

## Prognosis of teeth in the line of mandibular angle fractures

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### ABSTRACT

**Introduction:** The purpose of this study was to evaluate teeth involved in the line of fracture, clinically and radiographically, and their associated complications so as to indicate if they should be managed conservatively or extracted. **Materials**

**and Methods:** Data were collected from patients records treated of mandibular angle fractures. It was included pre and postoperative panoramic radiographs, information such as demographic data, age and sex, mobility, and vitality of teeth in the line of fracture, teeth stabilizing the fracture segment. **Results:** The sample presented 50 patients with teeth in the line of mandibular angle fractures. A total of 32 patient's teeth in the line of fracture were vital during the 6<sup>th</sup> week postoperative follow-up and 18 patients with their teeth in the line of fracture were nonvital of which 6 were endodontically treated and the rest 12 patient's teeth in the line of fracture were extracted as they showed signs of infection. **Conclusion:** This study demonstrated that the presence of teeth in the line of fracture is not a limiting factor for the treatment. Despite the risk of complications, tooth in the fracture line should be preserved for its merits. A regular clinical and radiological follow-up should be mandatory for at least a period of 1 year.

**KEY WORDS:** Tooth vitality, mandibular angle fracture, Fracture line, tooth mobility,

The mandible due to its relatively prominent position is more prone for fractures and accounts for the most common facial bone injuries. Almost, 50% of the mandibular fractures occur in the teeth bearing region.

A common problem in managing mandibular fracture involves dealing with teeth in the line of fracture. Commonly, there are impacted wisdom teeth associated with mandibular angle fractures. However, any fracture involving the dentate areas of the jaw has the potential to involve erupted teeth in the fracture line.

The fracture line with involved teeth communicates

through periodontal space with oral cavity, which may allow the spread of infection. Another possibility is that the blood supply of these teeth may be disturbed by trauma, and in that case causing necrosis of the pulp with subsequent infection.

In the literature, there are different attitudes and procedures of various authors regarding the tooth in mandibular angle fracture line. Čupar<sup>[1]</sup> in 1935, in the preantibiotic era, believed that the extraction was absolutely indicated if it was a very carious tooth or retained root. The danger of infection in a compounded fracture posed severe problems in treatment. Osteomyelitis, delayed healing and nonhealing were sequelae of mandibula

fractures rendering the treatment often prolonged and complicated. Ditchfield<sup>[2]</sup> in 1960 agreed that disrupted periodontal ligament around tooth might represent the entrance of infection, but he considered that the empty tooth socket after extraction of such teeth is even wider communication fulfilled only with blood clot. Rowe and Killey<sup>[3]</sup> in 1968 believed that the tooth in the fracture line should be removed only if there was suspicion that it was nonvital. Later, in the literature we could find the discussion that even such a devitalized tooth should be kept if needed for fixation.

In the recent years, the management of teeth in the line of mandibular angle fracture has become more and more conservative. Use of antimicrobial drugs has made infection control possible so that the prophylactic removal of the tooth in the fracture line became unnecessary.

Tooth should be kept in fracture line if its role in stabilizing bone fragments exceeds the possibility of development of inflammatory complications. Criteria for the decision should be the mobility of the teeth in the fracture line, associated fracture of the tooth root, periapical lesions and the role of the teeth in mandibular angle fracture line in the stabilization and fixation of bone fragments. The current evidences presented by researchers all over the world seem to be overwhelmingly in the support of conservative management of such teeth.

The aim of this study was to evaluate teeth involved in the line of fracture, clinically and radiographically, and their associated complications so as to indicate if they should be managed conservatively or extracted.

## Materials and Methods

This study included 50 patients of both sexes with mandibular angle fractures in the age group of 18-48 years, presenting no medical contra indications for the planned procedure. Detailed history of the patients was recorded in standardized format. Data collected from the patients included pre and postoperative panoramic radiographs, sex and age at the time of injury.

The sites of fractures in the mandible consisted angle and excluded symphysis, parasymphysis, body and condylar fractures, all of which were treated with open reduction and internal fixation with conventional stainless steel miniplates (2 and 2.5 mm, 4- and 6-holes plates). The patients were clinically and radiologically evaluated during preoperative, immediate postoperative, 6 weeks postoperative and during regular follow-ups.

All the patients were administered intravenous ampicillin 500 mg, metronidazole 400 mg, and intramuscular diclofenac sodium 50 mg postoperatively, which varied between 5 and 7 days. They were also prescribed an antiseptic chlorhexidine mouthwash for a week's time.

The following clinical parameters were used:

1. Mobility of the tooth involved in the fracture

2. Vitality of the tooth involved in the fracture.

The following radiological parameter was used:

1. Teeth stabilizing the fracture segment.

## Results

Males had 96% of mandibular fractures than females with 4%. The anatomic location of mandibular fractures was 80% in the angle region and 20% in the parasymphysis region.

