

# MANAGEMENT OF MANDIBULAR CONDYLAR FRACTURES; A RANDOMIZED CONTROLLED TRIAL

\*Muhammad Arshad Badar, \*\* Zahur Qayyum, \*Arsalan Wahid, \*\*\*Syed Adnan Ali Shah

\* Department of Oral & Maxillofacial Surgery, University Medical & Dental College, Faisalabad, Pakistan

\*\* Department of Oral & Maxillofacial Surgery, Women Medical and Dental College, Abbottabad

\*\*\* Department of Oral & Maxillofacial Surgery, University of Manitoba, Canada

## ABSTRACT

**Objective:** To evaluate the treatment outcome and post operative complications of different treatment modalities for condylar fractures.

**Material and Methods:** Total 70 patients of both genders and all ages were enrolled in the current study. Different treatment modalities were employed to treat condylar fractures. These include conservative therapy by putting patient on soft diet and active physiotherapy, closed reduction using arch bar with inter arch elastics, closed reduction using eyelet wiring and maxillomandibular fixation and open reduction and internal rigid fixation using titanium mini plates. All patients were reviewed after one week, two weeks, one month, two months and six months of initial treatment for evaluation of treatment effects and complications.

**Results:** Total 70 patients were included in this study aged 5 to 47 years. Most of the patients were males (80%), with females constituting only 20 % of the cases. Majority of patients were in age group 21-30 years (40%) followed by 11-20 years (25.7%). Regarding the etiological factors of injuries, fall (45.7%) was found to be more prevalent followed by RTA (40%). Various treatment modalities were used to treat fractures; majority was treated by closed reduction with arch bar (37.1 %) followed by closed reduction with eyelet wiring (25.8%). The most common complication was malocclusion (30.77%) followed by jaw deviation (23.07%).

**Conclusion:** Mandibular condylar fractures should be treated conservatively in children and in those cases where fractures are unilateral and minimally displaced as there is no difference in the outcome of results whether these fractures are treated conservatively or with open reduction and fixation. Open reduction and fixation should be preferred in absolute indications for open treatment.

**Key words:** Mandibular Fractures, Condylar Fractures, Maxillomandibular Fixation .

## INTRODUCTION

Mandibular fracture is the second most frequent maxillofacial injury associated with Road Traffic Accident<sup>1</sup>. Mandibular fractures are most frequently seen in the parasymphysis region followed by the condylar and subcondylar areas<sup>2</sup>. Fracture of condylar process is one of the most common fractures of the mandible<sup>3</sup> with a frequency that ranges from 25% to 50% of all mandibular fractures<sup>4</sup>. The neck of the condyle

constitutes the weakest region of the entire mandible and that makes it most susceptible to fracture<sup>5</sup>. Literature described various causes of mandibular condylar fractures. Fridrich et al<sup>6</sup> showed that traffic accidents predominated in their study, while Larsen and Nielsen<sup>7</sup> and Bastian<sup>8</sup> found that falls were the most common causes. The etiology would be expected to influence the degree and type of injury sustained<sup>9</sup>. Condylar fracture is diagnosed on combined clinical features and radiological investigations<sup>5</sup>. The useful radiological investigations include orthopantomograms (OPG), posteroanterior (PA), mandibular lateral oblique and transcranial views. Advanced imaging techniques such as CT scans and MRI are usually reserved for complex injuries of the condyle where surgical intervention is

### Correspondence:

Dr. Muhammad Arshad Badar

Associate Prof. Oral & Maxillofacial Surgery  
University Medical & Dental College, Faisalabad  
Cell: 0333-4080297

Email address: arshad\_badar@hotmail.com

likely to be considered<sup>10</sup>.

The treatment of condylar fractures remains controversial. Previous studies reported that both conservative and open reduction and internal fixation (ORIF) are currently used to treat condylar fractures<sup>11</sup>. Non surgical treatment is the main stay of management of majority of condylar injuries<sup>12</sup>, however there are certain situations where surgery is considered e.g. displacement of the fragment of the condyle into the middle cranial fossa, lack of adequate reduction with maxillomandibular fixation (MMF), lateral extra capsular displacement of condyle and invasion by a foreign body such as gunshot injury<sup>13</sup>. There are various surgical approaches to the fracture of mandibular condyle and the retromandibular approach seems to give the benefits of good cosmetics and adequate exposure for manipulation, reduction of the fracture and for the placement of fixation<sup>14</sup>. Different kinds of fixation methods have been used such as wires, pins, screws and plates<sup>15</sup>. There are certain potential long term problems that may arise from acute injuries to the mandibular condyle such as temporomandibular dysfunction, disturbed growth and temporomandibular joint ankylosis. Therefore, for both cosmetic and functional reasons, it is mandatory, that condylar injuries be properly diagnosed and adequately treated. The aim of this study was to evaluate the treatment outcome and post operative complications of different treatment options of condylar fractures.

