

PATTERN OF PRESENTATION OF MANDIBULAR CONDYLAR FRACTURES IN RELATION WITH KNOWN RISK FACTORS

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ABSTRACT

Mandibular fractures are one of the most common fractures of facial bones. Parasymphysis is the most common site followed by condylar and subcondylar areas of the mandible. A descriptive study was carried out at Department of Oral and Maxillofacial Surgery, King Edward Medical University/ Mayo Hospital, Lahore from 27th September 2011 to 26th September 2012. The study was carried out on forty patients with mandibular condylar fractures. The fractures were classified according to the Spiessl and Schroll classification system. Objective of this study was to describe pattern of presentation of mandibular condylar fractures and to evaluate factors leading to mandibular condylar fractures in a tertiary care hospital. 32 (80%) were males and 8 (20%) females. The age ranged from 1½ to 65 years with mean of 26 years (SD±16.90). Road traffic accidents including motor bike, auto-rickshaw and car accidents were found to be predominant risk factors (15 patients - 37.5%). Type II fractures (low neck displacement) comprised the highest proportion – 16 out of 48 fractures (33.3%).

Road traffic accidents and falls were the leading risk factors for mandibular condylar fractures identified in this study. Type II fractures were seen to be the most frequent variant of condylar fracture. It was noted that no specific pattern of condylar fracture was associated with any specific risk factors.

Key Words: *Condylar fracture, Mandibular fracture, Transosseous wiring, Miniplates, Road traffic accident.*

INTRODUCTION

Fracture of condylar process is one of the most common fractures of the mandible. The mandibular condylar process fractures account for 25% to 50% of all mandibular fractures.¹⁻⁷ The etiology is often related to age of the patient with bicycle accidents constituting the most common cause particularly in the 6-12 years of age group.⁸

In term of strength, the condylar neck constitutes the weakest region of the entire mandible and is the

most susceptible to fracture. It is also the most overlooked and least diagnosed site of trauma in the head and neck region.¹⁴ About 2/3rd of condylar fractures are associated with other mandibular fractures.¹¹ Diagnosis of condylar injuries is based on clinical features and appropriate radiological investigations. Definitive diagnosis of condylar fractures is only possible with radiographic investigations.¹⁵ The most commonly used radiograph is Orthopantomogram (OPG). Additional views such as posteroanterior (PA) view, mandibular lateral obliques and transcranial views can be used. Most advanced imaging techniques such as CT scan (especially the Coronal view) and 3D reconstructions are usually reserved for complex injuries of the condyle.¹⁶

Fracture of condylar process is one of the most common fractures of the mandible^{10,14} with a frequency that ranges from 25% to 50% of all mandibular fractures.^{11,15} Ellis et al¹², however studied 2137 cases and found that fractures of the condyle were the second most common fracture after that of the body, while Fridrich et al¹³, in their study of 1967 patients, found condylar fractures to be the second most common form of fracture after mandibular angle fracture.

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The pattern of distribution of condylar fractures has always generated interest for peculiar reasons. One of the reasons for this may be the range of etiological variables and treatment outcomes described in various studies but scarce data is available nationally in this regard. Our study may contribute in adding to the information that may be valuable in understanding the pattern of presentation of condylar fractures and thus may be used to improve the management of condylar fractures in local population.

METHODOLOGY

This descriptive study was carried out at Department of Oral and Maxillofacial Surgery, King Edward Medical University/Mayo Hospital, Lahore, from 27th September 2011 to 26th September 2012. The sample technique was non probability purposive. As per inclusion criteria, all patients of either gender with clinically diagnosed mandibular condylar fractures were included in the study from the outpatient and/or emergency department. An informed consent was obtained from the participants or their guardians to use their data for including in the study. Confidentiality of the data and anonymity of participation was also ensured to all the participants of the study who were told that they had the right to withdraw at any stage of data collection. Complete demographic information and a thorough history of the event related to the development of fracture was obtained. A comprehensive examination of fractured area was undertaken and Orthopantomogram (OPG) as well as PA (Posteroanterior) views of mandible were also performed to confirm the clinical diagnosis; and to elicit the site, severity and extent of the fracture. Mandibular Condylar fractures were then classified according to the Spiessl and Schroll classification²¹ (Table 4). All this information was collected and entered on a Performa designed after extensive literature research on the topic of mandibular condylar fractures keeping in view the variables of the study. The collected information was entered into SPSS version 16.0 and analyzed. The variables of demography (age and sex) were presented as frequency table giving mean and standard deviation of the age of the subjects. The factors leading to the fracture were classified into categories and these factors were expressed as proportion of each factor. The extent, severity and type of fracture were analyzed in relation to age, gender and mode of injury. Any association observed between categorical variables was tested for significance by applying the Chi square test. A p-value of 0.05 or less was accepted as significant.

