

## ORIGINAL RESEARCH ARTICLE

# COMPARISON OF FUNCTIONAL OUTCOME IN THE MANAGEMENT OF CONDYLAR FRACTURES- AN OBSERVATIONAL STUDY

**Authors:**<sup>1</sup>Vijayakumar Depesh<sup>2</sup>Natesh Pughalaendhi<sup>3</sup>Ganesh Mithun Rajasekaran<sup>4</sup>Serachelvan Sezhian<sup>5</sup>Ajay Das T<sup>6</sup>Dinesh Kumar PAssistant Professor<sup>1</sup>

Department of Oral & Maxillofacial Surgery  
KMCT Dental College, Manassery P.O., Mukkam  
Kozhikode District, Kerala, India.

Lecturer<sup>2,3</sup>

CSI College of Dental sciences and Research,  
Madurai, Tamil Nadu, India

Consultant Dentist<sup>4</sup>

Smileline Dental Clinic,  
Hyderabad, Telengana, India

Assistant Professor<sup>5</sup>

Department of Oral & Maxillofacial Surgery  
MES Dental College and Hospital,  
Palachode P.O., Malappuram, Kerala, India

Consultant Dentist<sup>6</sup>

S.K. Dental Care  
Tiruppur Dist., Tamil Nadu, India

**Address for correspondence**

Dr. Vijayakumar Depesh

Assistant Professor

Department of Oral & Maxillofacial surgery  
KMCT Dental College, Manassery P.O  
Mukkam, Kozhikode - 673601, Kerala, India  
E mail: depesh6@gmail.com

**ABSTRACT**

**Background:** The purpose of this study is to compare the functional outcome following surgical and nonsurgical management of mandibular condylar fractures.

**Materials and Methods:** Ten adult patients between the age group of 20 years to 50 years were included in this study. All the patients were subjected to routine blood investigation, radiographs such as OPG and Skull P.A. The study consisted of two groups of 5 patients each group. Open reduction was carried out in one group with unilateral condylar fractures and closed reduction was done in another group 5 patients with maxillo mandibular fixation and arch bars under local anaesthesia. 2mm thickness titanium plates with titanium screws 2x6mm used.

**Results:** Functional recovery after non-surgical and surgical treatment showed satisfactory results. Clicking of the temporomandibular joint on mouth opening was absent in both groups. Lateral and excursive movements were normal in both groups. No malocclusions were noticed in both groups. Pain in temporomandibular joint was noticed in 2 patients in the immediate post-operative period (40%) in the surgical group. Three patients treated by closed reduction (60%) had persistent pain in the temporomandibular joint for the first month which later got subsided gradually. Post-operative infection / wound dehiscence and unaesthetic scarring were noted in 1 patient (20%) in the surgical group at the retromandibular incision.

**Conclusion:** Based on this study there was no significant clinical difference between patients with surgically treated and those with conservatively treated unilateral condylar fractures. After both type of treatments some abnormalities remain. The radiographic examinations did show significantly better position in the surgically reduced condylar process. However satisfactory post operative function and occlusion were achieved for the surgical and non surgical groups.

**Key words:** Fracture, Temporomandibular, Reduction.

## INTRODUCTION

Mandibular fractures are third most frequent Maxillo-Facial fractures after those of nasal and zygomatic bones. Factors that influence treatment decisions include age of the patient, whether the fracture is unilateral or bilateral, presence of other mandibular fractures, the level and displacement of fracture, the presence of teeth and the degree to which occlusion is disturbed. The anatomic location and pattern of fractures are determined by mechanism of injury and direction of impact. The most common external causative factor is physical trauma, violence, industrial hazard, fall, sports and gunshot wounds. Internal causative factors include osteomyelitis, benign or malignant tumour and muscular spasm during electric shock treatment.