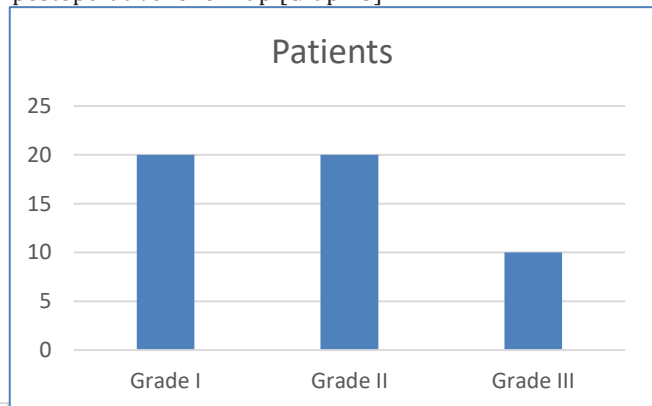
## Clinical Parameters

### Mobility of tooth in line of fracture

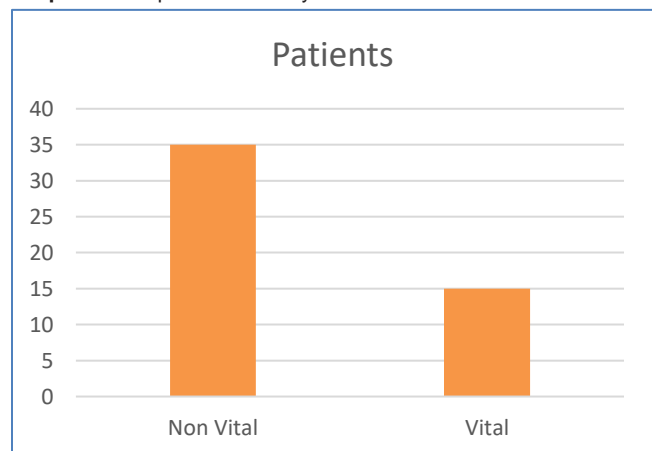
Ten patients had Grade III mobility of the teeth in line of fracture. 20 patients had Grade II and 20 patients had Grade I mobility of the teeth in the line of fractures [Graph 1]. Mobility was recorded preoperatively with conventional method.<sup>[4]</sup>

### Vitality of the teeth in the line of fracture

Totally, 35 patients with teeth in the line of fracture showed no response to cold pulp testing (nonvital) preoperatively. Rest 15 patients showed positive response for cold pulp testing (Vital) [Graph 2]. 26 patients with their teeth in the line of fracture showed positive response (vital) and 24 patients showed no response to cold pulp testing during 1<sup>st</sup> week postoperative follow-up [Graph 3].



Graph 1: Pre-operative mobility

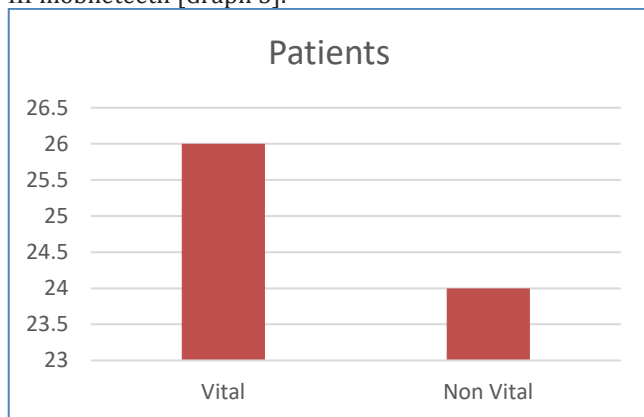


Graph 2: Pre-operative vitality

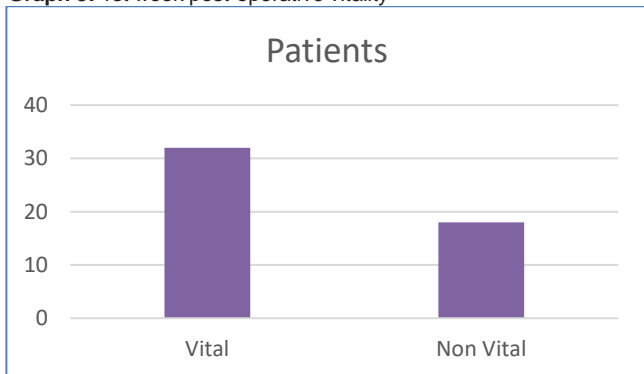
32 patients with teeth in the line of fracture showed positive response to cold pulp testing during the 6<sup>th</sup> week postoperative follow-up. There was a significant improvement in the vitality of the teeth in the line of fracture during the 6<sup>th</sup> week postoperative evaluation. The rest 18 patients with their teeth in the line of fracture showed no response to the cold test (nonvital) [Graph 4].

