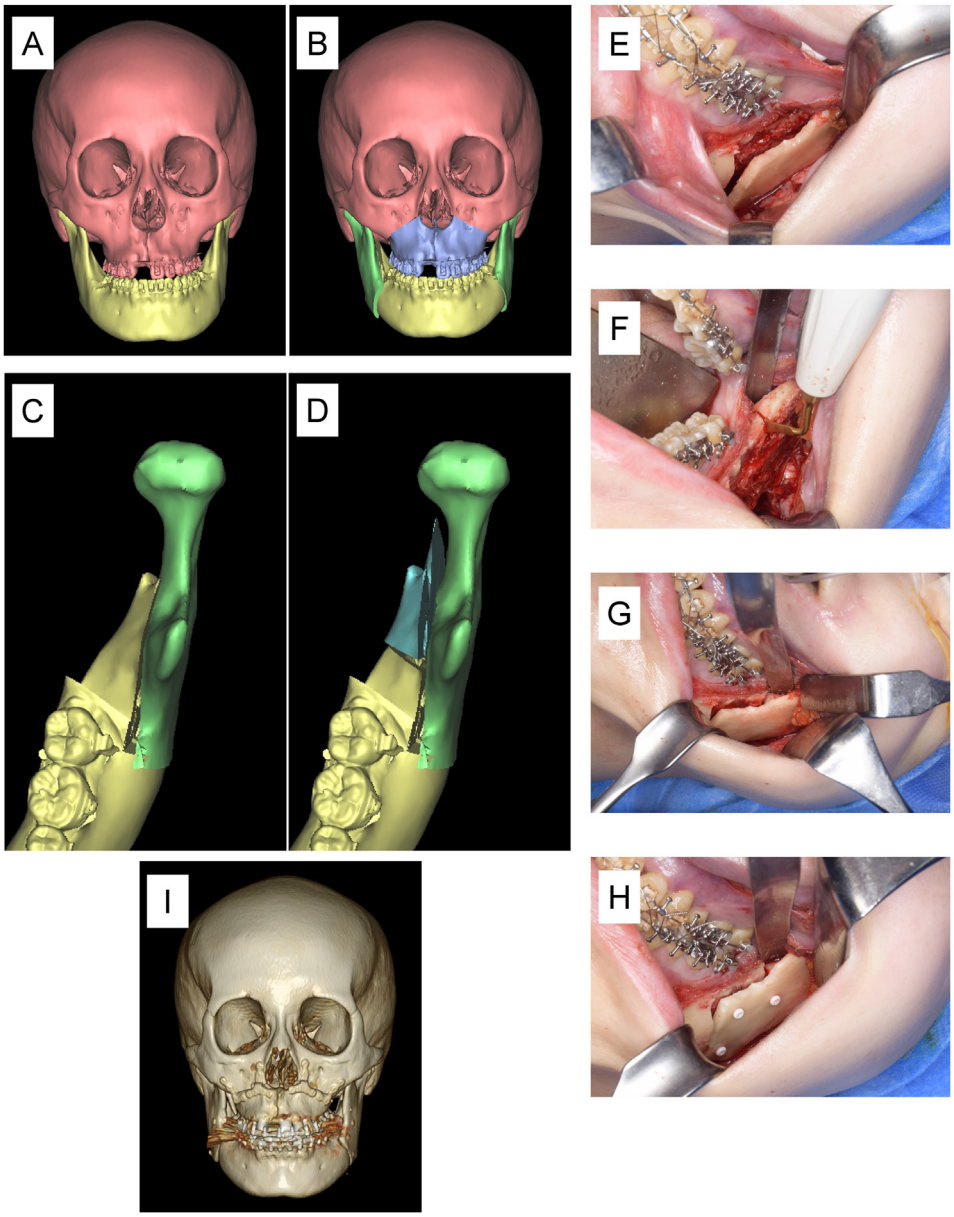

Figure 1 (A) Preoperative 3D CT findings. (B) Preoperative surgical simulation of Le Fort I osteotomy and BSSO (C) The simulation suggested bone interference between the proximal (shown in green) and distal (shown in yellow) fragments on the left mandible. (D) The addition of PBO to the simulation (shown in light blue) resolved bone interference completely. (E—H) Intraoperative photographs of the left mandible. (E) The inner surface of the proximal fragment was shaved after BSSO; however, bone interference could not be removed sufficiently, and an anterior gap was observed. (F) PBO was performed using VarioSurg3. (G) Bone interference was eliminated completely, allowing passive adaptation between the mandibular segments. (H) Bicortical fixation with absorbable screws. Two screws superiorly, one screw caudally. (I) Postoperative 3D CT. The asymmetry was improved. CT, computed tomography; BSSO, bilateral sagittal split osteotomy; PBO, posterior bending osteotomy. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

further posteriorly to ensure stable fixation and maintain the correct positioning of the proximal fragment within the glenoid fossa. This allowed a sufficient contact area to be secured without creating an anterior gap and bicortical fixation with absorbable screws. This suggests that fixation with absorbable screws may be possible by selecting the location of the PBO depending on the degree of asymmetry. BSSO with PBO, secured using absorbable screws, is a useful approach for treating facial asymmetry with mandibular prognathism that ensures postoperative stability, reduces the risk of condylar deviation, and avoids the necessity for hardware removal.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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