

Unilateral Condylar Fracture with Review of Treatment Modalities in 30 Cases - An Evaluative Study

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Abstract

Introduction: The treatment of subcondylar mandible fractures is a topic of debate and can be variable even though these fractures are commonly seen. The present study aimed at evaluation of various treatment modalities for unilateral condylar fracture in adults. **Materials and Methods:** Thirty patients with unilateral condylar fractures between the age of 18 and 60 years were evaluated. Treatment protocol included closed reduction for 15 patients and open reduction for 15 patients. **Results:** Assessment was done functionally for maximum interincisal mouth opening, deviation on maximum interincisal mouth opening, occlusion and facial nerve function, and radiologically for ramus height shortening. In general, there were no statistically significant differences between closed and open methods. **Discussion:** Both the treatment options for condylar fractures of the mandible yielded acceptable results. Closed treatment appears to be a safe and appropriate modality for most unilateral condylar fractures. Although the open group, in general, showed similar outcomes, this treatment should be reserved for limited indications. The present study has confirmed that both treatment options can yield acceptable results. On clinical examination, there was no significant difference in mouth opening measures, the incidence of occlusal disturbances or in the degree of pain perception.

Keywords: Closed reduction, open reduction, unilateral mandibular condylar fracture

INTRODUCTION

The mandible is the most prominent facial bone and a common site of trauma, constituting 12-56% of facial fractures.^[1] Condylar fractures account for about 29-52% of all mandibular fractures.^[1,2] Injury to the condylar region deserves special consideration apart from the rest of the mandible because of its unique anatomy and healing potential.^[3]

Treatment of condylar fractures primarily aims at the re-establishment of undisturbed joint function with physiologic occlusion and recovery of the osseo-discal ligamentary structures. Complications of trauma to the condylar region are far reaching in their effects and not always immediately apparent. Disturbance of occlusal function, deviation of the mandible, internal meniscal derangements of the temporomandibular joint (TMJ), ankylosis of the joint with a resultant inability to move the jaw, and growth disruption are all sequel of this injury.^[4] Thus, proper assessment and choosing an appropriate treatment strategy is of paramount importance.

Broadly, the two main treatment modalities for fractured condyle are defined as conservative (closed reduction) or

surgical (open reduction and direct fixation).^[4] Although there are equal studies supporting both open and closed reductions, there is still a dilemma about clear guidelines for treatment and precise functional evaluation of surgical treatment of condylar fractures and long-term complications associated with closed reductions. For any given patient, fracture, or incident, advantages and disadvantages are specific to each potential treatment plan.

In this study, 30 patients of unilateral condylar fracture either alone or with associated other mandibular fractures have been included. Patients were treated either by closed or open reduction and the results were then evaluated.

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MATERIALS AND METHODS

This evaluative study protocol was approved by the Ethical Committee of our college (KSDEC), approval number KSDEC/17-18/Apr/30. All the protocols of the Helsinki Declaration were followed. It was carried out between December 2017 and December 2019. All the patients during this time period with unilateral fracture of mandibular condyle with or without any other facial fracture were selected. After considering exclusion criteria, 30 patients were included (27 males and 03 females) and their ages ranged between 18 and 60 years. Patients with bilateral mandibular condylar fracture or comminuted or infected fracture or malunited or nonunited fracture and patients with fracture and bone loss which needed bone graft were excluded from the study. Informed written consent was obtained from all individual participants included in the study.

Patients were clinically evaluated and treated either by closed reduction (maxillomandibular fixation [MMF]) only or MMF with open reduction and internal fixation (ORIF).

For closed reduction, elastic bands were given for 24 h and were replaced with MMF wires and kept for 4–6 weeks.^[5] For ORIF, MMF was given for 1 week postoperatively.

For open reduction, either preauricular [Figure 1] or retromandibular [Figure 2] approaches were used depending on the level of fracture. Fixation was done by titanium miniplates [Figure 3] or delta plate [Figure 4] or lambda plates [Figure 5].