In the entire spectrum of Maxillo-Facial trauma no other topic has created so much of debate and controversies than that of condylar fractures regarding the treatment of fractures of condylar process over the selection of either closed or open reduction depending on displacement severity and fracture site. Many researchers recommended closed reduction with rigid or elastic maxillomandibular fixation for moderately displaced condylar fractures because of problems of surgical approach, such as difficult surgical access, salivary fistula, infection, potential damage to facial nerve and its branches and blood vessels with some approaches, difficult repositioning of the proximal fragment and possibility of post operative scar. The aim of surgical treatment of condylar fractures is to reduce to the pre-existing anatomic relationships by means of a functionally stable fixation. Open reduction should be conducted if fractured mandibular condyle is severely displaced or dislocated into the middle cranial fossa, inability to open the mouth or establish occlusion after conservative therapy, presence of intra-articular foreign body and lateral extracapsular displacement<sup>1</sup>. Closed reduction may be conducted considering various factors such as fractures without dislocation or displacement in elderly or pediatric patients, difficulty in the conduct of open reduction under systemic anesthesia, no other facial fracture and secured stability of occlusion.

The purpose of this study is to compare the functional outcome following surgical and nonsurgical management of condylar fractures of the mandible.

## MATERIALS AND METHODS

This study was undertaken on the patients who reported to Division of Oral and Maxillofacial Surgery, Rajah Muthiah Dental College and Hospital, Annamalai University, Chidambaram. Ten adult patients were included in this study belonging to age group between 20 years to 50 years. Inclusion criteria include patients who had unilateral simple, linear, non-comminuted, with or without concomitant fractures of the mandible and other associated facial bone injuries. Patients who presented with multiple comminuted, displaced or dislocated mandibular condyle fractures or high condylar fractures or below age of 20 years or severely medically compromised patient were excluded.

All the patients were subjected to routine blood investigation, radiographs such as OPG and Skull P.A. The study consisted of two groups of 5 patients each with a total number of 10 patients. All 10 patients had unilateral condylar fractures or concomitant fractures of the mandible and other associated facial bone injuries. Open reduction was carried out in one group of 5 patients with unilateral condylar fractures and closed reduction was done in another group of 5 patients with unilateral condylar fractures. Five patients underwent open reduction, under general anesthesia with retromandibular approach for the sub-condylar fractures. Fixation was carried with 2 mm 5 hole continuous titanium plate and 2x6 mm 4 titanium screws. Maxillomandibular fixation was used for a period of 2 weeks postoperatively. In closed reduction 5 patients underwent maxillomandibular fixation with arch bars under local anaesthesia. The maxillomandibular fixation was maintained for 2-4 weeks.

The radiographic investigations included Orthopantomogram (OPG) which was taken after the trauma and 3 months or more after completion of treatment. The two groups were compared for their pre-operative and post-operative mouth opening, lateral movements and occlusion with a follow up period of 3 months.

## RESULTS AND DISCUSSION

The treatment for condylar neck and subcondylar fractures remains one of the most controversial topics of mandible surgery despite the high incidence of these fractures<sup>2</sup>. The fractures of mandibular condyles are common injuries that account for 29% to 40% of fractures of the facial bones and represent 20% to 62% of all mandibular fractures<sup>3</sup>.

The most frequent cause for mandibular condyle fractures in all qualitative ranges of age are traffic accidents. The second in frequency was sports accidents in children and teenagers and casual accidents in adults. By gender the most frequent etiology was traffic accidents in both, men (62%) and women (52.6%). The second most common cause was alterations in men and casual accidents in women<sup>3</sup>.

The age of the patient, concurrent traumatic injuries, medical and dental history, current dental treatment, pathogenesis and severity of the injury, the position of the fracture and concomitant facial fractures all influence treatment of the condylar fractures<sup>4</sup>. Uwe Eckelt et al<sup>5</sup> in his study found that better functional results which were clearly in favour of open reduction and internal fixation of moderately displaced condylar fractures. In our study open reduction and internal fixation was done in moderately displaced subcondylar fractures and obtained similar functional results.

