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Review Article

Management Options for Bilateral Condylar Fracture: A Review

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***ABSTRACT*:**
Mandibular condylar fractures are among the most common facial fractures and some of the most difficult to manage. Opinions about the management of mandibular condylar fractures differ among surgeons. Majority of surgeons seem to favour nonsurgical treatment of condylar fracture because of its minor postoperative complications. However, nonsurgical treatment may still yield serious complications like post-traumatic malocclusion. With the implementation of new technology, an increased understanding of fracture management, and better functional and morphological outcomes reported in the literature, open reduction and internal fixation is becoming many surgeons' preferred choice for the treatment of condylar fractures. Choosing the best treatment, such as surgery, inter maxillary fixation, physiotherapy or their association is directly related to fractures type, patient age and functional impairment degree. Clinical findings are relevant for proper diagnostic but image is fundamental for a precise treatment indication. The objective of this review was to evaluate the main variables that determine the choice of an open or closed method for treatment of condylar fractures, identifying their indications, advantages, and disadvantages, and to appraise the current evidence regarding the effectiveness of interventions that are used in the management of fractures of the bilateral mandibular condyle.
KEY WORDS: Mandibular Condyle, Fracture, Trauma, Bilateral

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INTRODUCTION:

Mandibular fractures are common in facial trauma, with 26-57% involving the condyle and with 24-33% [1-5] of all condylar fractures presenting as bilateral condylar fractures. Multivariate analysis reveals that bilateral condylar fractures result from an extremely strong impact and are more often the cause of physical complaints than unilateral ones. They are also a predictive factor for poor outcomes. [6-8] Nevertheless; there is a paucity of information on the optimal treatment of bilateral condylar fractures. In bilateral subcondylar fractures the dilemma remains whether to manage it conservatively, perform open reduction and bone plating of one side only or perform open reduction and bone plating of bilateral condyles.[9-12] The management of adult condylar injuries remains one of the most controversial topics in facial trauma. While satisfactory outcomes can be achieved in the majority of patients with closed treatment, which fractures may benefit from open treatment remains up for debate. [13 14] Multiple factors should be considered in making the decision to select open treatment; these include the level of fracture, fracture displacement, condylar dislocation, associated injuries to the mandible and midface, state of the patient's dentition, confidence of the surgeon to

perform open treatment, and adaptability of the masticatory system. Another frequently described consideration is the presence of bilateral condylar fractures, which was traditionally considered a relative indication for open treatment. [15 16]
Shortening of bilateral rami frequently leads to an anterior open bite, and compared with unilateral injuries, a higher rate of malocclusion is associated with bilateral condylar process fractures. [17] Furthermore, bilateral condylar injuries lead to a disruption of the normal morphology of both temporomandibular joints (TMJ), and significant neuromuscular adaptation would be required to restore satisfactory masticatory function and dental occlusion. [18, 19] Because of these factors, several authors have advocated that open treatment of bilateral condylar fractures may lead tomore predictable outcomes.[20 22] In contrast, other studies have shown that closed treatment can lead to successful reestablishment of occlusion and comparable maximal mouth opening (MMO) to open treatment. [23 24]

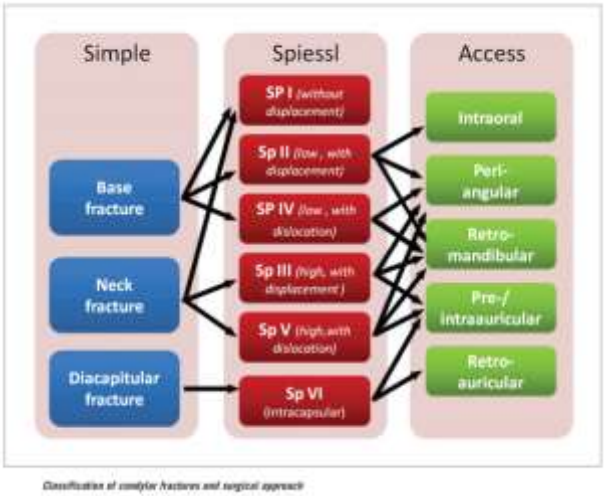
BACKGROUND:
In early 1925, ORIF was first applied to a low subcondylar fracture [25]. Several approaches have since been developed. When dealing with condylar fractures in children, many physicians prefer non-surgical approaches. . Clinical observations revealed that when a satisfactory anatomical occlusion was introduced via a nonsurgical intervention, the remodelling power and nearby muscles in young children remodel the condyle into an ideal anatomical and functional position [26 27 28]. The outcomes after closed reduction may lead to chin deviation in opening, occlusal disturbance and functional deficiency [29 30 31]. The primary concern with ORIF was damage to the complex anatomy and compromised circulation of TMJ and postoperative complications. [32]. CHOI reported no resorption, erosion or sclerosis of fractured condyles after ORIF and concluded that anatomically reducing fractured condyles could avoid adverse postoperative joint changes. His result is consistent with the authors' use of ORIF for bilateral condylar fractures. [33]