RESULTS

The study was carried out on a total of forty (40) patients with mandibular condylar fractures. The age ranged from 1½ to 65 years with mean of 26 years (SD±16.90).

There was male predominance in all age groups except in the age group of 1-10 years where female constituted about 71.4% of the cases. Of all the groups the highest numbers of condylar fractures were seen in second decade (11-20 years), and that was 30% of all the cases. Table 1

Among the risk factors; road traffic accident (RTA) including motor bike, auto-rickshaw and car accidents were found to be predominant risk factor (15 patients - 37.5%) followed by fall (11 patients - 27.5%). The rest of detail is given in Table 2.

Majority of patients had unilateral condylar fractures i-e 80% (n=32) while 8 patients had bilateral condylar fractures (20%) (Fig 1). Associated facial fractures can be seen in Fig 2. While evaluating the pattern of condylar fracture in relation to the risk factors, it was noted that no specific type of condylar fracture was associated with any specific risk factor. (Table 3)

Of 40 patients, 25 were associated with other facial fractures also while 15 had isolated condylar fractures. Mandibular body fracture was seen in 2 patients; right Parasymphysis fracture in 11; left Parasymphysis fracture in 7 patients.

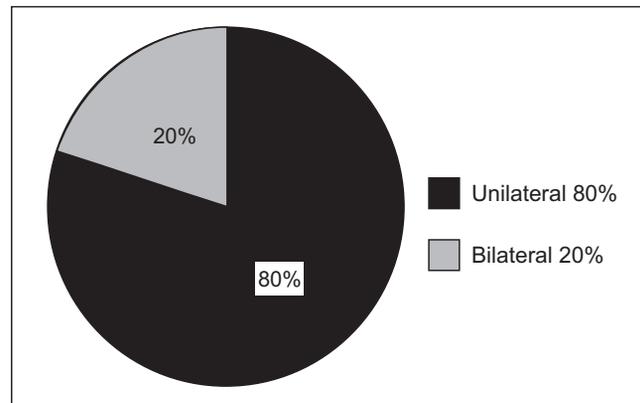


Fig 1: Side of fracture P<0.001

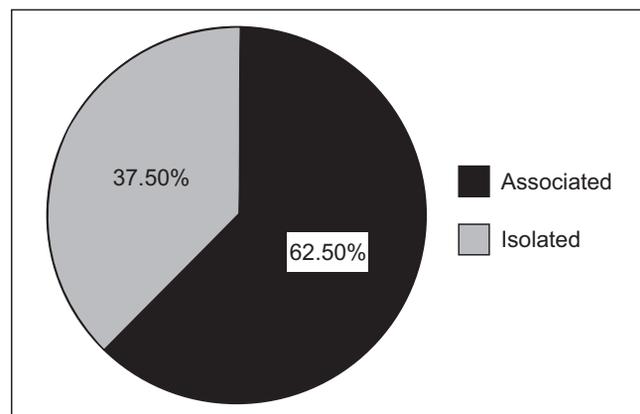


Fig 2: Associated facial fractures P<0.05

TABLE 1: DISTRIBUTION OF AGE GROUP IN MALE AND FEMALE (N=40)

Age (years)	Male	Female	Total
1 – 10	2	5	7
11 – 20	11	1	12
21 – 30	11	—	11
31 – 40	3	—	3
41 – 50	1	1	2
51 -60	4	—	4
> 61	—	1	1
Total	32	8	40

TABLE 2: DISTRIBUTION OF RISK FACTORS AMONG MALE AND FEMALE (N = 40)

Risk factors	No.	Male Percentage (%)	No.	Female Percentage (%)
Motor bike	10	31.3	1	12.5
Auto rickshaw	2	6.3	—	—
Car	1	3.1	1	12.5
Bicycle	3	9.4	—	—
Fight/Assault	1	3.1	—	—
Sport	—	—	-	—
Fall	6	18.8	5	62.5
Industrial trauma	4	12.5	—	—
Firearm injury	4	12.5	1	12.5
Any other	1	3.1	—	—
Total	32	100	8	100

