

## ORIGINAL RESEARCH

# MANDIBULAR FRACTURE TREATMENT IN EASTERN INDIA AND COMPLICATIONS FOLLOWING ITS TREATMENT

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### ABSTRACT:

Over a two-year period, individuals with mandibular fractures underwent surgical treatment, and the complications that resulted from that are examined. 225 patients (mean age 32.6 (SD  $\pm$ 14.6) years) who underwent surgery for a mandibular fracture between two years. There were 426 fracture lines in all. 29 of the 213 dentate patients were largely treated with intermaxillary fixation (IMF). On 99 patients, IMF and osteosynthesis were carried out. To enable open reduction and internal fixation (ORIF), 79 individuals solely underwent IMF during surgery. Three of the 12 edentulous patients had Gunning splint treatment. Internal fixation and manual reduction were used to treat nine patients. 442 plates and 1965 screws in all were used. Sixty (26.7%) of the patients had problems, including TMJ dysfunction, dysocclusion (15 patients), contaminated osteosynthesis material (15 patients), and (temporary) hyposensibility of the lip and chin (34 patients) (five patients). For the surgical retreatment required to address a dysocclusion, four patients. The findings of this study provide crucial information for improving the treatment of the broken mandible, and they partially accord with those of other studies.

Keywords: Mandibular fracture, Therapy, Plate osteosynthesis, Complications

### Introduction:

One of the body parts that fractures the most frequently is the maxillofacial area. The treatment of these fractures is difficult and demands knowledge and expertise. Reconstruction that is both functional and aesthetically pleasing is crucial in treating maxillofacial injuries. These wounds can range in severity from small soft tissue damage to significant face skeleton fractures. Mandibular fractures can happen by themselves or in conjunction with other skeletal and face bones. Road traffic accidents (RTAs), unintentional falls, assaults, workplace accidents, sports injuries, and gunshot wounds can all be the aetiology of mandibular fractures. RTA is the major cause of mandibular fracture in industrialised countries, whereas interpersonal violence is the leading cause in underdeveloped countries due to insufficient

law enforcement and implementation of existing traffic and speed restriction rules. This is the only institution at the tertiary level in the area with a fully functional surgical setup. Being a teaching and training facility with a multi-bed hospital attached, a central medical records department places a strong focus on meticulous record-keeping and documentation. The need for a thorough study that could analyse and relate the various patterns and types (The Effect) to the frequently documented aetiological factors (The Cause) and precisely determining as to what extent, if at all, do these factors contribute in these mishaps emerged as a result of these factors as well as the lack of a reliable study focusing upon these cases reported so frequently in this area from a maxillofacial perspective. The current study's goals were to document the prevalence of mandibular fractures and to understand the significance of demography, the influence of social habits, and the role that individual aetiological factors play in these injuries. Additionally, the high prevalence of intoxication in the affected population highlights the growing need for well-documented, scientific evidence that could hasten the strict enforcement of road traffic laws, including the decongestion of roads, the formulation of strict drink-drive policies in this region, and the establishment of mandatory seat belt and safety helmet regulations.

### **Materials and methods :**

Retrospective examination and analysis of the hospital and outpatient data of 225 patients who underwent surgery for a mandibular bone fracture between two years was performed. The hospital database was used to locate the patients. Included were patients who underwent surgical open or closed reduction for any form of mandibular fracture. Patients who had dentoalveolar fractures were not included since dentists typically treat these patients. For the sake of data clarity, patients with panfacial trauma (mandibular trauma combined with a Le Fort I/II/III fracture) were also excluded. Sex, age, the aetiology of the injury, pre-and post-operative radiography analysis, the kind of mandibular trauma, the mode of therapy, and complications were all recorded. The mandibular fracture was identified at the patient's admission to our department or emergency room by either dental panoramic tomographs, submentovertex radiography, or a (cone-beam) CT scan. The mandibular fractures were broken down into ramus, condyle, angle, and body fractures (including symphysis and parasymphysis). Patients were treated in accordance with our department's protocol. After surgery, all patients received customary painkillers (diclofenac 50 mg three times daily with paracetamol 1000 mg four times daily or codeine 20 mg four times daily with paracetamol 1000 mg four times daily). Prophylactic antibiotics were given to patients receiving osteosynthesis treatment for one week (either clindamycin 600 mg three times daily or amoxicillin-clavulanate 625 mg three times daily). Upon review, an oral hygienist from our department saw the patients. Only in instances of persistent illness that did not respond to oral antibiotics was the osteosynthesis material removed (after 2-3 months after surgery). The osteosynthesis material was removed 6–12 months following surgery in order to avoid any potential growth restriction of the mandible in individuals under the age of 18.

