Technical note

Ultrasonic vertical osteotomy of the distal segment for safe elimination of interference between the proximal and distal segments in bilateral sagittal split osteotomy for mandibular asymmetry

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Bilateral sagittal split osteotomy (BSSO) is commonly used in the correction of dentofacial deformities. However, in cases of facial asymmetry with a shift of the mandibular midline or occlusal cant, the condyle is displaced laterally by the pulling of the proximal segment medially when there is bony interference between the proximal and distal segments after the osteotomy. When the gap between the proximal and distal segments is large, the proximal segment will clearly be asymmetrical as a lateral bulge on the patient’s cheek, even if a large piece is removed. To overcome these problems, Ellis reported a vertical osteotomy of the distal segment behind the terminal molar to passively align the segments of the sagittal ramus osteotomy. This procedure can also be used to improve the angle of the occlusal plane and occlusal stability when rotating the maxillomandibular complex counterclockwise. When the inferior alveolar nerve (IAN) is exposed, it is retracted laterally and the vertical osteotomy made. However, the IAN is not always exposed because surgeons seek to minimise its exposure to prevent injury. As there is the potential for such injury during vertical osteotomy of the distal segment when a conventional bur or saw is used, we have developed an ultrasonic vertical osteotomy of the distal segment to eliminate interference safely between the proximal and distal segments of BSSO for mandibular asymmetry.

Preoperative three-dimensional planning and simulation, including the vertical osteotomy of the distal segment, is required for mandibular asymmetry (Fig. 1). After complete bilateral osteotomy, an ultrasonic bone device (SONOPET UST-2001, Stryker MedTech, Tokyo, Japan) is used to make a vertical osteotomy in the distal segment. The lingual perios- teum of the distal segment is raised and the ultrasonic bone device inserted to the lingual side of the mandible after space has been made (Fig. 2). A vertical osteotomy of the distal segment behind the terminal molar is then made ultrasonically through the exposed medullary bone and the lingual cortex, including the superior and inferior borders of the mandible (Fig. 3). The distal segment is then easily fractured medially using forceps. A complete vertical osteotomy can provide mobility of the segment of the internal ramus behind the terminal molar (Fig. 4). Bony interference is eliminated and the proximal segment can be aligned easily and passively with the distal segment. The proximal and distal segments are fixed in their proper positions with plates and screws.

Ultrasonic bone devices have recently been introduced in oral and maxillofacial surgery, because they enable minimally invasive bone cutting and removal without injury to soft tissues such as the IAN. Surgeons do not need to fracture the distal segment forcefully, and damage to the IAN caused

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Fig. 1. Preoperative three-dimensional planning and simulation, including vertical osteotomy of the distal segment, in bilateral sagittal split osteotomy. After the osteotomy, the distal segment that is laterally displacing the ramus (arrow) is repositioned. The ramus then adopts its correct position passively.

Fig. 2. Insertion of an ultrasonic bone device (arrow) to the lingual side of the mandible. The inferior alveolar nerve is not exposed.

Fig. 3. Ultrasonic osteotomy of the exposed medullary bone and lingual cortex of the distal segment behind the terminal molar. The arrow indicates the ultrasonic bone device.

Fig. 4. Complete fracture of the distal segment. The arrow indicates the inferior alveolar nerve.

by the fracture is therefore minimised because the device permits safe, complete osteotomy of the lingual cortex of the mandible and of the medullary bone surrounding the IAN. The ultrasonic bone device is useful for vertical osteotomy of the distal segment to eliminate interference between both the segments in BSSO for mandibular asymmetry.

Conflict of interest

None.
References