## METHODOLOGY

This is a randomized controlled trial was conducted in the Department of Oral and Maxillofacial Surgery, de, Montmorency College of Dentistry/Punjab Dental Hospital Lahore over a period of 3 years.

In this study 70 consecutive patients irrespective of age and gender reporting with mandibular condylar fractures to the hospital for treatment were requested to be the part of study after taking their informed consent. Patients who were not fit for local or general anesthesia, malunion cases and previously treated cases were excluded from the study. After recording a thorough history of all the patients, a detailed clinical examination was performed on all the patients with injury to their condyles. All subjects with suspicion of having mandibular condylar fractures were prescribed standard orthopantomogram (OPG), a postero anterior view and lateral oblique view of mandible. Final diagnosis of mandibular condylar fracture was

established with the aid of clinical and radiographic findings.

Different treatment modalities were employed to treat condylar fractures. These include conservative therapy by putting patient on soft diet and active physiotherapy, closed reduction using arch bar with inter arch elastics, closed reduction using eyelet wiring and maxillomandibular fixation and open reduction and internal rigid fixation using titanium mini plates. All patients were reviewed after one week, two weeks, one month, two months and six months of initial treatment for evaluation of treatment effects and complications.

Demographic variables like age, gender, education and employment status were calculated in frequencies. Study variable like treatment modalities and post operative complications were recorded in frequencies. Level of significance was set at  $p < 0.05$  with a confidence level of 95 %. Data were entered and analyzed in SPSS software, (version 20.0; SPSS Inc., Chicago, IL, USA).

## RESULTS

In this study 70 patients were included and among them 80% were males. The age range from 5 to 47 years. Majority of patients were in age group 21-30 years (40%) followed by 11-20 years (25.7%). Details are given in Table-1. Regarding the etiological factors of injuries, fall accounted for 45.7% cases followed by RTA 40% cases. Distribution of etiology is given in Table-2.

**Table - 1: Age Distribution**

Age	n	%
1-10 years	16	22.9
11-20 years	18	25.7
21-30 years	28	40
31-40 years	4	5.7
> 40 years	4	5.7
<b>Total</b>	<b>70</b>	<b>100</b>

**Table - 2: Etiology of fractures**

Etiology	n	%
RTA	28	40
Falls	32	45.7
Sports	4	5.7
Assault	2	2.9
Industrial	4	5.7
<b>Total</b>	<b>70</b>	<b>100</b>

Table - 3: Treatment modalities

Treatment Modality	n	%
Closed; arch bar	26	37.1
Closed; eyelets	18	25.8
Open reduction	10	14.2
Conservative	16	22.9
<b>Total</b>	<b>70</b>	<b>100</b>

Table - 4: Post Operative Complications

Complications	n	%
Malocclusion	8	30.77
Jaw deviation	6	23.07
Malocclusion+ Jaw deviation	4	15.39
Limited mouth opening	4	15.39
Infection	2	7.69
Nerve weakness	2	7.69
<b>Total</b>	<b>26</b>	<b>100</b>

Various treatment modalities were used to treat condyle fractures; majority were treated by closed reduction with arch bar 37.1 % followed by closed reduction with eyelet wiring (25.8%). The distribution is given in Table-3. The most common complication was malocclusion (30.77%) followed by jaw deviation (23.07%). The distribution is given in Table-4.

## DISCUSSION

The treatment of condylar fractures has always generated interest and one of the reasons attributable to it can be the differences in etiological variables and treatment outcomes described in various studies<sup>16</sup>. The treatment of fracture of the mandibular condyle remains one of the most controversial issues in oral and maxillofacial surgery. Surgeons around the world argue on the relative merits of open versus closed treatment<sup>17</sup>. Formerly, treatment decisions were largely based on philosophy, anecdotal experience and retrospective case series with short follow up. As the field of surgery has progressed, well designed studies have suggested improved results with open, anatomic reduction and fixation. Many surgeons are still hesitant about frank application of the open approach due to the resultant facial scarring and the risk of facial nerve injury<sup>18</sup>. According to Hall<sup>19</sup>, every patient should be evaluated individually before a treatment decision can be made. For the treatment of condylar fractures as a group, open and closed reduction has been considered equal, and the choice of treatment is dependent on

various factors. These factors are the level of fracture, amount of displacement, the adequacy of occlusion and whether the patient decides to undergo periods of maxillomandibular fixation<sup>20</sup>. We strive to follow the set of guidelines put forth by Zide and Kent<sup>21</sup>, however all the patients were treated at a Government hospital and at many times, lacked the necessary resources to afford the cost of rigid fixation mini plates and screws. Every patient that was fit for the absolute indication for open reduction of condyle was educated on the merits and demerits of the procedure, but few of them could eventually become candidates for rigid fixation due to financial reasons. This explains the relatively low frequency (14.2%) of patients who subsequently underwent open reduction with internal fixation.