Roughly 80% mandibular condylar fractures are unilateral and 20% are bilateral, and they occur mainly between the ages of 20 and 39 years. The male:female ratio is 3:1<sup>6</sup>. In our study all patients had unilateral condylar fractures and out of ten patients only we had nine male and one female patient 9:1. Different patterns of condylar fractures were analyzed on 382 patients. A high proportion of fractures (44%) were caused by interpersonal violence, followed in incidence by falls (29%) and road traffic accidents (26%)<sup>7</sup>. In our study most common cause for condyle fracture were, road traffic accidents (40%), followed by self fall (30%) and assault (30%).

The majority of surgeons seem to favour nonsurgical treatment of condylar fractures. This preference is largely the result of 3 main factors. First, nonsurgical treatment gives satisfactory results in the majority of cases. Second, there are no large series of patients reported in the literature who

have been followed after surgical treatment because of management of condylar fractures has historically been with nonsurgical means. Third, surgery of condylar fractures is difficult because of inherent anatomical hazards (i.e., VII nerve)<sup>8</sup>. The main reason for favouring nonsurgical treatment previously were, the risk of wound infection, the close anatomic relationship of facial nerve and temporal vessels and the absence of osteosynthesis materials<sup>9</sup>.

Edward Ellis<sup>10</sup> described that bilateral fracture of condyles seem to be the one that causes most malocclusions. He treated these patients with such fractures by non-surgical means, placing arch bars and using a short course of maxillomandibular fixation followed by guiding elastics to control the occlusion and he noted patients developed anterior open bite.

Edward Ellis et al<sup>11</sup> in their study of 137 patients treated with unilateral fractures of the mandibular condylar process (neck or subcondyle) of them 77 were treated closed and 65 treated open. He found that patients with isolated condylar process fractures (no associated mandibular fractures) who were treated by closed technique had significantly more malocclusions than those treated by open reduction.

Hyde. N et al<sup>12</sup> in their study on 54 patients with condylar fractures, 33 underwent open reduction and 21 closed reduction. Mouth opening varied in both the groups. In the open reduction group the mean interincisal opening was 42mm and in the closed group it was 32mm. In our study the interincisal opening varied in both groups. In the closed group it ranged from 35 - 40mm and in the open reduction group it ranged from 36 - 46mm. The mean interincisal opening in open reduction group was 42mm and in closed group it was 38mm. The results of the clinical examination showed that there was no statistical significant difference between maximal mouth opening in both surgically and conservatively treated patients.

Severe displacement of fractured condyle can cause malocclusion, abnormal opening and impaired function. It is therefore sometimes desirable to reposition the condylar fragment, if possible. Once the condyle is displaced, however, replacement and repositioning usually cannot be achieved by nonsurgical means. The surgical treatment of condylar process fractures is to restore the preexisting anatomic relationships by means of functionally stable fixation<sup>13</sup>.

Andre H. Montazem and George Anastassov<sup>1</sup> have summarized the absolute and relative indications for open treatment of condylar fractures and absolute indications for closed treatment of condylar fractures.

**Absolute indications for open treatment of mandibular condyle fractures are:**

- (I) Dislocation of condyle into the middle cranial fossa.
- (ii) Inability to open mouth or establish occlusion after conservative treatment.
- (iii) Intra-articular foreign body.
- (iv) Lateral extracapsular displacement.
- (v) Tympanic plate injury.

**Relative indications for open treatment of mandibular condyle fractures are:**

- (I) Medical necessity (alcoholism, seizure disorder, bulimia and so forth).
- (ii) Bilateral condylar fractures in edentulous patients, when splinting is impossible because of alveolar ridge atrophy.
- (iii) Displacement of the condyle out of the fossa.
- (iv) Periodontal problem and loss of teeth

**Absolute indications for conservative therapy of mandibular condyle fractures:**

- (I) Intracapsular fractures.
- (ii) Fractures in small children.
- (iii) Fractures without dislocation..

