



## COMMENTARY



# An uncommon cause for a common fracture - Commentary

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**Abstract**

**Aim:** Mandibular angle fracture is one of the common fractures which a maxillofacial surgeon faces, which has a variable etiology. The aim of this commentary is to present a rare case of a mandibular angle fracture caused by heavy bite force and amplified by the wedging action of impacted mandibular third molar in a 29-year-old male patient. This is a first case report in the literature as per our knowledge, where a strong bite force caused a mandibular angle fracture, during heavy weight lifting in the gymnasium. **Conclusion:** The consequent fracture was reduced with an open reduction and internal fixation under local anaesthesia. An unusual case of a mandibular angle fracture with a very uncommon etiology of heavy bite force has been presented here with its management. **Clinical Significance:** This commentary discusses the relationship between the normal bite force, force required to fracture the mandible, and how a fracture of this kind can affect a person involved in non-contact sports.

**Keywords:** Angle fracture, bite force, impacted third molar, non-contact force, prophylactic mouth guard

**Introduction**

The mandible constitutes the bony framework for the lower third of the face. The angle, condylar process, and either side of the mentum are considered as mechanical weak points.<sup>[1]</sup> Mandibular angle fracture may be defined as a fracture located behind the second molar extending from the junction of the body and ramus in the retromolar area till the inferior border of the body and posterior border of mandible.<sup>[2]</sup> According to Halazonetis, the weakest region of the mandible is the angle.<sup>[1]</sup> There are two main proposed reasons: The first being, smaller cross-sectional area as compared to its neighbouring segment, and second, the presence of unerupted third molar which further weakens the area.<sup>[3]</sup> The force required to fracture a mandible is around 44.6–74.4 kgf.<sup>[4]</sup> There can be possibility that one's self-biting force, which are 44.8±19.8 kgf in males and 29.6±11.6 kgf in females, in the presence of an impacted third molar, could possess a possible chance of mandibular angle fracture, as the force is twice that required to fracture a mandible.<sup>[4,5]</sup> This type of injury can affect athletes involved in contact and non-contact sports such as heavyweight lifter, regular person using excessive force during lifting heavy objects, patients with severe bruxism, osteogenesis imperfecta, osteoporosis, or any other pathological bone diseases; donor site weakness after mandible is used as graft for donor site.<sup>[6-8]</sup>

**Case Report**

A 29-year-old male patient reported to the Department of Oral and Maxillofacial Surgery with a chief complaint of pain in the lower right back tooth region. He gave a history of strong clenching of teeth while he was lifting heavy weights in the gym about a week back after which the pain started.

On extraoral examination, tenderness was present on the right angle region of the mandible. No step deformity could be palpated [Figure 1]. Mouth opening was adequate. Intraorally, 48 with distal cusp visible was noted, which was mildly tender on palpation. Occlusion was acceptable with normal condylar movements. Orthopantomogram revealed an undisplaced fracture on the right angle of the mandible just mesial to the impacted third molar propagating till the lower border [Figure 2].

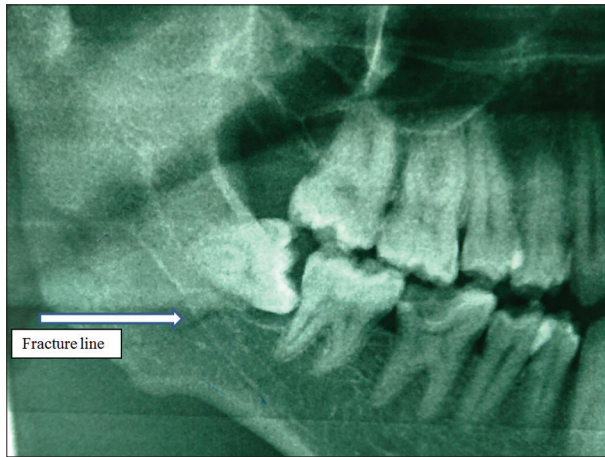
Under local anesthesia with sedation, fractured site was exposed intraorally by giving a Modified Ward's incision and reflecting a full thickness mucoperiosteal flap. Fracture line was visualised just below the impacted third molar [Figure 3]. Fracture was reduced and fixed with 2.0 mm four hole with gap miniplate system according to Champy's line of osteosynthesis. Following which, surgical removal of the third molar was done and closure achieved in layers [Figure 4].



