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Extraoral approach to mandibular condylar fractures: Our experience with 100 cases

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A B S T R A C T

Introduction: Mandibular condylar fractures are very common. The current literature contains many indications and methods of treatment. Extraoral approaches are complicated by the need to avoid injury to the facial nerve. On the other hand intraoral approaches can make fracture reduction and/or fixation difficult. The mini-retromandibular approach provides an excellent view of the surgical field, minimises the risk of injury to the facial nerve, and allows rapid and easy management of condylar fractures.

We have collected and reviewed our first 100 condylar fractures treated by means of a mini-retromandibular approach.

Patients and methods: Between June 2006 and June 2012, Eighty-seven patients with extracapsular condylar fractures underwent open reduction and rigid fixation for 100 extracapsular condylar fractures *via* a mini-retromandibular approach.

Results: Dental occlusion and anatomic reduction were restored in all 100 condylar fractures. Post-operative infection developed in three patients. There was one sialocele and one case of plate fracture. Four patients experienced transient palsy of the buccal branch of the facial nerve. No permanent deficit of any facial nerve branch was observed.

No patient showed condylar head resorption.

Conclusions: Our experience with the treatment of the first 100 condylar fractures using the mini-retromandibular approach has demonstrated that this technique has allowed the Authors to safely manage extracapsular condylar fractures at all levels.

1. Introduction

Mandibular condylar fractures are very common occurring in 20–52% of mandibular fractures (Ellis et al., 1985; Eulert et al., 2007).

Undiagnosed or incorrectly managed condylar fractures heal eventually with anatomic malalignment or malunion frequently resulting in poor occlusion, reduced mouth opening with deviation, and limited lateral mandibular excursion. Condylar fractures with major dislocation can result in shortening of the posterior facial height thereby causing asymmetry (Silvennoinen et al., 1992; Zachariades et al., 2006).

The current literature contains many indications for, and methods of, mandibular condylar fracture treatment. Whereas almost all mandibular fractures are currently managed by open reduction and internal rigid fixation, this treatment is not always used for fractures affecting the condylar process.

Condylar fractures differ markedly from other mandibular fractures with respect to the anatomy of surrounding tissues. Fractures affecting the mandibular symphysis, body, and/or angle are readily approached intraorally, but such approaches make optimal anatomic reduction and rigid fixation of condylar fractures very difficult because the condyle and the fracture site are unfavourably aligned. For these reasons, mandibular condylar fractures are more easily managed *via* an external approach or an intraoral approach with the use of instrumental aids, such as endoscopy.

Extraoral approaches are complicated by the need to avoid injury to the facial nerve and its branches, which run superficial to the condyle (Handschel et al., 2012). On the other hand, intraoral approaches, including those that use endoscopic guidance and dedicated instruments, can make fracture reduction and/or fixation extremely difficult, especially for high fractures and/or those with medial luxation of the proximal stump (Schmelzeisen et al., 2009; Kellman and Cienfuegos, 2009; Kokemueller et al., 2012).

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For these reasons, condylar fractures have been treated non-surgically for many years using intermaxillary fixation and post-operative rehabilitation (Delaire et al., 1975; Wassmund, 1934; Kohler, 1956).

Some fractures, such as intra-articular fractures, are still often treated with short-term intermaxillary fixation and intensive rehabilitation (Wassmund, 1934; Kohler, 1956). The treatment of extracapsular condylar fractures remains under debate, with the choice of treatment often depending on the surgeon's experience and preferences (Ellis et al., 2000).

Various recent reports have provided statistical evidence that the surgical treatment of extracapsular condylar fractures yields better functional and anatomic results compared with non-surgical management (Ellis and Throckmorton, 2000; Throckmorton and Ellis, 2000; Vesnaver et al., 2011; Kokemueller et al., 2012) in terms of bone morphology, occlusion, mouth opening, and jaw movement.

A recent randomized prospective study has confirmed these results (Eckelt et al., 2006). The Authors declared that "further recruitment of patients ceased for ethical and legal reasons, because there was a clear trend for better results in the open treatment group" (Eckelt et al., 2006).

