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Ingenuity in treating malunion after inappropriate open reduction and internal fixation of symphyseal mandibular fractures with bicondylar fractures

KEYWORDS
Mandibular fracture;
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Reoperation;
Fracture fixation

Mandibular symphyseal fractures with bilateral condylar fractures, common multiple mandibular fractures, are problematic because they create an increase in the lower facial width.[1,2] Closure of the lingual cortex gap at the symphysis and repair of facial width is achieved by adequate surgery; however, symphyseal fractures with bilateral condylar fractures are often challenging to treat.[3] If improperly treated, problems such as malocclusions or limited mouth opening can remain.[4,5]

A 22-year-old Japanese male injured in a motor vehicle accident and was diagnosed with mandibular symphyseal fractures, bilateral condylar fractures, and a maxillary alveolar bone fracture on the right side. The day postinjury, an otolaryngologist at another hospital performed open reduction and internal fixation (ORIF) of the mandible with intermaxillary fixation (IMF). The bilateral condylar fractures were treated conservatively. Four weeks after ORIF, the IMF was removed, and abnormal occlusion and difficulty in opening the mouth were noted; therefore, further treatment was recommended. At the first visit to our department, the mandibular angles on both sides were strongly outward and protruding, and the mandible receded (Fig. 1A and B). The right molars showed a crossbite, and mouth opening was 5 mm (Fig. 1C). Seven weeks postinjury, re-ORIF was performed via the submandibular approach under general anesthesia. There was no improvement in mouth opening, even after general anesthesia induction. The fracture site showed fibrous malunion, and no obvious gap was observed on the lingual side. After removing the plates fixed at the mandibular symphyseal region, the mandible was re-sectioned at the midline using a reciprocating saw, and the lingual-side bone stump was shaved based on the morphology of the mandible (Fig. 1D). A MatrixWAVE™ MMF (DePuySynthes, West Chester, CA, US) was attached to the IMF. Drilling was performed on the bilateral antegonical notch to form a bony foramen, and 0.5-mm wires were passed through the bony foramen on both sides. The wires were ligated at the midline to reduce the interangular distance with reference to the occlusal relationship (Fig. 1E). At the position where a good occlusal relationship and mandibular morphology were obtained, IMF was performed; the mandible was fixed bicortically with a 2.5-mm thickness reconstruction plate (DePuySynthes). As mouth opening improved, bilateral condylar fractures became unnecessary. Three years after re-ORIF, a 40-mm mouth opening was maintained, and good occlusion was obtained (Fig. 1F–H).

During the initial surgery, ORIF and IMF were considered difficult to perform due to the presence of multiple missing teeth. However, the surgeon's previous inexperience and