**Radiological parameter**

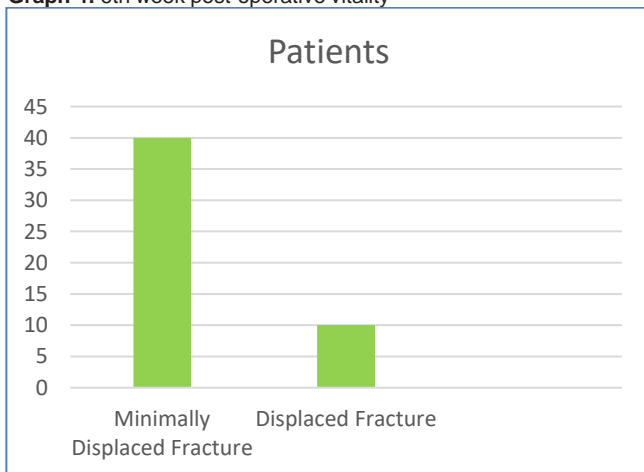
Forty patients panoramic radiographs showed minimally displaced fractures due to the presence of teeth in the line of fractures. In 10 patients, the panoramic radiographs showed displaced fractures due to the fully erupted Grade III mobileteeth [Graph 5].



Graph 3: 1st week post-operative vitality



Graph 4: 6th week post-operative vitality



Graph 5: Teeth stabilizing fracture segment

**Discussion**

The mandible is the area of the face with major incidence of fracture. Its prominence and position in the skeletal face predispose to frequent traumas. Some studies<sup>[5]</sup> have demonstrated that it is really common to observe teeth in the line of fractures. Others authors<sup>[6]</sup> mentioned that the presence of the teeth can be one of the determinant factor of the fracture location.

The management of teeth in the line of fracture had changed within the past years. In the past, it was thought that teeth in the line of fractures should be immediately removed.<sup>[7]</sup> Although recent studies support the vision that non infected teeth in the line of fracture can be preserved.<sup>[5]</sup>

This study demonstrated that in 32 patients the vitality of the teeth in the line of fracture with Grade I and II mobility was gradually improved and where as in 18 patients the teeth in the line of fracture remained non vital and out of which 12 patients showed signs of infection due to Grade III mobility which had to be extracted to prevent further complications.<sup>[6,8]</sup> The rest 6 patients with nonvital teeth were subjected for endodontic treatment. Macan *et al.*<sup>[9]</sup> in his study concluded that one third of the teeth were reinnervated within 6 weeks after injury and a year after the injury 81% were reinnervated.

The study demonstrated that 40 patients with teeth in the line of fractures favoured the treatment as they contributed in stabilizing the fractured segments. Correct repositioning of fractured fragments is made quicker and easier if the tooth in the line of fracture is conservatively managed. The teeth in the line of fracture provided occlusal reference and posterior stop. They have a stabilizing effect and do not impede bone healing.<sup>[10,11]</sup> If extracted, they increase the risk of fracture contamination and may sometimes be difficult to suture.<sup>[4]</sup> Neal *et al.*<sup>[5]</sup> study supports the vision that noninfected teeth in the line of fracture can be preserved. The maintenance of these teeth can favour the treatment in some cases; therefore, they contribute for the stability of the fracture. Its removal can be harmful, once that can diminish the contact between fragments, cause additional trauma to the region, increase the risk of contamination of the fracture through the empty alveolus, convert a closed fracture into an open fracture and cause the loss of the bony bunch in the zone of tension. Each case must be evaluated individually, for maintaining or not the teeth in the fracture line, depending on the clinical and radiographic findings.<sup>[12]</sup>

It is generally accepted by most surgeons that antibiotic therapy should be administered when teeth are left in the line of fracture because of open nature and contamination of the oral cavity.<sup>[13]</sup> Conservative treatment of teeth involved in the line of mandibular fractures has a favourable prognosis, especially if optimal reduction of the jaw fragments is achieved.

**Conclusion**

The study demonstrated that the teeth presence in the line

of mandibular angle fracture is not a limiting factor for the treatment. Teeth associated with mandibular angle fracture should not be removed on a prophylactic basis to reduce the risk of infection of fracture sites just if there is an absolute indication for removal and when retained, they should be followed-up clinically and radiographically for at least 1 year with a view to endodontic treatment if indicated. Patients with teeth in the fracture line showing no response on pulp vitality testing should be advised extraction to avoid further complications. Despite the risk of rate of complications, tooth in the fracture line should be preserved for its merits. A regular follow-up both clinical and radiological should be mandatory for at least a period of 1 year. Each case must be evaluated individually, for maintaining or not the teeth in the fracture line, depending on the clinical and radiographic findings. As our sample size consisted of only 50 patients, a larger sample size with long-term follow-up can better evaluate the teeth in the line of fracture.

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