Subsequent follow-up was done at 1 week, 1 month, and 6 months. During every follow-up occlusion, range of motion, maximum mouth opening, jaw deviation, oral hygiene, malunion, nonunion as well as other complications

were evaluated. The required radiographs were taken and the patients were assessed for any further complaints. In the open reduction group, facial nerve function was also assessed.

RESULTS

A total of 30 patients were enrolled in the study under two treatment groups, conservative treatment group and ORIF group each had an equal number of patients ($n = 15$).

Maximum active interincisal opening

The mean preoperative maximal active interincisal opening was 26.6 mm (range: 24–30 mm with standard deviation [SD] of 1.5 mm) in the closed group and 22.66 mm (range: 21–25 mm with SD of 1.54 mm) in the open reduction group.

The mean postoperative maximal active interincisal opening after 1 month reached up to 33.46 mm (range: 30–36 mm with SD 2.03 mm) in the closed group and 28.6 mm (range 28–32 mm with SD 1.2 mm) in the open reduction group.

It increased to 45.86 mm (range: 43–48 mm with SD 2.23 mm) in the closed group and 46.33 mm (range: 43–49 mm with SD 1.17 mm) in the open reduction group after 6 months [Figure 6].

Deviation on maximum mouth opening

Twenty-four out of 30 (80%) cases had a deviation on maximum mouth opening during preoperative evaluation. Fifteen out of 24 (62.5%) cases had a deviation on maximum mouth opening at 1-week follow-up out of which 9 out of 15 (60%) cases were of closed reduction and 6 out of 15 (40%) cases were of open reduction. At the end of 6 months, 6 out of 9 (66%) cases of closed reduction and 3 out of 6 (50%) cases of open reduction had a mild deviation on maximum mouth opening [Figure 7].

Preoperative and postoperative occlusion

Twenty-five out of 30 (83.3%) cases were suffering from a



Figure 1: (a) Marking of preauricular incision. (b) Incision. (c) Exposure of fracture site



Figure 2: (a) Marking of retromandibular incision. (b) Incision. (c) Exposure of fracture site

preoperative malocclusion. Nearly 14 out of 25 (56%) were associated with other mandibular fractures.

Four out of 30 (13.3%) cases showed malocclusion postoperatively. Three (75%) cases were in the closed group and 1 (25%) in the open group had occlusal discrepancy, which was corrected by giving elastics for 10 days postoperatively. Only one patient in the closed treatment had mild occlusal discrepancy after 3 months which was corrected by selective occlusal grinding.

Assessment of facial nerve function

Two out of 15 (13.33%) cases in the open reduction group showed postoperative transient weakness of the marginal mandibular branch of the facial nerve. They showed temporary moderate weakness in Grade 2 according to the House–Brackmann Facial Nerve Grading System.^[6,7] Weakness of facial nerve was transient and lasted for 1-1/2 months in one patient and for 3 months in the other one [Figure 8].

Ramus height difference

The mean preoperative ramus height shortening was 3.01 mm (range: 1.18–5.14 mm with SD of 1.18 mm) in the

closed group and 3.33 mm (range: 2.12–6.1 mm with SD of 1.07 mm) in the open reduction group.

The mean postoperative ramus height shortening after 6 months was 2.07 mm (range: 0.42–3.57 mm with SD 0.93 mm) in the closed group and 1.13 mm (range: 0.71–1.89 mm with SD 0.3 mm) in the open reduction group [Figure 9].

DISCUSSION

There are two principal management procedures for condylar fractures: conservative treatment and surgical treatment. Many authors have described the conservative treatment as safe, noninvasive, easy, and low cost, but they have also described complications including poor oral hygiene, gingivitis, facial deformity, TMJ dysfunction, and even TMJ ankylosis.^[1,8-10] Surgical treatment also has disadvantages such as its high cost, scar formation, intraoperative haemorrhage, facial nerve injury, and others.^[10]

In the field of maxillofacial trauma, the management of condylar fracture is still the most controversial issue generating more discussions. These debates have been continuing for six decades with no general agreement yet. Although there are clearly defined guidelines for when an open or closed reduction