Statistical Analysis

The Statistical Package for Social Sciences (SPSS) version 22.0 was used to process the data. Chi square tests and the Student's t test were used for parametric and non-parametric data, respectively.

### Results:

The study's participants, 151 men and 74 women, had an average age of 32.6 (SD± 14.6) years (range 2-88 years). Table 1 provides a summary of mandibular fractures.

**Table 1. Overview of the mandibular fractures**

Type of fracture	No.	%
Unilateral condyle	16	7.1
Unilateral body/angle/ramus fracture	56	24.9
Unilateral condyle fracture+body/ramus/angle fracture	67	29.8
Bilateral condyle fracture	2	0.8
Bilateral condyle fracture+ramus/angle/body fracture	42	18.7
Bilateral body/angle/ramus fracture	42	18.7
Total(%)	225	100%

According to the reason, each form of mandibular fracture is shown in Table 2. There were 426 fracture lines in all. Mandibular body and condyle fractures made up the majority of fracture sites, or about 86 percent of all fractures. Fractures were mostly caused by traffic accidents (42.0%), then by violence (24.2%) and falls (19.2 percent).

**Table 2. Mandibular fractures according to cause of injury**

Fracture site	Fall	Violence	Traffic accident	Sport	Others	Missing	Total	%
Body	39	51	81	14	3	12	200	46.9
Condyle	33	23	85	6	3	16	166	39.0
Angle	9	29	13	1	1	5	58	13.6
Ramus	1				1		2	0.5
Total	82	103	179	21	8	33	426	
%	19.2	24.2	42.0	5.0	1.9	7.7		

### 3.1. Radiographic analysis

Type of pre-and post-operative analysis was divided into dental panoramic tomography, submentovertex radiograph, (cone-beam) CT-scan, and other (e.g., occipitontal radiograph, cephalometric radiograph, posteroanterior radiograph). In total 471 pre-operative radiographical analyses were performed (Table 3). Post-operatively 330 radiographs were taken. For some patients a CT-scan of the skull was performed, mainly for neurological reasons.

**Table 3. Radiographical analyses done pre- and post-operatively**

	Pre-operatively	Post-operatively
Dental panoramic tomograph	169	165
Submentovertex radiograph	158	132
(Cone-beam) CT-scan	67	6
Other	77	27
Total	471	330

### 3.2. Treatment modalities and operation duration

There were 213 dentate patients and 12 edentulous patients. A total of 442 plates (1.5-2.7 mm) and 1965 screws (5-12 mm) were used. Nine patients received plates for reconstruction (2.7 mm). Two patients had their damaged condyle externally fixed with 1.5 mm plates. 29 of the 213 dentate patients received IMF as the main treatment. In 97 individuals, IMF in conjunction with osteosynthesis was carried out (2.0 mm plates). 2.7 mm reconstructive plates were applied to two patients. IMF was only used intraoperatively in 79 individuals to enable open reduction and internal fixation. Six patients underwent manual ORIF (2.0-2.7 mm) without the use of IMF. 2.7 mm plates were used to treat comminuted body or angle fractures in five individuals. Transorally was used to apply these plates.

Twelve patients with no teeth had treatment for mandibular fractures, often as a result of falls (seven patients). Gunning splints were utilised as IMF in three edentulous patients, and manual fracture reduction was performed on nine patients. Four patients had 2.7 mm treatment, while six patients received 2.0 mm treatment.

Two dentate individuals were treated extraorally using a preauricular technique out of 127 patients who had a unilateral or bilateral condyle fracture. These individuals had bilateral condylar fractures that were significantly displaced. The typical surgery lasted 102.2 ( $\pm 28.0$ ) minutes. ( $P < 0.01$ ; Pearson's R 0.7) The length of the procedure strongly predicted the number of fractures.

### 3.3. Complications

34 (or 15.1%) of 225 patients expressed concern about decreased sensitivity in the lip and chin area on the broken side. None of the patients reported having hypoaesthesia, dysaesthesia, or anaesthesia that persisted after six months. There were no objective analyses carried out. During follow-up, 15 (6.7%) patients with dysocclusions visited the outpatient clinic; 11 of these dysocclusions were treated with traction using guided elastics. Within 4 weeks following surgery, two (0.9%) patients underwent surgical revision, one with a fractured mandibular body and the other with a combined condyle fracture and a fractured mandibular body. The reduction and fixing process was revised for these individuals.