Classification of collum fractures according to Spiessl and Schroll [34]
Type I: Collum fractures without considerable displacement
Type II: Deep collum fractures with displacement
Type III: High collum fractures with displacement
Type IV: Deep collum fractures with dislocation
Type V: High collum fractures with dislocation
Type VI: Intracapsular/diacapitular fractures

Following the classification of [Spiessl and Schroll 35, Neff 36, Hlawitschka 37 and Loukota 38] additionally classified the intraarticular or diacapitular condylar fractures according to the fracture line. A diacapitular fracture is defined by a fracture line starting within the articulation surface

Type A (VI A): Displacement of medial condylar pole with preservation of the vertical dimension. The fracture is supported, stable and not shortened. The joint supporting articulation surface is partially affected at the medial condylar head fragments.
Type B (VI B): The lateral condylar pole is involved with loss of the vertical dimension. The fracture is not supported, unstable and shortened. The joint supporting articulation surface is subtotally affected, together with the lateral gauge and the lateral ligament.
Type C (V): The joint supporting articulation surface is entirely affected with a dislocation of the entire condylar head.

In summary, Fig. 1 illustrates the relation between commonly applied classifications and the surgical approaches.



Classification of condylar fractures and surgical approach

While occlusion and inter incisal opening are two important parameters to judge the success of a procedure, the other parameters are deviation of mandible on opening, left and right lateral movements and protrusion of the mandible. When must a surgeon resort to open reduction? This question is best answered when one goes through the absolute indications given by Zide et al [16]

TABLE 1: Indications for open reduction and rigid internal fixation of mandibular condyle fractures (HAUG and ASSAEL, 2001[19]; BRANDT and HAUG, 2003 [30]).

Indications

Absolute Indications:
- Patient preference (when no absolute or relative contraindications co-exist)
- When manipulation and closed treatment cannot re-establish the pretraumatic occlusion;
- When rigid internal fixation is being used to address another facial fracture affecting the occlusion;
- When stability of the occlusion is limited (e.g., less than 3 teeth per quadrant, gross periodontal disease, skeletal abnormality);
- Displacement into the middle cranial fossa;
- Lateral extracapsular deviation;
- Open fracture with potential for fibrosis;
- Invasion by foreign body.

Relative Indications:
- Edentulous jaws;
- Periodontal problems;
- Bilateral condylar fractures in an edentulous patient without a splint;
- Unilateral or bilateral condylar fractures where splinting cannot be accomplished for medical reasons or because physiotherapy is impossible;
- Bilateral condylar fractures with comminuted midfacial fractures, prognathia or retrognathia;
- Unilateral condylar fracture with unstable base;
- Displaced condyle with edentulous or partially edentulous mandible with posterior bite collapse;
- Noncompliance;
- Uncontrolled seizure disorders;
- Status asthmaticus;
- Obtunded neurologic status with documentation of predicted improvement;
- Psychologic compromise (e.g., mental retardation, organic mental syndrome, psychosis);
- Substance abuse.

Contraindications to open reduction and rigid internal fixation of mandibular condyle fractures (HAUG and ASSAEL, 2001) [39]; (BRANDT and HAUG, 2003). [40]

Contraindications

Absolute Contraindications:
- Condylar head fractures (at or above the ligamentous attachment—single fragment, comminuted, or medial pole);
- When medical illness or systemic injury add undue risk to an extended general anesthetic;
- Good occlusion;
- Minimal pain;
- Acceptable mandibular movement.