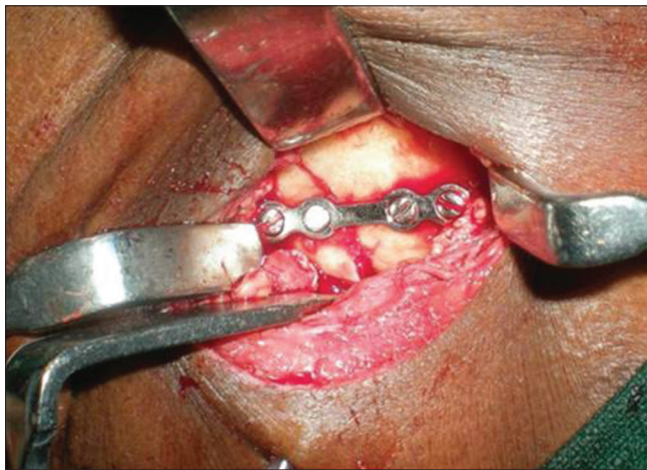


Figure 3: Fixation by miniplate



Figure 5: Fixation by lambda plate



Figure 4: Fixation by delta plate

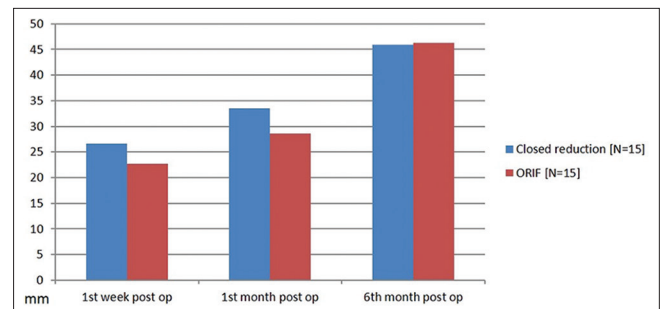


Figure 6: Maximum mouth opening in MM

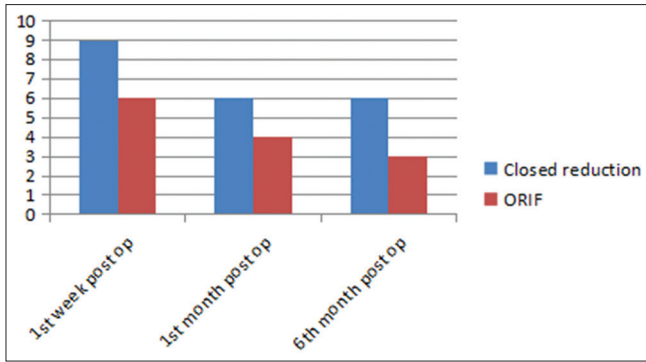


Figure 7: Deviation on maximum mouth opening

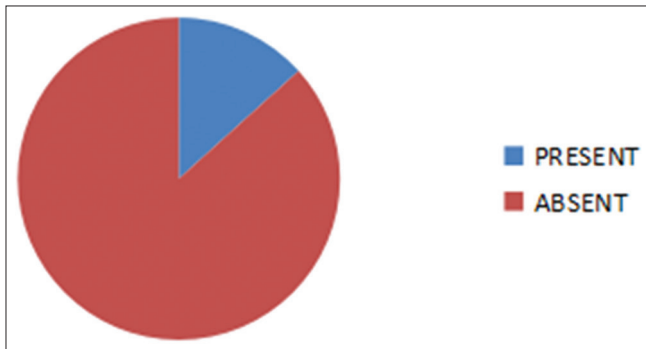


Figure 8: Transient facial nerve palsy in the open reduction group

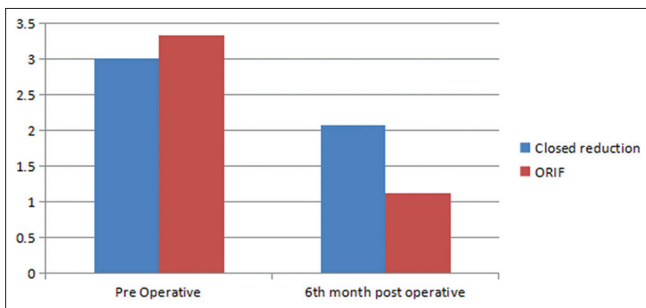


Figure 9: Ramus height shortening in MM

is indicated in the management of fractures in most areas of the mandible, there are still continuing arguments over how to best manage fractures of the condylar process. To date, the literature on condylar fractures has reported good outcomes for both open and closed treatment methods.^[11-13]

In this study, no significant difference was noted in maximum mouth opening between surgically and conservatively treated fractures. Similar results were noted by Santler *et al.*,^[14] Khiabani *et al.*,^[15] Haug and Assael.^[16] Although immediate postoperatively maximum mouth opening was significantly higher (26.6 mm ± 1.50 mm) in conservatively treated patients than surgically treated patients (22.66 mm ± 1.54 mm), the patients treated by open methods may have had less mouth opening at 6 weeks because surgery induced some hypomobility due to joint and incisional pain, or possibly because scarring occurred during healing of the surgical site.

In this study, deviation occurred in 6 patients (40%) out of 15 in the closed treatment group and in 3 patients (20%) out of 15 in the ORIF group. These findings are consistent with the findings of Hidding *et al.*^[17] and Murakami *et al.*^[18]

In this study when comparing the occlusal outcomes postoperatively, no statistically significant difference was noted. This was also the result reported by Santler *et al.*,^[14] Haug and Assael,^[16] Singh *et al.*,^[19] and Merlet *et al.*^[20] On the other hand, Worsaae and Thorn.^[21] reported a complication rate of 39% in the nonsurgical group with eight patients complaining of malocclusions. In addition, Ellis *et al.*^[22] concluded that after 3 years, patients treated via the closed approach had a significantly greater percentage of malocclusion (22.2% to 28.6%) when compared to those treated by ORIF (0%).

Garcia-Guerrero *et al.*^[23] reviewed the main intra- and postoperative complications in ORIF versus conservative treatment, finding that differences in asymmetry, residual pain, TMJ and articular imbalance, and malocclusion were minimal and infrequent.

