



Technical note

Small-diameter compression screws completely embedded in bone for rigid internal fixation of the condylar head of the mandible

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Accepted 25 April 2017

Keywords: Mandibular condyle head; Fracture; Headless compression screw

Complications after open reduction and internal fixation of the condylar head include irritation of the sensitive soft tissues surrounding the temporomandibular joint (TMJ) caused by permanent friction from the screw head,¹ and resorption beneath the screw heads because of bony remodelling around the lateral pole.^{1,2} However, a second operation can risk damage to the facial nerve.

Small-diameter compression screws (Fig. 1) are easy to use and have a similar effect to larger-diameter lag screws. The double thread (the leading thread is deep and wide, with a steeper pitch and smaller external diameter than the trailing thread, which has a more gradual pitch and wider external diameter) draws the two bony segments together to produce compression (Figs. 2 to 4). The screws, which are 14 mm long, ensure the most stable fixation and are not exposed medially or superiorly after condylar remodelling.

Cannulated 2.0 mm screws fitted with a larger, regular-diameter head, have been reported.³ I know of only one published report of the use of single headless screws for osteosynthesis of the condylar head,⁴ but diameters of less than 2.3 mm have not been available until recently.

The presented screws are easy to insert because of elimination of the internal canal.^{2,3} They have the advantage of stable fixation without the loss of compression despite lack-

ing a typical head (such as that of a lag screw) and their use allows more room for manoeuvre in the limited condylar region.

Compression by a screw head can cause fracture or resorption of the outer layer of cortex,² and the large diameter of the screw relative to the condyle can make accurate alignment difficult. Small-diameter compression screws do not need to be countersunk because the head is below the surface of the bone, and there is no need to prepare a gliding canal or manipulate K-wires. A headless 14 mm screw in the condylar head has a similar effect to that of a 15–16 mm lag screw because it is completely embedded in the bone.

The reduced diameter, the lack of a protrusive head, and the short leading threads for fixation of the small proximal segment, are excellent characteristics for fixation of typical A and B fractures of the head because of perpendicular insertion. Use for type C fractures is also possible. Stable fixation is easy, as insertion of the screw perpendicular to the fracture line causes the bony segments to be drawn together. The amount of compression across the fracture depends on the pitch differential and the number of turns after the trailing thread enters the bone. Use of these screws may reduce irritation of the lateral ligament of the TMJ, as well as resorption, and removal will not be indicated, as in the case of orthopaedic HerbertTM screws (Zimmer[®] Inc, Warsaw, IN, USA).⁵

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Fig. 1. The proposed set of small-diameter compression screws (all 14 mm long) that can be completely embedded in bone for rigid internal fixation of the condylar head of the mandible. Left: outer diameter of leading thread = 1.5 mm, shaft = 1.1 mm in diameter; middle: outer diameter of leading thread = 1.8 mm, shaft = 1.4 mm in diameter; right: outer diameter of leading thread = 2.0 mm, shaft = 1.6 mm in diameter.

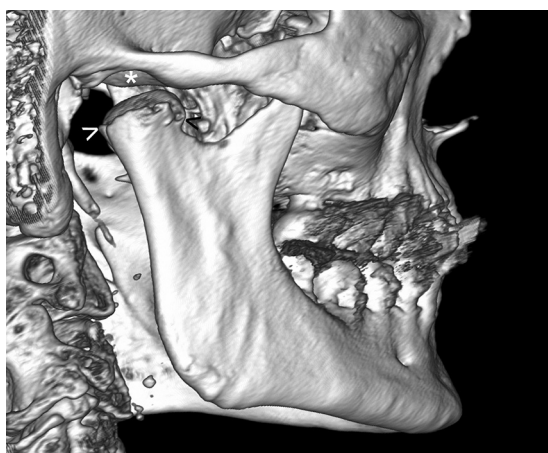


Fig. 2. Right-sided fracture of the condylar head type C. Digital occlusal analysis by interdental pressure mapping shows that more than 90% of the occlusal force was dislocated to the right, with near total disocclusion on the left (only 9.8%). Anteromedial dislocation of the condylar head caused the right ascending ramus of the mandible to be reduced in height (* empty glenoid fossa; > < fracture line).

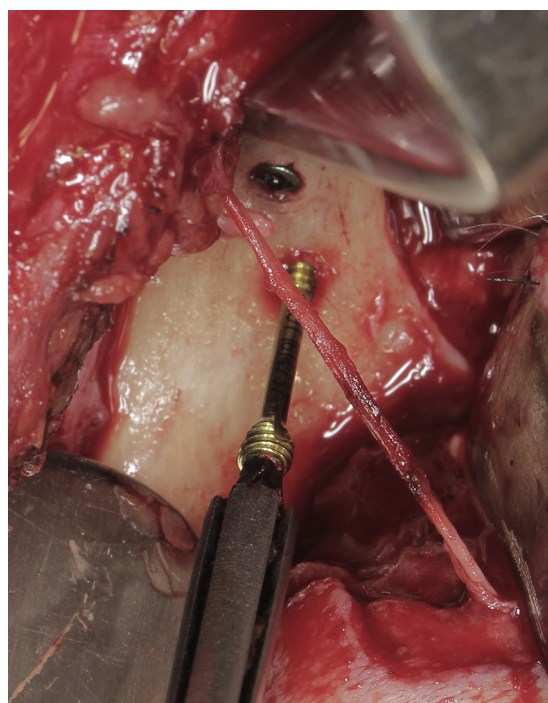


Fig. 3. The preauricular approach. The first screw (2.0 mm, green colour) stabilised the condylar process and an additional 1.5 mm screw was placed just below (yellow colour). Rigid fixation was finally achieved by the main 2.0 mm screw and two additional 1.5 mm screws inserted inferiorly and posteriorly to the main screw.

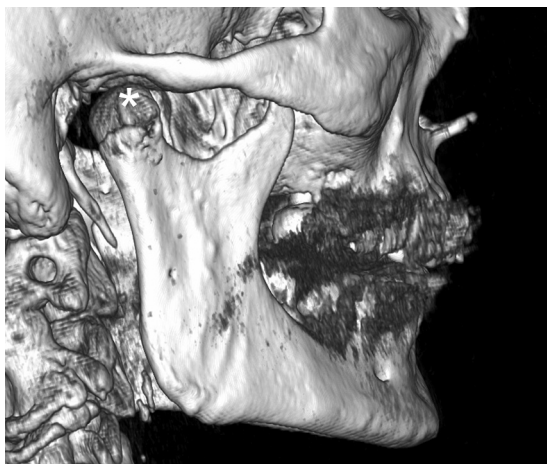


Fig. 4. Postoperative computed tomogram showing restoration of the height of the mandibular ramus and the head of the mandible reduced to the glenoid fossa (*). The screw heads are invisible as they are embedded in the bone. The open bite on the left side was eliminated. Digital occlusal analysis by interdental pressure mapping confirmed that the sides were balanced.

Conflict of interests

I have no conflicts of interest.

Ethics statement/confirmation of patients' permission

The study was approved by my institutional review board. Patient's permission has been obtained.

Acknowledgements

The author wishes to thank ChM (www.chm.eu), who manufactured the prototypes. This study was supported by grants from the Polish Republic Ministry of Science and Higher Education: 0117/DIA/2014/43 and the Medical University of Lodz503/5-061-02/503-01.

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