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Incidence and Pattern of Mandible Fractures: An Urban Tertiary Care Centre Experience

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ABSTRACT- Mandible forms the skeletal framework of the lower third of the face, over which the soft tissue musculature is draped. Fracture of the mandible leads to compromise in mastication and speaking along with cosmetic concerns if left un addressed.

Material & Method - In this study, a retrospective evaluation of 238 patients with mandible fractures without other maxillofacial injuries (186 male and 52 female) aged between 04 to 69 years was carried out. Information on age, gender, etiology, pattern of fracture, and treatment done was obtained and analyzed. As per literature, Parasymphysis fracture is the second commonest fracture after condylar fractures in the mandible but in this study, incidence of Parasymphysis fracture was found to be the highest among the cases.

Results - The present study assessed correlation between etiology and mandibular fracture along with various fracture patterns. The most common cause was two-wheeler accidents, fall and motor vehicle accidents. The most frequent site was mandible parasymphysis (n = 116, 48.7%) while second most frequent site was mandibular condyle (n = 64, 26.9%). Various combination patterns were seen, among which parasymphysis along with condyle (n=47, 72.3%) was present due to indirect transmission of forces.

Discussion - Open reduction and internal fixation with functionally stable fixation is the favored treatment in cases of mandible fractures. Intermaxillary fixation using arch bars is used as an adjunct procedure to provide better control while fixation. Parasymphysis is the commonest fracture and it most frequently occurs with the fractures of mandibular condyle.

Key words- Mandible fracture, Arch bar, Motor vehicle accident, Two-wheeler accident

I. INTRODUCTION

Incidence of Mandible fractures is second highest after nasal bone which is complex in nature. It occurs at a frequency of 38% in maxillofacial skeleton.[1,2] Approximately 44.6–74.4 kg/m of energy is required to fracture the mandible which is almost equal to the energy required to fracture the zygoma. [3-5] Poorly managed cases may lead to complications like facial widening, malocclusion, Non-union/malunion, if not managed judiciously.

Etiological factors include high velocity motor vehicle accidents (MVAs), interpersonal violence, fall and pathological fractures. Management of fracture can vary from pediatric to geriatric age group. The main aim of the treatment is to restore pre injury function and cosmesis. Treatment modalities are mainly of three types 1. Closed treatment, 2. Closed functional and 3. Open treatment.[6] Functionally stable osteosynthesis is the treatment of choice worldwide now a days according to the lines given Michelet et al and later confirmed by Champy et al.[7,8]

This retrospective study was conducted to evaluate the epidemiology, etiology for the mandible fracture, their different patterns and combinations treated in an urban tertiary care institute over the last 05 years.

II. MATERIALS AND METHODS

Retrospective review of mandible fracture from Jan (2014) to Dec (2019) was done after institutional ethical clearance. Admission/discharge, case sheet and institutional

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archive was utilized for assessing demographics, mode of injury, anatomic location, type of management and complication after surgery. There were 238 patients aged from 04 to 69 years who sustained mandible fracture. Etiology for the mandible fracture was further divided into motor vehicle accident (MVA), two-wheeler, assault, fall and gunshot wound. Fracture location was divided in to symphysis, parasymphysis, body, angle, condyle, ramus and coronoid according to the classification given by Dingman and Natvig. (Graph-1).

Patients who reported to the trauma center or were referred from other clinics were managed by the oral and maxillofacial team from (2014-2019). Clinical examination and radiological evaluation (CT/CBCT and OPG) were done for all the patients. Neurological clearance was obtained prior to surgery in cases of reduced GCS score, history of loss of consciousness/Amnesia/Vomiting/Headache. A total of 117 patients who sustained other maxillofacial injuries apart from mandible fracture including zygoma, Maxillary fracture at lefort I, II and III levels were excluded from the study. Management of fractured Mandible dentate segments, symphysis, parasymphysis and body were initially done with tension band (0.5mm Stainless steel wire) (Fig-1) to reapproximate and immobilize the fracture. Arch bar and IMF screws were mainly used to attain immobilization. Functional stable fixation was done using miniplate (2.0 mm) based on Champy line of osteosynthesis (1973) in all the cases. (Fig-3) The mean duration between trauma and surgery was 3-5 days. Antibiotic was given immediately pre operatively just before the surgery and the same was maintained for 05 days postoperatively in all the patients. Postoperative guiding elastics were given only in cases of combination types mainly to guide the mandible movements in cases of severe muscle spasm. None of the patients were managed solely with IMF except in pediatric age group, which were managed with cap splint using circummandibular wiring. Postoperative radiographs (OPG) were taken for all the patient for assessment of fracture reduction and position of plates and screws. All the patients were advised soft diet for a duration of 3 weeks.

