

Open Reduction of Condylar Fractures Using 8 Different Plate Osteosynthesis Methods

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Abstract

The management of condylar fractures (CFs) has been the subject of debate for many years. Closed reduction has been the favorite of many surgeons due to its simplicity and low surgical risk, however, it can sometimes be associated with undesirable sequelae and long-term follow-up periods, which can compromise the predictability of the results. On the other hand, open reduction reduces both recovery and follow-up time, but increases the risks inherent in surgery. Recent literature has reported better results for the second treatment option. In this technical note, we want to present 8 different and successful designs for the placement of rigid fixation plates, used for the open reduction of CFs.

Keywords: Open Reduction; Condylar Fractures (CFs); Closed Reduction

Introduction

To date, one of the most controversial issues in craniomaxillofacial trauma is the management of CFs, due to the existence of two widely accepted approaches: open and closed. Closed reduction is less invasive and easier to perform, however, long-term complications such as joint pain, arthritis, malocclusion, limitation of mandibular movement, facial asymmetry and ankylosis are documented [1,2]. On the other hand, open reduction allows immediate anatomic and mandibular movements, but has been associated with complications such as facial nerve injury and visible scarring [3]. Although there is no consensus yet, recent systematic reviews documented better results for the open method than for the closed one [4,5]. The objective of this study is to present 8 different designs used for the open reduction of condylar fractures, performed in two Colombian hospitals from 2004 to 2020.

Surgical technique

In all cases, Erich arc bars or intermaxillary fixation screws are placed as the first step. CFs are exposed by a retromandibular approach, using minimally invasive skin incisions of 1 to 1.5 cm. Subsequently, the anatomical reduction is performed placing the thumb on

the occlusal plane on the side of the fracture and the other fingers supporting the mandibular basal, to perform circulatory movements following the sagittal plane, so that the condyle relocates. A periosteal elevator can be used to achieve a better coupling of the segments. After maxillomandibular fixation, the placement of the plates is performed. The design is chosen according to the fracture line. If the fracture line is in the neck of the condyle or above, single rhomboid or L-shaped plates are recommended, because they are easy to place cephalically. If the fracture is found more towards the base of the condyle, the other 6 designs are effective, because they provide greater support and stability.



Figure 1: Schematic representation of the different designs for reduction of condylar fractures.

Top from left to right: L-plate, rhomboid plate, square plate, double straight plate.

Bottom from left to right: straight plate with L-plate, double L-plate, L-plate with square plate.