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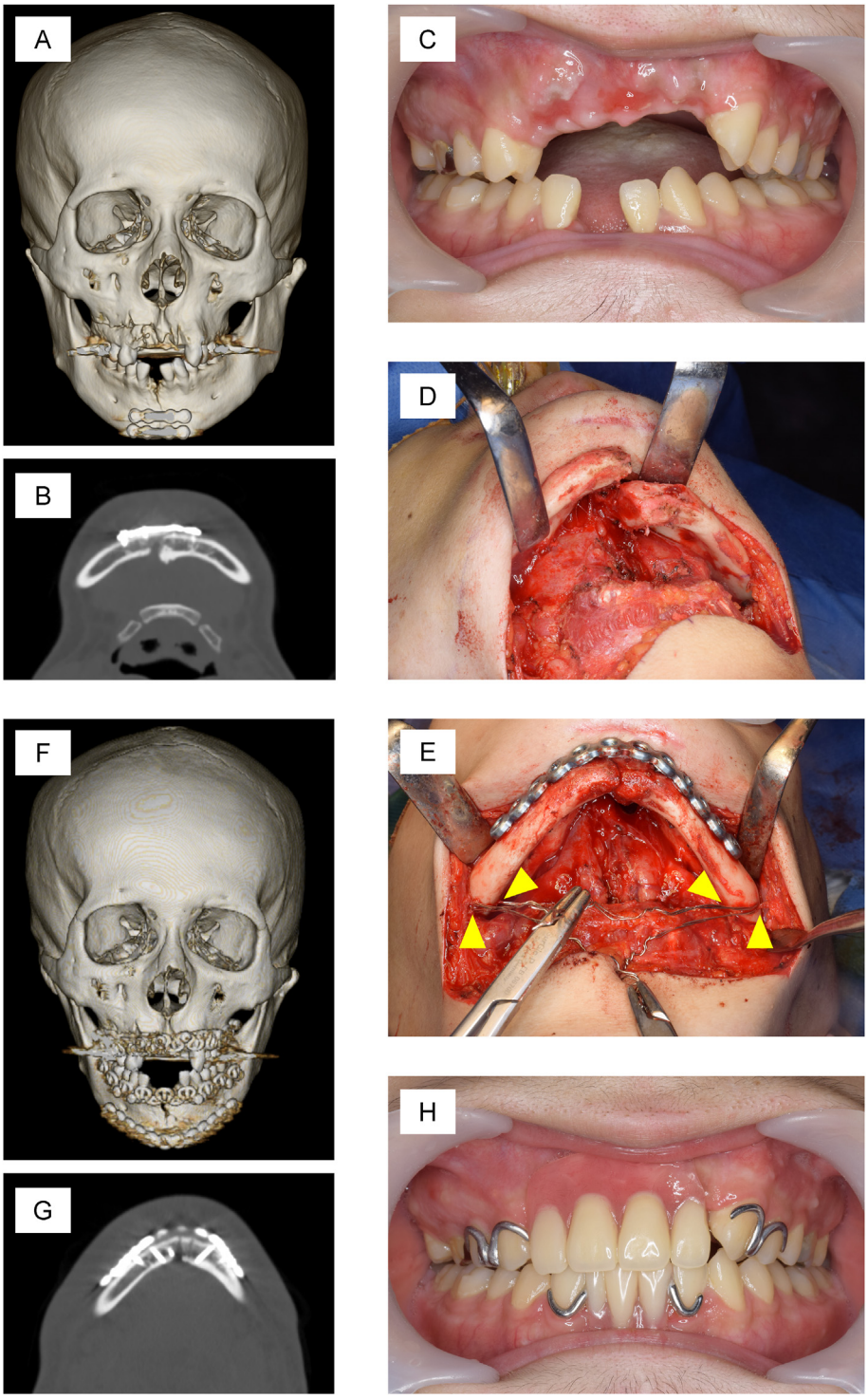

Figure 1 Computed tomography (CT) images and clinical photographs of our patient.
(A) 3D CT at the first visit to our department showing the mandibular angles on both sides were strongly outwardly protruded and both mandibular condyles were laterally dislocated. (B) Axial CT at the first visit to our department showing a large lingual cortex gap at the symphysis. (C) Intraoral photograph at the first visit to our department. Both lower central incisors were missing. A crossbite at the right molars due to the mandible receding was observed. (D and E) Intraoperative photographs. (D) The mandible was re-sectioned in the midline, and the lingual side bone stump was shaved. (E) While the 0.5-mm wires passing through the bony foramen (yellow allow heads) were ligated in the midline to reduce the inter-angular distance, the mandible was fixed bicortically with a reconstruction plate. (F) Postoperative 3D CT showing improved mandibular morphology. (G) Postoperative axial CT showing improved lingual cortex gap at the symphysis. (H) Intraoral photograph three years after the re-ORIF, showing a good occlusion with partial dentures.

inappropriate ORIF and IMF caused the alveolar side of the mandible to tilt toward the lingual direction, resulting in a large protrusion of the mandibular angle and limited mouth opening. In re-ORIF, it is necessary to press both mandibular angles inward with strong force, and the position of the bone fragments needs to be maintained to be fixed with a reconstruction plate. When performing re-ORIF for malunion of mandibular symphyseal fractures with bilateral condylar fractures, wire ligation between the mandibular angles is a useful method.

Declaration of competing interest

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

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None.

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