Six months after their original operation, two additional patients who developed a dysocclusion underwent surgical retreatment. One patient experienced a lateral open bite on the side with the cracked mandibular angle. A unilateral sagittal split osteotomy was performed to surgically rectify this. The fourth patient experienced an anterior open bite along with bilateral condylar fractures, a body fracture, and other injuries. Bilateral sagittal

split osteotomies were performed on this patient. Both dysocclusions responded well to treatment. As per our department's practise, follow-up was halted six months following surgery, therefore the long-term effects of the occlusions in all patients remain unclear.

Infected osteosynthesis was detected in six of the patients. The osteosynthesis material was taken out of three of these individuals. Oral antibiotics were successfully used to treat the remaining patients. During the follow-up, temporomandibular dysfunction manifested in five patients. Physical therapy was a beneficial treatment for these patients.

### **Discussion:**

The epidemiology of 225 patients who underwent surgical treatment for 426 mandibular fracture lines in a Dutch population is shown in the current study. There are both surgical and non-surgical mandibular fracture treatment options (Chuong et al., 1983; Olson et al., 1982; Stacey et al., 2006). Out of the 225 patients, 213 had teeth, and 12 were edentulous. A total of 442 plates (1.5-2.7 mm) and 1965 screws (5-12 mm) were used. IMF was used primarily to treat 29 patients. In 99 individuals, IMF and osteosynthesis were carried out. IMF was only carried out intraoperatively in 79 individuals to enable open reduction and internal fixation. Gunning splints or manual reduction and fixation were used to treat the broken mandible in 12 edentulous patients. All mandibular body, angle, and ramus fractures were treated with plates because plate osteosynthesis is now the standard of care for treating facial fractures (Alkan et al., 2007; de Matos et al., 2010; Ellis et al., 1985). There were 442 plates used in total. Early mobilisation, according to Zachariades et al., is essential in the management of condylar fractures (Zachariades et al., 2006). Rigid internal fixation allows for early mobilisation and stabilisation, therefore conservative treatment is the preferred course of action. Open reduction is nevertheless sometimes advised, particularly in cases of significantly displaced and dislocated fractures with ramus height loss. Only two patients received an open reduction, despite the fact that some patients in the study population had badly displaced condyle fractures. Patients with a significantly dislocated condyle and patients with some dislocation did not differ in their treatment outcomes or experience any problems. Furthermore, there were no differences between conservative treatment and open reduction using a preauricular technique in terms of treatment outcomes or side effects. Since there were only a few patients with unilateral or bilateral condyle fractures, the treatment results could not be measured objectively, and it is therefore impossible to draw any definite conclusions from them. Although it is generally believed that there is a greater likelihood of developing an open bite following a bilateral condyle fracture, there is no literature on the subject. Following (uni- or bilateral) condyle fracture, Silvennoinen identified two serious sequelae (Silvennoinen et al., 1994). Regardless of the level or direction of angulation between the fragments, ramus height was considerably reduced in patients with persistent dysocclusion. Patients who had displaced condyles experienced jaw deviation when opening their mouths without occlusal disturbances. In our study, two patients had their open bites surgically retracted. One of these individuals experienced an anterior open bite in addition to bilateral condyle fractures and body fractures. The lack of statistical significance was mostly caused by the small number of patients.

After maxillofacial trauma treatment, radiographs are frequently taken for a variety of reasons, such as surgical treatment evaluation, defect detection following surgery before the patient is discharged, registration of the osteosynthesis material for future removal, for teaching and medico-legal reasons, and more (Durham et al., 2006; Jain and Alexander, 2009). 471 pre-surgical radiographs and 330 post-operative radiographs were collected for the treatment of 225 patients. Whether all of these post-operative radiographic examinations were required is debatable. According to studies, clinical judgement alone is sufficient for the postoperative evaluation of maxillofacial fractures, and radiographs are not required (Durham et al., 2006; Jain and Alexander, 2009). However, because it is outside the purview of this study, this topic has to be further investigated and won't be covered here.

The temporomandibular dysfunction, dysocclusion, contaminated osteosynthesis material, and hyposensibility of the lip and chin were among the 60 patients' (26.7%) moderate or serious problems. This shown to be in line with the literature already in existence (Seemann et al., 2010b; Serena-Gomez and Passeri, 2008). For the surgical retreatment required to rectify a developing dysocclusion in four individuals. Osteosynthesis that was infected was removed in three individuals.

### **Conclusion:**

The current study provides a summary of 225 individuals who underwent mandibular fracture surgery. Sixty individuals (26.7%) showed minor or significant problems. This turned out to be consistent with the literature already in use. Even though there is little literature on the subject, it is generally believed that there is a high likelihood of developing an open bite following a bilateral condyle fracture. The prevalence of an open bite and the associated clinical issues requiring surgical repair requires further study. It is important to investigate whether routine post-operative radiographs are required for the evaluation of maxillofacial fractures.

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