C.A.Landes et al<sup>14</sup> listed the general justifications for open treatment, which included anatomical reduction, occlusal stability, rapid function, maintenance of vertical support, avoidance of facial asymmetry, lower postoperative incidence of temporomandibular joint disorders and no mandibulo-maxillary fixation. Arguments for closed treatment included reduced overall morbidity, acceptable occlusal results, avoidance of typical surgical complications, simpler procedure and less risk of ankylosis and avascular necrosis.

Bilateral condyle fractures are associated with symphysis fractures and unilateral fractures with opposite parasymphysis fractures. The condylar fractures result from an indirect force applied to the

mandible associated with at least one other mandibular fracture, mostly symphyseal or parasymphyseal. This suggests that condylar fractures may be as a result of transmission of force which is not fully absorbed in the majority of cases in the area of its primary application, i.e the mental region<sup>15</sup>.

Closed reduction intermaxillary fixation is done using arch bar and wire, followed by maintaining of the fixation of the maxilla and mandible for 2-4 weeks. After achieving stable union of fractured site, a wire for intermaxillary fixation is removed. Then normal occlusion is induced after fixation using elastics and soft diet is maintained for 2 weeks<sup>16</sup>. In our study for the closed reduction group intermaxillary fixation was done using arch bar and wire for 2-4 weeks and normal occlusion was induced using elastics and maintaining soft diet.

**Advantages of closed reduction with functional therapy are:**

- (I) Relatively safe treatment.
- (ii) No injury to nerve and blood vessels occur during treatment.
- (iii) No postoperative complications such as infection or scars, and in particular fracture, loss

**Disadvantages of closed reduction:**

- (I) Injury to periodontal tissues and buccal mucosa, poor oral hygiene, pronunciation disorder, imbalanced nutrition, reduced mouth opening and respiratory disorder.
- (ii) Growth disorder and excessive growth of the injured mandible may occur due to improper reduction of bone fragments and right and left displacement of the mandibular ramus or mandibular deviation upon opening may occur after conservative treatment.
- (iii) Metastasis of the fractured bone by muscle strength, abnormal occlusion due to inappropriate fixation and inappropriate function of the temporomandibular joint due to disuse muscular atrophy caused by long term intermaxillary fixation.

**Advantages of open reduction:**

- (I) Reduction of the displaced bony fragment to the most ideal anatomical site by a direct approach.

- (ii) Prevents complications such as respiration disorder, pronunciation disorder and serve nutritional imbalance by shortening intermaxillary fixation.

#### Disadvantages of open reduction:

- (I) Intra operative bleeding.
- (ii) Postoperative infection.
- (iii) Facial nerve damage or paralysis.
- (iv) Functional disorder of the auriculotemporal nerve.

Many studies reported that infection occurred in 7% of patients with mandibular fracture. In addition, some studies reported preoperative infection, most of which are associated with delayed early treatment and the teeth positioned in the line of fracture<sup>17</sup>. M.F.Delvin et al<sup>18</sup>: in their study on 42 patients with fractured condyles treated by open reduction by using the submandibular approach, 19 of them were edentulous and 21 were dentate, in this one patient developed a hypertrophic scar.

In our study post operative infection, wound dehiscence and unaesthetic scarring was noted in 1 patient who was treated by open reduction and internal fixation using retromandibular approach. Patients treated by open reduction and rigid internal fixation had the advantage of more rapid return to the pre-traumatic occlusion and enhanced nutrition. On the other hand non-surgically treated patients required prolonged maxillomandibular fixation with periodic adjustments of elastics. The functional benefits for patients treated with closed reduction were as good as those treated by open reduction.

#### CONCLUSION

On the basis of this study we conclude there was no significant clinical difference between patients with surgically treated and those with conservatively treated unilateral condylar fractures. After both type of treatments some abnormalities remain. The radiographic examinations did show significantly better position in the surgically reduced condylar process. However satisfactory post operative function and occlusion were achieved for the surgical and non surgical groups.

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