Inter arch elastics with arch bar fixation (37.1%) was the most commonly employed method for the treatment of condylar fractures in this study. Condylar injuries in which there is a failure to obtain adequate occlusion can be treated with closed reduction<sup>22</sup>. In these instances, inter arch elastics guide the arch bar supported jaws into maximum intercuspation and correct malocclusion that is caused by condylar fracture. The complications that were seen in these patients were largely due to the lack of anatomic approximation of the fractured condyle segments. In the present study 23.08% of the patients continued to have some sort of malocclusion which explains the limit of inter arch elastics in bringing jaws into a proper occlusal relationship. Due to the improper anatomic reduction of the fractured segments, 15.39% had a deviation of jaw on opening, which is due to an impaired or affected lateral pterygoid muscle on the injured side. However 7.69% cases presented with both complications which is in agreement with the findings of Newman<sup>23</sup> and De Ritu et al<sup>24</sup>.

In this study 25.71% of the patients underwent maxillomandibular fixation with eyelet wiring. Most of these patients did not have a preoperative malocclusion which obviated the need for them to have interarch elastics. Again the attendant complications of closed reduction were seen in 33.3% of the cases either in the form of a decreased mouth opening or jaw deviation. The decreased mouth opening can be attributed to the healing process that is initiated in the temporomandibular joint capsule after an injury in the condylar region. This healing process is characterized by a process of fibrosis which limits the ability of condyle to translate forward and open the jaw<sup>25</sup>. When the condyle is kept

immobile with eyelet wiring and maxillomandibular fixation after sustaining an injury, this leads to a post-operative decreased range of motion when the eyelets are removed and many surgeons suggest a vigorous course of physiotherapy to increase the jaw motion<sup>26</sup>. Palmieri et al<sup>27</sup> reported that the patients treated for fractures of the mandibular condylar process by open reduction had somewhat greater condylar mobility than patients treated by closed reduction, even though the former group had more severely displaced fractures before surgery. Other studies have also suggested a relationship between duration of maxillomandibular fixation and postsurgical hypomobility<sup>28,29</sup>. Hovinga et al<sup>30</sup> evaluated the long-term results of nonsurgical management of condylar fractures in children and reached the conclusion that nonsurgical management of unilateral and bilateral fractures of the mandibular condyle in children is still the method of choice. We applied a similar philosophy in 22.86% cases of condylar fractures in children in this study.

Indications for open reduction and internal fixation of mandibular condyle fracture are still controversial. Opinions range from the belief that all or most displaced fractures should be surgically treated, to the conviction that virtually no condylar fracture requires surgical intervention<sup>19</sup>. Newly developed access techniques and combinations with new methods of osteosynthesis have led to satisfying results concerning surgical reduction and fixation of fractures of the condylar process. More cases of condylar fractures fitted the indication according to Zide and Kent<sup>21</sup> than treated in the present study. The method of internal rigid fixation of the mandibular condyle is increasingly becoming popular through preauricular, retromandibular and submandibular approaches.

## CONCLUSION

- Mandibular condylar fractures should be treated conservatively in children and in those cases where fractures are unilateral and minimally displaced as there is no difference in the outcome of results whether these fractures are treated conservatively or with open reduction and fixation.
- Open reduction and fixation should be preferred in those fractures which have absolute indications for open treatment of mandibular condylar fractures.