There were 23 patients with Parasymphysis fracture who underwent ORIF under Local anesthesia. All Combination fracture or patients with other maxillofacial injury were treated under General anesthesia. soft diet, physiotherapy and post-operative follow up was advised at 05 days mainly for evaluation of surgical site, occlusion and removal of arch bar and later follow-up at one month and six months.

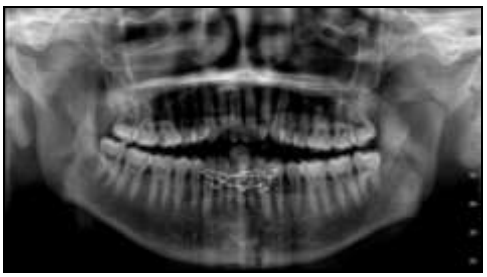

Figure 1: Use of Tension band

III. RESULTS

Demographics and data of the patients

In this study, a total number of 238 patients sustained mandible fractures in which there were 186 Male (78.2%) and 52 females (21.8%). Age Ranges from 04 to 69 years, maximum number of the patients were seen in 20-40 years of age group.

Etiology

The main etiological cause for the mandible fracture was two-wheeler accident (n=95, 39.9%), followed by fall (n = 58, 24.4%), MVA (n= 57, 23.9%), assault (n=24, 10.1%) and gunshot (n=4 1.7%). In males, two-wheeler accident was the most frequent etiology due to over speeding and improper or no use of helmet followed by fall which was highly associated with pediatric and school children age group. In females the most common cause was history of fall. Two-wheeler accidents were the most common etiology in 2^{nd}-4^{th} decade of life and least was assault and gunshot wound.

Mandible fracture

A total (n= 238) cases of mandible fracture distributed as symphysis (n= 1, 04%), parasymphysis (n = 116, 48.7%), body (n = 16, 6.7%), angle (n = 34, 14.3%), condyle (n = 64, 26.9%), ramus (n = 6, 2.5%). and coronoid (n=1) which was associated with parasymphysis fracture. (Graph-1) There were 18 cases in which avulsion of lower anterior was seen following fracture. (Fig-2)

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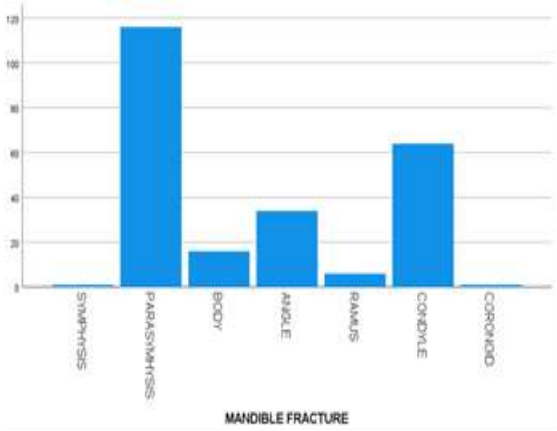
Figure 2: Avulsion of teeth



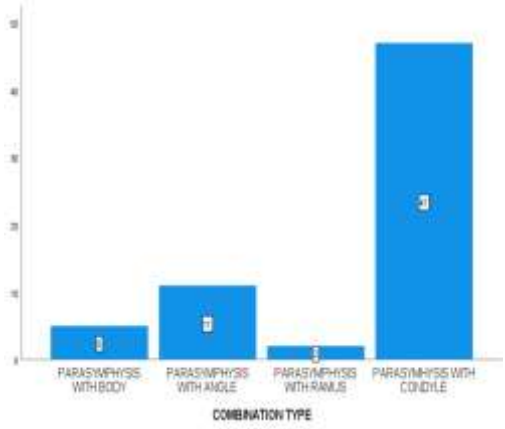
Graph 1: Mandible fracture

Condyle fractures

There were total 65 cases of mandible condyle fractures (26.9%) among which 16 cases were having bilateral fractures. Condylar fractures consisted of 09 cases high condylar fractures, 18 cases with low condylar fractures and 38 cases with subcondyle fractures. 05 cases of high condylar fractures medial pole were dislocated on the medial side due to the pull of lateral pterygoid.

Combination of Parasymphysis fracture.

There were total 65 parasymphysis fractures (27.3%) which were having combination with other fracture in the anatomical region of mandible. In 51 cases isolated parasymphysis fracture was present. Parasymphysis with body fracture was present in 05 cases (2.1%) cases. Parasymphysis combined with angle was present in the 11 (4.6%) cases. Parasymphysis with condyle was seen in 47 (19.7%) cases which was highest among all the fracture combination due to indirect transmission of the force to the mandibular condyle. (Graph-2)



Graph 2: Combination fracture

Treatment

All patients were managed with ORIF using miniplates (2.0) except in the 05 patients of paediatric age group. A satisfactory healing outcome was observed in all cases. Infection, non-union and malunion were not detected in any of the patients in the follow-up period. In 19 cases of parasymphysis fracture mental nerve dysfunction for a transient period was noticed following surgery. All shown satisfactorily recovery, 8 to 12 weeks after the surgery without any additional intervention and second surgery for implant removal was not undertaken in any of the cases. Signs of transient weakness in relation to marginal mandibular branch of facial nerve was observed in 08 cases with high condylar fracture treated with open approach using Mini retromandibular approach which recovered after 03 months post surgery.

