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Review Article

Mandibular trauma in Central Karnataka, India – An outcome of 483 cases at a regional maxillofacial surgical unit



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ABSTRACT

Objective: The spectrum of etiologies of mandibular fractures is diverse; also, factors such as geography, seasons, means of livelihood, and the psychological make-up and living standards of individuals influence its pattern and incidence. Of significance is the understanding of the pattern and mechanism of mandibular injury that would appear to facilitate choosing the most ideal treatment plan.

Method: A systematic retrospective review of 483 cases treated between June 2001 and June 2012 was carried out to determine mandibular trauma pattern and distribution in Central Karnataka.

Results: In our analysis, there were 57 females and 426 males; the male-to-female ratio was 7.5:1 [age range = 5–87 years (mean = 31.19 years)]. RTA (predominantly two-wheeler) was commonest cause of mandibular trauma; age group affected was 20–29 years. While March witnessed a peak in casualty incidence, Sunday recorded the maximum frequency. The mandibular parasymphysis was the commonest site of fracture in this region of Karnataka. Extremity injury was the predominant form of associated injury. In all, 1018 fractures were documented; 887 affected the mandible. Fifty-nine cases had concomitant mid face injury (131 fractures). The left side of the mandible was (marginally) more susceptible to trauma, regardless of gender or etiology. Modes of treatment were 'open' or 'closed' – 800 fractures were treated by ORIF; the complication rate observed was 48.46%.

Conclusion: However, further advances in diagnostic imaging and implant-fixation device technology not only aim at reducing the rate of complications in a given setting but also facilitate early return to function and improved quality of life.

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* Asian AOMS: Asian Association of Oral and Maxillofacial Surgeons; ASOMP: Asian Society of Oral and Maxillofacial Pathology; JSOP: Japanese Society of Oral Pathology; JSOMS: Japanese Society of Oral and Maxillofacial Surgeons; JSOM: Japanese Society of Oral Medicine; JAMI: Japanese Academy of Maxillofacial Implants.

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1. Introduction

The mandible for several reasons is an important osteological unit of the oral and maxillofacial skeleton. It determines lower facial proportion through its intimate association with muscles and other vital structures, thereby influencing the perception of beauty through balance and harmony. The teeth, in particular, are supremely 'ornate and immaculate' in the level of arrangement and position in facial cosmesis. Moreover, they are essential constituents of the stomatognathic system and, therefore, from the anatomical perspective, serve as principal 'reference keys' to reducing and fixing facial fractures, particularly those of the mandible.

Several etiologies have been implicated in mandibular trauma – through perusal of epidemiological data, a wealth of information describing the standards of patient care and preventive measures instituted help establish new incidence rates and patterns of such fractures. Management of mandibular trauma is complex; however, the outcome is principally dependent on precise knowledge, an incisive analysis of its behavioral mechanics, principles of fracture reduction and fixation, and most of all technical expertise of the operator. Nevertheless, it is not uncommon to encounter complications following operative intervention on fractures of the mandible.

This paper not only discusses our experience in treating a large case-series of mandibular trauma, but also presents an overview of techniques evolved and employed in addressing such fractures. An algorithm devised for the general treatment of isolated fractures of the mandible and those associated with mid-face fractures is also presented.

2. Patients and methods

Retrieving the medical records of patients admitted to our maxillofacial trauma unit, a systematic retrospective review of cases presenting chiefly with mandibular trauma, treated between June 2001 and June 2012, was carried out to determine its pattern and distribution through correlation of pertinent variables such as age, gender, etiology, site of fracture, the month and day during which the incidents most frequently occurred, the treatment performed and the complications observed. Imaging modalities used were predominantly conventional in nature and depended on the location of the mandibular fracture, unless of course if such fractures were accompanied by a fracture(s) involving the mid-facial region or the zygoma including the arch, wherein computed tomography was necessary to evaluate the extent of fracture in all three planes of dimension, and with 3D reconstruction enhancing overall preoperative assessment and preparation. Also, on principle, all cases to be radiologically examined initially employed conventional imaging techniques.

We confirm that Institutional Review Board or ethical approval has been obtained for this 11-year retrospective study. We also confirm that we have read the Helsinki Declaration and have followed the guidelines in this investigation.

3. Results

In our analysis, there were 57 females and 426 males; the male-to-female ratio was 7.5:1 [age range = 5–87 years (mean = 31.19 years)].

Although all the 483 cases had at least 1 mandibular fracture, 59 had concomitant fractures involving the midfacial region and/or the zygoma including the zygomatic arch.

In all, 1419 X-rays were recommended to prove possible existence of a fracture following physical examination. These included 449 Ortho-Pan-Tomograms [OPT], 193 Postero-Anterior views of the Mandible [PA Mandible], 126 Para-Nasal Sinus views [37°; PNS], 53 Sub-Mento-Vertex views [SMV], 15 Lateral Skull views, 179 Reverse Towne's views and 49 Lateral Oblique views of the Mandible-body of the mandible, 350 True Occlusal views of the jaws and 67 Intra Oral Peri-Apical X-rays [IOPA], depending on the fracture site. However, 59 cases necessitated CT scans to peruse involved regions in the axial, coronal and sagittal planes, in addition to a 3D reconstruction of the entire maxillofacial region.

Prior to July 2008, the CT scans that we obtained were issued by other regional diagnostic centers, apart from those that we received outside the district, and the imaging parameters used for the 28 cases that reported during this period were variable. However, following July 2008, the imaging parameters employed for the remaining 31 cases were constant: model – ACTIVION 16; software – TOSHIBA, Japan; detector elements: (800 × 28) 22,400/16 slice; kV – 120; mA – 150; Pitch: 10-16 (0.625–1); gantry tilt: 3–5°; section thickness: 3 mm; bone reconstruction algorithm: FC 30; field of view (FOV): 240 mm.

RTA (predominantly two-wheeler) was commonest cause of mandibular trauma and the age group affected was 20–29 years. While March witnessed a peak in casualty incidence, Sunday recorded the maximum frequency, as per day of the week. The parasymphysis was the commonest site of fracture in this region of Karnataka and extremity injury was the predominant form of associated injury. In all, 1018 fractures were documented – 887 affected the mandible. Fifty-nine cases had concomitant mid face injury (totaling 131 fractures). The left side of the mandible was (marginally) more susceptible to trauma, regardless of gender or etiology. Modes of treatment were 'open' or 'closed' – 800 fractures were treated by ORIF and the complication rate observed was 48.46%.

4. Discussion

In this day and age, advancement of research in science and technology has become the 'cornerstone' in all spheres of life. But, of course, without doubt, there lies the inherent risk to injury, be it work-related or transport-related. However, the degree of inter-personal harmony is independent of working or transport conditions, if one may carefully observe. Various factors such as regional geography, traditions or cultural practices, work profile, socio-economic status, level of education and the mode and frequency of transport of people, all greatly influence the pattern and severity of injury. Despite explosive advances in science and technology, maxillofacial fractures, regardless of etiology and/or gender, continue to be incident.

The incidence of mandibular fractures is relatively higher compared to the rest of the maxillofacial region and hence would appear to constitute the major case-bulk in any regional trauma set-up. As per the literature, the mandible is the tenth most often injured bone in the body and the second most often injured bone in the face [1]. However, the nasal bones are fractured more often as a result of facial trauma. Following fracture of the lower jaw, myriad

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