TABLE 3: DIFFERENT PATTERN OF FRACTURES IN RELATION TO KNOWN RISK FACTORS (N=40)

Pat-tern	Motor bike	Auto rickshaw	Car	Bicy- cle	Fight/ As- sault	Sport	Fall	Indus- trial trauma	Fire- arm injury	Any other
Type 1	5	—	1	1	—	—	5	—	—	—
Type 2	4	1	1	2	—	—	3	3	2	—
Type 3	1	—	—	1	1	—	3	1	—	1
Type 4	2	—	—	—	—	—	—	—	—	—
Type 5	—	1	—	—	—	—	2	—	—	—
Type 6	1	—	—	—	—	—	2	1	3	—

Type 1 = No displacement Type 2 = Low neck with displacement Type 3 = High neck with displacement
 Type 4 = Low neck with dislocation Type 5 = High neck with dislocation Type 6 = Intracapsular head injury

DISCUSSION

The pattern of distribution of condylar fractures has always generated interest for peculiar reasons. One of the reasons for this may be the range of etiological variables and treatment outcomes described in various studies. There has always been ongoing debate

about best available treatment modality and to employ which treatment option to treat the different patients with mandibular condylar fractures? This study may provide valuable information that could be beneficial in improving the management of condylar fractures in local population by guiding about the treatment plan according to classification used.

Male to female ratio in this study was 4:1 while on the contrary, Larsen and Nielsen¹⁷ in Denmark described the male to female ratio as 3:1 in their study. On the other hand, the relative frequency of condylar fractures in our female population remained low. This can be attributed to the more home bound nature of the female population in our country which makes them less prone to be associated with road traffic accidents while male inhabitants are more prone to RTA and motor bike injuries.

In this study, the number of condylar fractures was found highest (30%) in 11-20 years age group. This was followed by the age group of 21-30 years which contributed 27.5% of all condylar fractures. Likewise, the frequency of condylar fractures was highest (26.15%) in 11-20 years age group in the study carried out by Marker et al.¹⁸ Lida and Matsuya¹⁹ demonstrated condylar fractures being common in children younger than 14 years, especially in those below 6 years. It may be that condylar fractures in younger population in our set up occur as isolated fractures and due to the absence of any other injury remain unreported particularly in the less privileged and those from a rural area. At the moment, we do not have a government or other agency's data to support this hypothesis about the isolated condylar fractures being unreported in a younger age group. This may be indirectly supported by the high number of temporomandibular joint ankylosis reported in our literature.⁹ Moreover, isolated condylar fractures with no injury to the body of the mandible may go unnoticed. This is because of mild occlusal disturbances that are difficult to detect clinically and would require advanced imaging techniques for proper radiological diagnosis.

Local kite flying traditions and festivities like Basant have led to reckless accidents caused by falls from rooftops while involving in different acts associated with kite flying. The results of this study show that road traffic accidents are the most common risk factor whereas, Abbas I et al⁹ also described road traffic accidents as the most leading cause of mandibular fractures in their study.

We employed classification of condylar fractures as described by Spiessl and Schroll.²¹ Joos and Kleinheinz examined 122 cases of condylar fractures and showed type II condylar fracture (low neck with displacement) to comprise the highest number of the total cases. These were followed by type I (no displacement), type IV (low neck with dislocation), type VI (intracapsular head injury), type III (high level with displacement) and type V (high neck with dislocation) fractures.²¹ Similar to their findings, Type II fractures (low neck with displacement) constitute the highest number of condylar fractures in the current study too, which were followed by type I fracture, type III, type IV and

type V condylar fracture. Those fractures that are not displaced (type I) often become a little difficult to be diagnosed on a routine plain radiograph. Some of the radiographs' quality may not be of the most immaculate nature and even the most experienced of the clinicians may find it difficult to diagnose a simple hairline condylar fracture. Same is the case with intracapsular condylar fractures that are even impossible sometimes to be appreciated on a plain radiograph. Also because of lack of obvious malocclusion on associated injury the number of reported condylar fractures may be less than the actual number of cases. According to Strobl et al²², type III fractures were the most numerous (41.81%) in the 55 pediatric condylar fractures in their study. Their findings differ from those of ours due to the major reason that this study was carried out in children below 10 years of age; and the character of bone and morphology at this age may be such that it predisposes the higher part of the condylar neck to an increasing number of injuries.