Figure 2: ORIF using miniplate

IV. DISCUSSION

As described by Huelke in (1961) mandible is a non-uniform, mobile bone which is less resistant to tensile force.[9] Fracture mandible is the second highest after nasal bone and fracture pattern can be linear or oblique in fashion. Bilateral mandibular parasymphyseal fractures may cause airway obstruction due to the concomitant loss of tongue muscle support.[10,11] Fractures mandible are relatively easy to diagnose using panoramic

radiographs which provide an overview for the entire mandible. CT/CBCT can be utilized for better diagnosis, treatment planning, educating the patient and considered to be gold standard. Intraoral findings include pain, swelling, facial asymmetry, deranged occlusion, step deformity and hematoma of floor of the mouth.

Out of 238 patients who sustained mandible fractures, majority were male (78.2%) and females were (21.8%). Male to female ratio was in agreement with other studies with age incidence peak occurrence at 2nd to 4th decade of life. The primary etiological factor was two-wheeler accident, fall and MVA in this study and it was co related that increased usage of high velocity motor vehicle and two-wheeler among younger male population with improper/no use of helmet leads increased incidence of trauma. Preventative measures can be use of helmet, avoid over speeding, avoid drinking and driving can minimize the incidence of mandible fractures.

Parasymphysis region has rich vascularity from the lingual vasculature and muscles. The key to successful management of these fractures is to understand the principles of accurate reestablishment of occlusion, fracture reduction, and stable internal fixation. In this study (n=116) patients had Parasymphysis fracture and (n=51) cases were having isolated Parasymphysis fracture or without dentoalveolar fracture while rest of the fractures were combination type. Highest combination of parasymphysis fracture was along with condyles in (n=47) cases also called as "Guardsman fracture" or parade ground fractures. (Fig -1) The neck of the condyle being the weakest area in the mandible was commonly involved in combination fractures. In such bilateral situations, the objective should be to fix at least one site with rigid fixation. The second site can be managed with a functionally stable fixation or semi-rigid fixation. The most favoured approach in this study was to fix the dentate segment first followed by condyle.

Pediatric mandible fractures are less when compared with adults due to variation in the anatomy of bones. Most of the pediatric fractures are nondisplaced which can be firmly united in 2 weeks, because of the increased metabolic rate and increased osteogenic potential of periosteum. Pediatric Parasymphysis fractures are best managed with splints and circummandibular wiring .[12] In this study only 5 cases were in pediatric age group which were managed successfully with use of splint. Short period of IMF in the management of minimally displaced Parasymphysis mandibular fractures of the tooth bearing area in young adults is a suitable alternative but it delays early return to function and wound healing.

The use of arch bar has been a time honoured and reliable technique for the reduction and stabilization of mandibular fractures prior to fixation. It is a time-consuming procedure but decreases the overall operative time. In the past 25 years, plate osteosynthesis has become popular in the management of facial fractures and in the treatment of mandibular fractures. This technique offers some advantages to the patients for early return to function. Fixation as per Champy's lines of optimal osteosynthesis provide good results in the vast majority of patients.[8] Use of two miniplates 2.0 along with miniscrews inserted monocortically in the self-tapping mode. Difficulty is commonly encountered in case of avulsed teeth or in comminuted fracture of Parasymphysis. These cases can be best managed with 4-hole universal fracture plate 2.4 mm thickness or a compression plate from the matrix mandible system.[6]

Recent advances include three dimensional plates, trapezoidal plates and they can be adequately utilized to manage mandible fracture. Bioresorbable plates can be used in pediatric age group. [13]

V. CONCLUSION

The study was carried out at an urban tertiary care Maxillofacial Surgery centre. The cases reporting to the hospital had a high incidence of Road traffic accident and fall as the main etiological factors for the mandible fracture. Maximum patients were in the age group of 20-40 years once again underlining the fact that the younger population is more prone to such injuries that too in an urban setting. The study revealed that Parasymphysis is the commonest anatomical site of involvement in mandible with strong association with condylar fracture. Thorough maxillofacial examination with history is necessary to rule out other maxillofacial injuries. Our study has suggested an association between the cause and the number/site of mandibular fracture which can be reduced with use of helmet and by avoiding avoid over speeding.

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Conflicts of interest
There are no conflicts of interest.

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