## REFERENCES

1. Holmes PJ, Koehler J, McGwin G, Rue LW. Frequency of maxillofacial injuries in all-terrain vehicle collisions. *J Oral Maxillofac Surg.* 2004;62:697-701.
2. Abbas I, Ali K, Mirza YB. Spectrum of mandibular fractures at a tertiary care dental hospital in Lahore. *J Ayub Med Coll Abbottabad.* 2003;15:12-4.
3. Marker P, Nielsen A, Bastian HL. Fractures of the mandibular condyle. Part 2: results of treatment of 348 patients. *Br J Oral Maxillofac Surg.* 2000;38:422-6.
4. Silvennoinen U, Iizuka T, Lindqvist C, Oikarinen K. Different patterns of condylar fractures: an analysis of 382 patients in a 3-year period. *J Oral Maxillofac Surg.* 1992;50:1032-7.
5. Dimitroulis G. Condylar injuries in growing patients. *Aust Dent J.* 1997;42:367-71.
6. Fridrich KL, Pena-Velasco G, Olson RA. Changing trends with mandibular fractures: a review of 1,067 cases. *J Oral Maxillofac Surg.* 1992;50:586-9.
7. Larsen OD, Nielsen A. Mandibular fractures. I. An analysis of their etiology and location in 286 patients. *Scand J Plast Reconstr Surg.* 1976;10:213-8.
8. Bastian. Fractures of the mandible: a discussion of etiology and location. *Danish Dent J.* 1989;93: 589-93.
9. Adi M, Ogden GR, Chisholm DM. An analysis of mandibular fractures in Dundee, Scotland (1977 to 1985). *Br J Oral Maxillofac Surg.* 1990;28:194-9.
10. Raustia AM, Pyhtinen J, Oikarinen KS, Altonen M. Conventional radiographic and computed tomographic findings in cases of fracture of the mandibular condylar process. *J Oral Maxillofac Surg.* 1990;48:1258-62.
11. Dahlstrom L, Kahnberg KE, Lindahl L. 15 years follow-up on condylar fractures. *Int J Oral Maxillofac Surg.* 1989;18:18-23.
12. Takenoshita Y, Ishibashi H, Oka M. Comparison of functional recovery after nonsurgical and surgical treatment of condylar fractures. *J Oral Maxillofac Surg.* 1990;48:1191-5.
13. Hyde N, Manisali M, Aghabeigi B, Sneddon K, Newman L. The role of open reduction and internal fixation in unilateral fractures of the mandibular condyle: a prospective study. *Br J Oral Maxillofac Surg.* 2002;40:19-22.
14. Ellis E, 3rd, Dean J. Rigid fixation of mandibular condyle fractures. *Oral Surg Oral Med Oral Pathol.* 1993;76:6-15.
15. Hayward JR, Scott RF. Fractures of the mandibular condyle. *J Oral Maxillofac Surg.* 1993;51:57-61.
16. Reddy NV, Reddy PB, Rajan R, Ganti S, Jhawar DK, Potturi A, et al. Analysis of patterns and treatment strategies for mandibular condyle fractures: review of 175 condyle fractures with review of literature. *J Maxillofac*



- Oral Surg. 2013;12:315-20.
17. Chakranarayan A, Mukherjee B. Condylar segment removal in the management of diacapitular mandibular fractures. *J Maxillofac Oral Surg.* 2012;11:328-32.
  18. Kang SH, Choi EJ, Kim HW, Kim HJ, Cha IH, Nam W. Complications in endoscopic-assisted open reduction and internal fixation of mandibular condyle fractures. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2012;113:201-6.
  19. Hall MB. Condylar fractures: surgical management. *J Oral Maxillofac Surg.* 1994;52:1189-92.
  20. Hu M, Wang Y, Zhang L, Yao J. [Comparative effectiveness of surgical and non-surgical treatment for pediatric mandibular condylar fractures]. *Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi.* 2010;24:1440-3.
  21. Zide MF, Kent JN. Indications for open reduction of mandibular condyle fractures. *J Oral Maxillofac Surg.* 1983;41:89-98.
  22. Akadiri OA, Omitiola OG. Maxillo-mandibular fixation: utility and current techniques in modern practice. *Niger J Med.* 2012;21:125-33.
  23. Newman L. A clinical evaluation of the long-term outcome of patients treated for bilateral fracture of the mandibular condyles. *Br J Oral Maxillofac Surg.* 1998;36:176-9.
  24. De Riu G, Gamba U, Anghinoni M, Sesenna E. A comparison of open and closed treatment of condylar fractures: a change in philosophy. *Int J Oral Maxillofac Surg.* 2001;30:384-9.
  25. Baltrusaityte A, Surna A, Pileickiene G, Kubilius R, Gleiznys A, Baltrusaitis M. Dynamical changes of occlusion and articulation during treatment of mandibular angle fractures. *Stomatologija.* 2013;15:12-9.
  26. Nogami S, Yamauchi K, Kataoka Y, Takano H, Yamashita Y, Takahashi T. Clinical comparison between arthrocentesis and conventional conservative treatment with maxillomandibular fixation for unilateral high condylar fractures. *J Oral Rehabil.* 2013. Available at: <http://www.ncbi.nlm.nih.gov/pubmed>
  27. Palmieri C, Ellis E, 3rd, Throckmorton G. Mandibular motion after closed and open treatment of unilateral mandibular condylar process fractures. *J Oral Maxillofac Surg.* 1999;57:764-75; discussion 75-6.
  28. de Amaratunga NA. Mouth opening after release of maxillomandibular fixation in fracture patients. *J Oral Maxillofac Surg.* 1987;45:383-5.
  29. Oikarinen KS, Raustia AM, Lahti J. Signs and symptoms of TMJ dysfunction in patients with mandibular condyle fractures. *Cranio.* 1991;9:58-62.
  30. Hovinga J, Boering G, Stegenga B. Long-term results of nonsurgical management of condylar fractures in children. *Int J Oral Maxillofac Surg.* 1999;28:429-40.