In this study, transient facial nerve palsy occurred in 15% of the surgical group and the patients made a full recovery in 6 months. We observed that transient facial nerve weakness occurred more frequently in fractures that located in a high position where the duration of the operation was long, and the procedure required extensive stretching of nerve branches when exposing the condylar region. Similar observations were made by Ellis *et al.*^[24] and Imai *et al.*^[25]

In this study, there was a very minor difference noted between postoperative ramal height shortening in open reduction and closed reduction. However, functional results can still be satisfactory as no correlation exists between the clinical and radiographic results.^[26,27]

One patient who underwent open reduction developed infection 2 weeks postoperatively. Incision (on the same site of the preauricular incision of ORIF) and drainage was performed to relieve the infection. Patient was prescribed antibiotics course for 5 days. However, 3 months later, the patient underwent another operation for plate removal due to recurrent episodes of infection.

There are limitations that must be acknowledged in this study. The primary limitation is the extent to which the findings can be generalized to cases outside the study. First, the study may be compromised by the single hospital approach. The other factor which may affect the external validity of this study was the small sample size. Time and budget constraints have limited the scope of this study, yet it does present valuable insight on the effective management options for condylar fractures to be used in future researches. Future research should compare the outcomes of many more cases with long-term follow-up.

CONCLUSION

The present study has confirmed that both the treatment options

can yield acceptable results. On clinical examination, there was no statistically significant difference in mouth opening measures, the incidence of occlusal disturbances, or in the degree of pain perception. Surgical intervention through a preauricular or retromandibular approach provides adequate functional results in facial symmetry and fair esthetics. The results of the closed treatment were satisfactory and may provide a safer option since the surgical approach involves a number of variables which may affect the outcome.

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Conflicts of interest

There are no conflicts of interest.

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