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. Literature suggests improved results with open, anatomic reduction and fixation²³. Many of the surgeons are still hesitant about frank application of the open approach due to the resultant facial scarring and the risk of facial nerve injury²⁴. According to Hall²⁵, every patient should be treated 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 (MMF). We strive to follow the set of guidelines put forth by Zide and Kent.²⁶ However, all of our study 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 fitted the absolute indication for open reduction of condyle was educated about the merits and demerits of the procedure. However, only few of them could eventually become candidates for rigid fixation due to financial constraints. This explains relatively low frequency (12.5%) of patients who subsequently underwent open reduction with internal fixation.

The most commonly employed method of treatment for condylar fractures in present study was maxillo-mandibular fixation (MMF) with eyelet wiring in 24 patients (68.6%). Most of these patients did not have a preoperative malocclusion which obviated the need

for them to have inter-arch elastics. The second most commonly employed method of treatment for condylar fractures was inter arch elastics with arch bar fixation in 11 patients (31.4%). In these instances, inter arch elastics guide the arch bar supported jaws into maximum intercuspation and correct the malocclusion that is caused by condylar fracture. Due to an improper anatomic reduction of the fractured segments, many patients may have a deviation of jaw on opening, which is due to an impaired or affected lateral pterygoid muscle on the injured side.²⁷ In cases of condylar displacement, open reduction with internal fixation is the preferable method. In such cases, open reduction gives better occlusal results, anatomic restoration and faster recovery rate than nonsurgical techniques.

Hovinga et al²⁸ 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. Surgical treatment of condylar fractures in children is not advocated because of a multiplicity of associated problems such as a chance of ankylosis in later life and growth disturbances associated with on-site-surgery and periods of maxillomandibular fixation (MMF).

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. 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. The method of internal rigid fixation of the mandibular condyle is increasingly becoming popular through preauricular, retromandibular and submandibular approaches.²⁶

This study is hampered by the similar factors and problems as what did happen to some past studies. Affecting problems included, a limited sample size, mis- and under-reporting of facts regarding condylar fractures and lack of a proper referral of maxillofacial injuries to an Oral and Maxillofacial Surgery Unit.

CONCLUSION AND RECOMMENDATIONS

Male gender and age group between 11-20 years were predominant demographic valuables presented with condylar fractures. Road traffic accidents and falls were the leading risk factors identified. Type II fractures were the most frequent variant of condylar fracture. Most of the patients were managed with closed reduction using MMF.

The leading risk factor in this study are quite avoidable if prevention strategies, like enforcing the use of helmets, are adopted well in the society. Moreover, any such insult should carefully be evaluated both clinically and radiologically. A proper streaming and referral of maxillofacial injuries should be sought for treatment to a center having qualified and trained oral and maxillofacial surgeon and such center may then ensure correct statistics of these peculiar injuries.