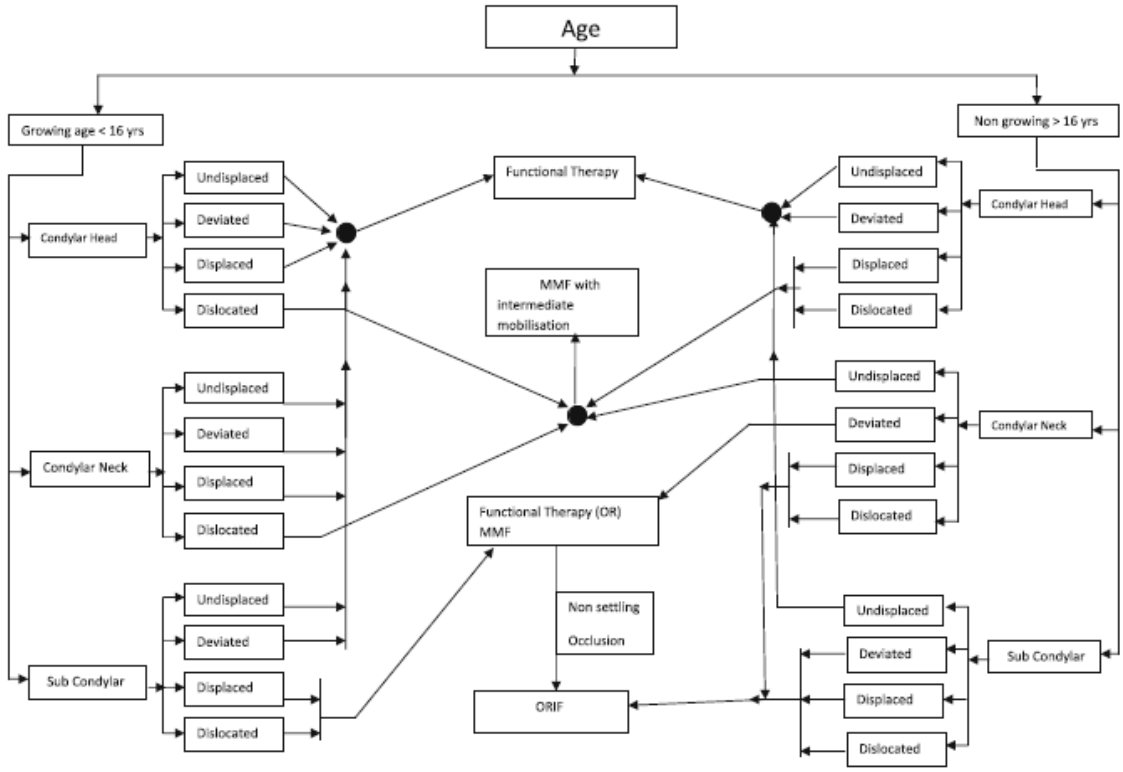
Relative Contraindications:
- When a simpler method is as effective;
- Condylar neck fractures (the thin, constricted region inferior to the condylar head);
- Obtunded neurologic status when there is no documented hope for improvement.

Conservative management of bilateral condylar/ subcondylar fracture leaves behind a residual deformity, especially when the condylar head is displaced medially because of the action of lateral pterygoid muscle. Even though the fracture is bilateral, it is possible to achieve good functional result by open reduction and bone plate fixation of unilateral condyle. The advantages of open reduction of one side only are that it reduces the degree of scar on the face and decreased possibility of damage to the branches of facial nerve and blood vessels with reduction in operating time. However maintenance of IMF for a period of 3-4 weeks is a big disadvantage. The success of the method of treatment adopted is greatly aided by the bone remodelling and functional adaptation that takes place. No substantial functional difference was found by Hidding et al [41], when they compared 34 surgically and non surgically treated patients. There was deviation in opening in 64% of patients treated conservatively as against 10% in surgically treated ones. Newman [42], evaluated 61 patients of bilateral condylar fractures of which only 9 (15%) were managed by ORIF. He found that the most common complaint after treatment was persistent limitation in mouth opening which was less in the ORIF group mean (44 ± 2 mm) than in conservatively managed group (28 ± 2 mm), $p < 0.01$ He concluded that if either of the condyles is displaced, ORIF is the most satisfactory method of treatment. Though some authors claim that condylar cartilage is a primary growth centre for the mandible and others support the functional matrix theory of Moss [43], it is universally accepted that the condyle plays an important part in mandibular growth. Other author reported patients had bilateral condylar fracture, open reduction and bone plating of one side only prevented reduction of ramal height and gave

clinically satisfactory result.[44] Whereas the transoral approach proved to be a reliable surgical approach also for bilaterally displaced subcondylar or condylar neck fractures with comminution. In the case of a bilateral condyle fracture with mild displacement on one side, fixation or inspection of both fractures is recommended to avoid further displacement by intraoperative manipulation. Miniplate osteosynthesis using two miniplates is preferably used in this mechanically demanding fracture site [46]. In the treatment of mandibular condyle fracture, conservative treatment using closed reduction and surgical treatment using open reduction are used. However, it is still controversial over indications. Thus, treatment type should be selected considering patient's age, fracture type, patient's systemic status, other fracture, teeth, and possibility of occlusal restoration by intermaxillary fixation, and existence of foreign materials. In the final determination of treatment plan, the advantage, disadvantage, and risk of each treatment, and risk of complications should be sufficiently discussed with patients and patient's guardians. In addition, the treatment plan of mandibular condyle fracture should be established considering the aforementioned various factors rather than the criteria for absolute indications using the treatment guideline suggested by the authors.

Different technology to improve transoral ORIF has ensured that some of the adverse ORIF related sequelae were avoided by a transfacial method, such as facial damage of nerve. For example, using an endoscope to aid visualisation and right-angle drills and screw drivers has made transoral surgical approaches a reality, reduces the risk of facial nerve injury and eliminates the risk of facial injury. This method has been used in the management of mandibular condyle fractures but after a period of progress, the method has not been usually established. [47]

Treatment algorithm for the condylar fracture: [48]



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