Some Authors have argued that non-surgical treatment can be indicated for comminuted fractures, paediatric patients, and intracapsular fractures (Myllar, 1994; Hovinga et al., 1999).

Some Authors report good results with non-surgical management of undisplaced or only slightly angulated fractures (Landes et al., 2008; Danda et al., 2010). The same Authors however favour surgical management of displaced extracapsular fractures.

Open reduction is recommended in paediatric cases with major dislocation or when the contact between bony stumps is lost. In addition, surgical treatment is the best option for condylar fractures in paediatric patients that are part of panfacial trauma.

Different approaches to the condyle, including a variety of external approaches, have been described.

We first described our experience with the mini-retromandibular approach to condylar fractures in 2008 (Biglioli and Colletti, 2008). Since that time, this technique has become our routine approach to the treatment of isolated condylar fractures. We also use this approach to treat condylar fractures that are part of complex trauma (Colletti and Biglioli, 2012; Rabbiosi et al., 2012).

We have collected and retrospectively reviewed our first 100 condylar fractures treated by means of a mini-retromandibular approach. The long term results and complications are discussed.

2. Materials and methods

Between June 2006 and June 2012, Eighty-seven patients with extracapsular condylar fractures (57 Caucasian males, 4 North African males, 3 South American males, and 23 Caucasian females; average age, 36 years; range, 9 to 83 years) underwent open reduction and rigid fixation for 100 extracapsular condylar fractures *via* a mini-retromandibular approach. Seventy-four patients presented with unilateral fractures and thirteen had bilateral fractures.

The sample included 25 high- and middle-neck fractures, 26 low-neck fractures, and 49 subcondylar fractures.

Forty-seven patients presented with associated fractures (34 in the mandibular symphysis/angle/body, 7 involving the zygoma/orbit/nose, and 6 panfacial).

The average time required to manage each condylar fracture was 52 min (range, 15–120 min).

We treated two paediatric patients: a 12-year-old boy and a 9-year-old girl who presented with unilateral subcondylar fractures with major displacement.

We treated six bilateral condylar fractures associated with panfacial fractures. Four patients had complex fractures in all thirds of the facial skeleton and two patients had complex fractures in the middle and lower thirds.

One patient with bilateral condylar fractures that were components of panfacial trauma was treated 60 days after injury, and complete articular functional restoration was not achieved despite functional therapy.

2.1. Surgical technique

Surgical treatment was performed under general anaesthesia. A sterile surgical field was prepared and a preoperative drawing of the skin incision, surrounding landmarks, and the fracture site was made.

The mandibular body and angle, zygomatic arch, and glenoid fossa were used as landmarks. A 2-cm-long incision was made 1–2 cm posterior to the mandibular angle (Fig. 1). The vertical position varied among patients, depending on fracture height and skin mobility, but was usually 5–15 mm superior to the angle and 1 cm posterior to the radix of the auricular lobule.

A 1:200,000 adrenaline solution was injected into the soft tissue of the parotid-masseteric region, and the skin was incised. A diluted vasoconstrictor was used instead of local anaesthetic, given the need to identify branches of the facial nerve during access. In cases of doubt about the precise location of the nerve, the nerve fibres were electrically stimulated.

Subcutaneous dissection was performed anteriorly and superiorly, superficial to the superficial musculoaponeurotic system (SMAS). The anterior border of the parotid gland was identified, and the masseter muscle fibres were located anterior to this border. Blunt dissection was performed parallel to the facial nerve fibres to enable passage through the masseter (Fig. 2). The branches of the facial nerve were visible in about 50% of cases, and were identified and preserved with a retractor if present. An electrical stimulator was used to aid nerve branch detection in cases of doubt.

The mandibular ramus was then reached and the periosteum was elevated widely. If necessary, the access was widened slowly by

Fig. 1. Preoperative drawing. The landmarks are drawn: zygomatic arch, glenoid fossa, mandibular ramus, coronoid process and fracture site. A 2 cm skin incision is planned 10 mm posterior to the angle 8 mm inferior to the radix of the lobule.