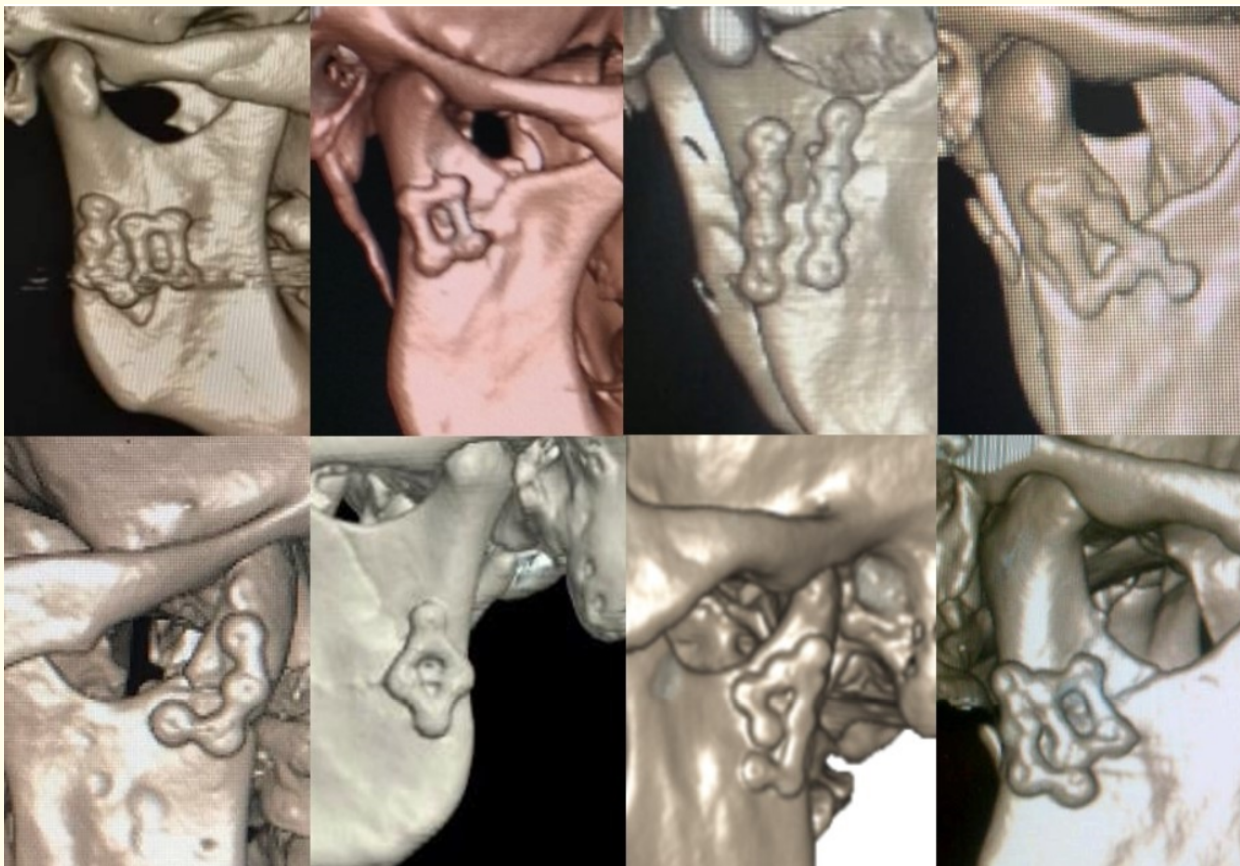


Figure 2: Computed tomography of the cases, showing adequate condylar reduction.



Figure 3: Image showing the conservative retromandibular approach used in the procedures.

Discussion

In 2008, Schneider, *et al.* compared the open reduction with respect to the closed treatment of CFs using objective (oral opening, protrusive and laterotrusive movements) and subjective variables (pain, functional impairment and discomfort), and concluded that the open technique provides better outcomes than closed, regarding both unilateral and bilateral fractures [6]. Gupta, *et al.* described 3 treatment protocols: no invasive treatment, closed reduction with maxillomandibular fixation, or open reduction with internal semirigid fixation; despite the authors concluded that there are not significant differences between the 3 groups, better functional results were obtained using open reduction [7]. Later, in 2015, Al-Moraissi and Ellis performed a systematic review with meta-analysis, in which they compared open versus closed reduction of mandibular fractures, establishing 6 variables: maximum interincisal opening, laterotrusive movement, protrusive movement, malocclusion, pain, and chin deviation during jaw opening); significantly better functional results were obtained with the open method [4]. Chrcanovich this same year, performed a meta-analysis comparing open versus closed reduction, in which surgical treatment showed statistically better outcomes regarding post-treatment malocclusion, lateral deviation during maximum inter-incisal opening, protrusion, and laterotrusion. Results of non-surgical treatment were better only regarding infection appearance. There was no statistically significant effect on temporomandibular joint pain, noise, or maximum inter-incisal opening [5]. In this way, according to these systematic reviews, designed with the strictest systematization, in order to maintain the highest levels of evidence, it seems that open reduction has considerable advantages over closed reduction.

As for the rigid internal fixation system, several techniques have been described, such as reduction with lag screws, one or two-plate fixation systems, dynamic compression plates or Kirschner's screws. Choi, *et al.* reported that the use of two-miniplate fixation techniques provides more stable and functional fixation of condylar neck fractures compared to the use of single plates [8]. According to Sugiura, *et al.* the reductions performed using lag screws show the best outcomes, considering mandibular ramus height reposition [9].

Conclusion

This article presents a summary of the 8 different techniques used for the open reduction of condylar fractures in 138 patients over 16 years, which, at the authors' discretion, are predictable and generates excellent results. The literature review seems to support the use of open reduction of condylar fractures when indicated.

Conflict of Interest

None declared.

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