REFERENCES

- 1 Valiati R, Ibrahim D, Abreu MER, et al. The treatment of condylar fractures: to open or not to open? A critical review of this controversy. *Int J Med Sci* 2008; 5(6): 313-18.
- 2 Ellis III E, Throckmorton GS. Treatment of mandibular condylar process fractures: biological considerations. *J Oral Maxillofac Surg* 2005; 63: 115-34.
- 3 Asprino L, Consani S, De Moraes M. A comparative biomechanical evaluation of mandibular condyle fracture plating techniques. *J Oral Maxillofac Surg* 2006; 64: 452-56.
- 4 Alkan A, Metin M, Mug'ali M, Özden B, Nükhet Ç. Biomechanical comparison of plating techniques for fractures of the mandibular condyle. *British J Oral Maxillofac Surg* 2007; 45: 145-49.
- 5 Andersson J, Hallmer F, Eriksson L. Unilateral mandibular condylar fractures: 31-year follow-up of non-surgical treatment. *Int J Oral Maxillofac Surg* 2007; 36: 310-14.
- 6 Simsek S, Simsek B, Abubaker AO, Laskin DM. A comparative study of mandibular fractures in the United States and Turkey. *Int J Oral Maxillofac Surg* 2007; 36: 395-97.
- 7 Cole P, Kaufman Y, Hollier LH. Managing the Pediatric Facial Fracture. *J Craniomaxillofac Trauma Reconstr* 2009; 2(2): 77-83.
- 8 Banks P. Introduction. In: Banks P, ed. *Killeys fracture of the mandible*. 4th ed. London: Wright, 1984; 1-8.
- 9 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: 12-14.
- 10 Anyanechi CE, Saheeb BD. Mandibular Sites Prone to Fracture: Analysis of 174 Cases in a Nigerian Tertiary Hospital. *Ghana Med J* 2011; 45(3): 111-14.
- 11 Silvennoient U, Lizuka T, Lindqvist C, Oikarinen K. Different patterns of condylar fractures; An analysis of 382 patients in a 3-years period. *J Oral Maxillofac Surg* 50; 1992; 1032-37.
- 12 Ellis E, Moos KF, El- Attar. Ten years of mandibular fractures: an analysis of 2137 cases. *Oral Surg Oral Med Oral Pathol* 1985; 59: 120-29.
- 13 Fridrich KL, Pena-Velasea G, Olson RAJ. Changing trends with mandibular fractures: a review of 1067 cases. *J Oral Maxillofac Surg* 1992; 50: 586-89.
- 14 Bastian HL. Fractures of the mandible: a discussion of etiology and location. *Danish Dent J* 1989; 93: 589-93.
- 15 Myall RWT. Condylar injuries in children: what is different about them? In: Worthington P, Evans JR, eds. *Controversies in oral and maxillofacial surgery*. Philadelphia: WB Saunders, 1994; 191-200.
- 16 Raustia AM, Pythinen J, Oikarinen KS, et al. Conventional radiograph and computed tomographic findings in cases of fracture of the mandibular condylar process. *J Oral Maxillofac Surg* 1990; 8: 1258-64.

- 17 Larsen OD, Nielsen A. mandibular fractures: An analysis of their etiology and location in 286 patients. *Scand J Plast Reconstr Surg* 1976; 10; 213-18.
- 18 Marker P, Nielsen A, Bastian HL. Fractures of the mandibular condyle. Part 1: patterns of distribution of types and causes of fractures in 348 patients. *Br J Oral Maxillofac Surg* 2000; 38: 417-21.
- 19 Lida S, Matsuya T. Paediatric maxillofacial fractures: Their aetiological characters and fracture patterns. *J Craniomaxillofac Surg* 2002; 30: 237-41.
- 20 Vogt A, Roser M, Weingart D, et al. Transparotid approach to surgical management of condylar neck fractures. A prospective study. *Mund Kiefer Gesichtschir* 2005; 9: 246-50.
- 21 Joos U, Kleinheinz J. Therapy of condylar neck fractures. *Int J Oral Maxillofac Surg* 1998; 27: 247-54.
- 22 Strobl H, Emschhoff R, Rothler G. Conservative treatment of unilateral condylar fractures in children: a long-term clinical and radiologic follow-up of 55 patients. *Int J Oral Maxillofac Surg* 1999; 28: 95-98.
- 23 Choi KY, Yang DJ, Chung HY, Cho BG. Current Concepts in the Mandibular Condyle Fracture Management Part II: Open Reduction Versus Closed Reduction. *Arch Plast Surg* 2012; 39(4): 301-08.
- 24 Croce A, Moretti A, Vitullo F, et al. Transparotid approach for mandibular condylar neck and subcondylar fractures. *Acta Otorhinolaryngol Ital* 2010; 30(6): 303.
- 25 Hall MB. Condylar fractures; surgical management. *J Oral Maxillofac Surg* 1994; 52: 1189-92.
- 26 Zide MF, Kent JN. Indications for open reduction of mandibular condyle fractures. *J Oral Maxillofac Surg* 1983; 41: 89-98.
- 27 de Riu G, Gramba 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: 384-89.
- 28 Hovinga J, Boering G, Stegenga B. Long-term results of non-surgical management of condylar fractures in children. *Int J Oral Maxillofac Surg* 1999; 28: 429-40.

CONTRIBUTION BY AUTHORS

- 1 Malik Ali Hassan Sajid:** Collected & analyzed the data and revised this manuscript.
- 2 Shaker Mahmood:** Conducted the study.
- 3 Khurram Latif:** Contributed to proof reading & finalized the draft of this manuscript.
- 4 Riaz Ahmed Warraich:** Conceived the idea & supervised the study.

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