Technical note

Computer-assisted preoperative simulation for screw fixation of fractures of the condylar head

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Fractures of the condylar head are generally treated conservatively because exposure and fixation are difficult without damaging the facial nerve. Conservative treatment is also recommended for children or for patients whose condylar head is in several fragments.1 The conservative approach requires long-term treatment, whereas open surgery can provide early recovery of occlusion and movement of the jaw for adults who have a condylar fracture with a large segment and loss of the vertical height of the mandibular ramus.1–4 Preoperative evaluation by three-dimensional computed tomography (CT) with computerised simulation can help the surgeon to decide whether open treatment is possible to fix the fracture. We have used three-dimensional simulation to assist in the planning and treatment of fractures of the condylar head.

Patients with maxillofacial fractures routinely have both three-dimensional CT and conventional radiography. When the CT shows a fracture of the condylar head, and the size of the fragment is large enough to fix with a plate, or screws, or both, digital imaging and communication in medicine (DICOM) data from the CT are put into Mimics 14.01 software (Materialise, Leuven, Belgium) to enable computer-assisted preoperative simulation. The mandible and fragments from the condylar fracture are segmented with the simulation software (Fig. 1), which enables the fragment from the condylar fracture to be virtually reduced in a precise fashion (Fig. 2). After the virtual reduction, we can measure the width of the reduced condyle to decide preoperatively the length of screw for fixation of the fractured condylar head (Fig. 3). When the lateral condylar segment is not thick enough after the reduction, the plate and screws can then be selected. Computer-assisted preoperative simulation plays an important part in the selection of methods of fixation and the decision about the length of the screw to fix the fragments of a condylar fracture.

Fig. 1. Segments of the mandible and fragments of the condylar fracture.
Fig. 2. Virtual reduction of the condylar heads.

Fig. 3. Measurement of the width of the reduced condyle for fixation of the screws.

References


