

# A retrospective study of temporomandibular joint ankylosis secondary to surgical treatment of mandibular condylar fractures

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## Abstract

We investigated the incidence of ankylosis of the temporomandibular joint (TMJ) after open operations for fractures of the mandibular condyle, and analysed possible risk factors in a total of 385 patients with 492 condylar fractures who had been operated on in our department from 2001 to 2010. Sixteen patients developed postoperative ankylosis of the TMJ with 26 joints (5%) affected during a follow-up of 6 months–10 years. Of the 492 condylar fractures, the most common ones that were associated with postoperative ankylosis were those of the condylar head (20/248), followed by the condylar neck (6/193). Subcondylar fractures did not cause postoperative ankylosis (0/51). Among the 16 patients with postoperative ankylosis, 13 had associated anterior mandibular fractures. Long-screw (bicortical screw) fixation of fractures of the condylar head seemed to be associated with a lower incidence of postoperative ankylosis than fixation by miniplate and wire or removal of the fractured fragment. The articular discs were damaged in all ankylosed joints, and the remaining fractured fragment was found in 10 ankylosed joints after fractures of the condylar head. The results suggest that fractures of the condylar head are more prone to lead to postoperative ankylosis of the TMJ, and that the possible risk factors seem to include the technique used for fixation and damage to the disc, together with an anterior mandibular fracture with the fractured fragment remaining.

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## Introduction

Mandibular fractures are extremely common in maxillofacial trauma, and condylar fractures account for 17.5–52% of them.<sup>1</sup> Clinically, there are two main therapeutic approaches to their management: functional or closed treatment, or operative or open treatment. Currently the consensus is that condylar fractures in children should be treated by a closed

approach,<sup>2,3</sup> while for fractures in adults treatment is still controversial. Nevertheless, in recent years open treatment of adult condylar fractures has become more common as it has given more satisfactory results than closed treatment.<sup>1,4–6</sup> Many oral and maxillofacial surgeons have reported complications after operative treatment of mandibular condylar fractures, including facial nerve palsy, auriculotemporal nerve dysfunction, Frey's syndrome, salivary fistulas, limitation of mouth opening, occlusion disorders, loosening of miniplates or screws, torsion or fracture of the miniplate, changing position of the condylar fragment, resorption and

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remodelling of the condylar process, osteoarthritis, infection, and unsightly scars.<sup>6–9</sup> However, to our knowledge little if anything has been reported about postoperative ankylosis of the temporomandibular joint (TMJ).

We have retrospectively investigated ankylosis of the TMJ secondary to open repair of condylar fractures and analysed the possible risk factors.

## Patients and methods

We retrospectively reviewed all the casenotes of patients who had had open treatment of condylar fractures at the School and Hospital of Stomatology, Wuhan University, during the period 2001–2010. Details of any patient who developed ankylosis were also noted and risk factors were analysed. Patients who had a history of other surgical treatment of the TMJ or diseases known to cause ankylosis were excluded. The following personal data were collected: sex, age at injury, associated mandibular fracture, presence of a remaining fractured fragment, and position of the disc. The site of the fracture (head, neck, or subcondylar region), technique of fixation used, and type of ankylosis were also recorded. The type of postoperative ankylosis was categorised as described by Sawhney.<sup>10</sup> The position of the articular disc was recorded at the time that the ankylosis was treated. In all cases the medical histories and radiographs were reviewed by two senior oral and maxillofacial surgeons.

## Results

Three hundred and eighty-five patients with a total of 492 condylar fractures (248 of the head, 193 of the neck, and 51 of the subcondylar region) were included in the study. Sixteen patients (4%) with 26 joints (5%) developed ankylosis after open treatment (Fig. 1) during a mean follow-up of 7 (range 0.5–10) years (Table 1).

### *Site of condylar fracture and postoperative ankylosis of the TMJ*

In a total of 248 fractures of the condylar head that were treated by open operation 20 joints developed ankylosis postoperatively (8%). In eight patients it was bilateral. Of 193 fractures of the condylar neck six joints (3%) developed ankylosis. None of the 51 fractures in the subcondylar region developed ankylosis. Among 385 patients who had had open treatment of condylar fractures, 145 of the 369 who did not develop ankylosis postoperatively (39%) had anterior mandibular fractures, and 13 of the 16 who did develop ankylosis had anterior mandibular fractures.

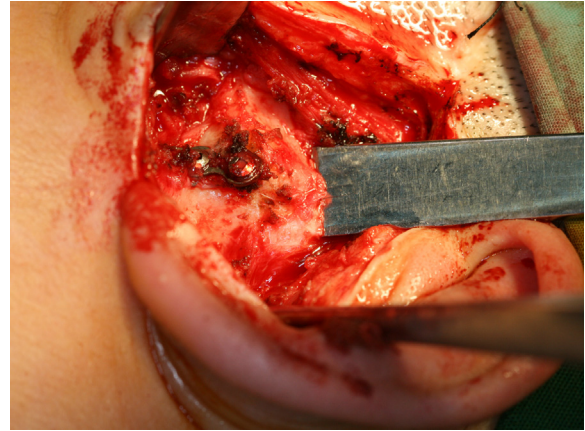


Fig. 1. Operative view showing formation of a bone mass after open reduction and internal fixation.

### *Surgical technique for the treatment of condylar fractures and postoperative ankylosis of the TMJ*

Among 248 fractures of the condylar head treated by open operation, 117 fractured fragments were treated with long-screw (bicortical screw) fixation and two joints (2%) developed ankylosis. Eighteen fractured fragments were fixed with miniplates and three joints (17%) developed ankylosis, in which torsion or fracture of the miniplate after open reduction was found (Fig. 2). Seventy-eight fractured fragments were removed, and seven joints (9%) developed ankylosis (Fig. 3). The other 35 fractured fragments were treated with wire fixation, and eight joints (23%) developed ankylosis (Fig. 2). Long-screw fixation for fractures of the condylar head was associated with a lower incidence of postoperative ankylosis of the TMJ than fixation with miniplates and wires or removal of the fractured fragment. Of the six cases of postoperative ankylosis that were caused by fractures of the condylar neck, the fractured fragments were all fixed with miniplates (Fig. 4).

### *Assessment of postoperative ankylosis of the TMJ*

The types of ankylosis are shown in Table 1. By radiographic examination and photomacrography during operation for ankylosis, the remaining fractured fragments were found in 10 ankylosed joints after fractures of the condylar head, and the articular discs were displaced or disrupted in all the affected joints.

## Discussion

Although numerous clinical studies<sup>1,4–6</sup> have shown favourable functional outcomes for open treatment of condylar fractures, there are still challenges such as the development of ankylosis of the TMJ postoperatively. We know

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