**Figure 1:** Frontal view of the patient



**Figure 3:** Intraoral photograph showing fracture line



**Figure 2:** Orthopantomogram showing fracture line extending from the mesial surface of 38 to the lower border of the mandible in the angle region



**Figure 4:** Open reduction and internal fixation done with stainless steel mini plates and surgical removal of the third molar done

## Discussion

Mandible is a tubular bone bent into a horseshoe shape. It is strongest at the midline with progressively less strength toward the condylar process.<sup>[1]</sup> Mandibular fracture ranked second 23.3% to nasal bone fracture and 58.6% among maxillofacial fractures.<sup>[9]</sup> Among mandibular fractures, the incidence of angle fracture is around 27–30%,<sup>[10]</sup> as it consists of a transition zone between the dentate and edentulous part of the mandible, where there is a change in the orientation of the grains.<sup>[11]</sup> The cross-sectional area of the mandibular angle is less compared to the anterior part of the mandible.<sup>[3]</sup> Various studies provide evidence that patient with impacted third molar has a significantly more incidence of angle fracture.<sup>[2]</sup> Magnitude and direction of the impact play a pivotal role in the location and severity of the fracture.<sup>[12]</sup> Majority of the cases with angle fracture are the result of interpersonal violence, motor vehicle injury, self-fall, and sports injury. Contact sports such as rugby, football, ice

hockey, and basketball are a known cause of facial injuries, but in our case, we see that non-contact sports such as weight lifting can cause mandibular angle fracture.<sup>[1,6-8]</sup>

Deep impacted molars were not generally associated as a risk factor for mandibular fractures unless a surgical removal of the same was attempted, as compared to superficially placed impacted molars. A partially erupted third molar amplifies the occlusal force that is transmitted to the lower border of the mandible, due to stress concentration at the root apex.<sup>[11]</sup> In the case discussed here, during strenuous activities like weight lifting, a large amount of force was applied by the masticatory muscles on the angle, by the said individual. While biting, due to the wedging action, the bite force got intensified and exceeded the threshold of mandible. The angle, being already weakened by the presence of third molar, was easily fractured. Radiographically, we can classify the patients' third molar as IIB (Pell and Gregory). According to Halmos *et al.*, deep impacted molars (IIC and IIIC) did not cause angle fracture

as compared to the superficial positions (IA and IIB). They also stated that the IIB position was 1.5 times more potent to cause fracture as compared to IA. It was also found that mesioangular angulation had the mandibular angle fracture followed by vertical and distoangular. The minimal possibility was found with bucco-version angulations.<sup>[13]</sup> A study showed that fused roots had a higher possibility of fracture, compared to teeth with separate roots.<sup>[11]</sup> This is in accordance with our patients' third molar which is mesioangular and IIB, with fused roots. In most reported cases, external forces were the etiology of fracture; however, in this case, body's own internal bite force was enough to fracture the angle, amplified by wedging action of the third molar. Athletes and sports person are often on steroid supplementation which can even weaken the bone and make it prone to fracture.<sup>[14]</sup>

Management of these peculiar fractures may include reduction and fixation of fractured segment for stabilization followed by removal of the impacted molar.<sup>[15]</sup> Prophylactic removal of partially impacted third molar may be carried out for prevention although a minimum of 6 months may be required for bone fill and recovery of enough strength. The use of mouth guard and soft splints during weight lifting is advisable so as to prevent any untoward injury to the jaws and teeth.<sup>[16]</sup>

## Conclusion

Actual stress pattern that occurs in the mandible is influenced by several factors, including the bony anatomy, masticatory forces, occlusal disharmony, point of application of force, direction, and severity of the impact determines the site of fracture. As we experienced, body's own force can be enough to fracture a mandible which is already weakened by a partially erupted third molar, and we like to suggest persons involved in gymnasium and sports such as rugby and all contact and non-contact sports, to get prophylactic removal of the third molar and also to use soft split, mouth guard, and bite guard, as prevention is always better than cure.

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