

# Practicable Alternative for Mandibular Fracture Management: Case Report

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**Abstract** - Although Open Reduction and Internal Fixation (ORIF) by using plates and screws system is gold standard for mandibular fracture management worldwide, there are some barriers to be practiced in every secondary level hospitals of Myanmar. Closed reduction by Maxillo-mandibular fixation (MMF) is still the most commonly used treatment option for mandibular fracture management. MMF by using Intermaxillary Fixation (IMF) screws is a new technique which has become popular in recent decades. It is a bone anchored technique which is completely different from other conventional MMF achieving techniques. A 25 year-old woman, worked as a teacher, from Phyu Township, Bago Region came to Department of Oral and Maxillofacial Surgery, University of Dental Medicine, Yangon for the treatment of mandibular fracture due to motorcycle accident. She was treated by using IMF screws. In this article, treatment outcomes of this case were reported.

**Keywords;** *fracture mandible, intermaxillary fixation screws, maxillomandibular fixation*

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## Introduction

Myanmar is one of the developing countries where use of motorcycles and other vehicles in peri-urban and rural areas

is increasing in recent years. According to Ministry of Health and Sports' data in Hospital Statistics Report 2014-2016, incidence of road traffic accident (RTA)-related mandibular fractures showed increasing pattern.

Open Reduction and Internal Fixation (ORIF) is globally accepted as gold standard in the overall management of mandibular fractures since Champy *et al.*, (1978) proved the ideal lines of osteosynthesis. Its advantages include shorter operation time, easier to assess traumatized area, easier to reduce in comminuted fracture, and increased compliance and comfort of patients. But some drawbacks such as incidence of infection, expensive treatment costs, technically difficult, dependence of surgeon's skill and needs to do under general anesthesia are still present as controversial issues (Fonseca, 2013).

In recent decades, many developments have been made for plates and screws systems for better fixation and stabilization of the fractured segments (Luhr, 1985). Because of its expensive treatment costs compared to other treatment options, it has limitations to practice in every State and Region Hospitals of Myanmar.

Closed reduction by Maxillomandibular fixation (MMF), is still the most commonly used treatment option in Myanmar for mandibular fracture management. For achieving MMF, Erich arch bar is the most commonly used worldwide. But its usage is minimal in Myanmar because of difficult technique compared to Interdental Intemaxillary

Fixation (IDIMF) i.e. using 0.4mm diameter stainless steel wires.

These MMF methods are tooth-anchored techniques which use the strength of teeth to stabilize maxilla and fractured mandible to get correct occlusion. Advantages of this technique are low cost and can be done only with Local anesthesia. Disadvantages includes long period of immobilization, lack of patient compliance, inability to perform oral hygiene care, wire trauma to soft tissues, wire loosening and inability to obtain complete rigidity during treatment period. Moreover, it has an inherent risk of perforation of the operators' gloves and consequent wire stick injury caused by the sharp-ended wires (Coburn *et al.*, 2002).

And this technique is difficult to use when teeth are grossly carious, periodontally compromised, crowded and when patients have extensive crown and bridgework. Finally, wires tightened during the application of interdental wires around the teeth may cause an ischemic necrosis of the marginal gingiva and subsequent loss of vitality of the tooth. It is also difficult to maintain gingival health (Ayoub & Rowson, 2003).

Arthur and Berardo (1989) first published an article in British Journal of Oral and Maxillofacial Surgery named "A Simplified technique of maxillomandibular fixation" introducing the use of conventional 2.0 mm titanium bone screws which are directly linked with wire loops to establish MMF. They named these bone screws as Intermaxillary Fixation (IMF) screws. MMF using IMF screws is different from other traditional MMF achieving methods. It is bone anchored method.

Several reports for numerous and distinctive advantages of IMF screws over traditional methods had been made during the 1990s (Vartanian & Alvi, 2000).

Some of the advantages includes simplicity of technical handling, low risk of inadvertent skin punctures with decreased risk of transmission of viral pathogens, can be done only under local anesthesia, minimal amount of hardware in the oral cavity, improved comfort for patients and painless and fast removal in the office (Cornelius & Ehrenfeld, 2010).

The overall positive response to bone anchoring MMF technique using IMF screws fostered the design and manufacturing of specially designed IMF screws (Jones, 1999). The second-generation IMF screws has polished and smoothed capstan-style heads with milled channels for the uptake of the wires to minimize damage to the labial mucosa and increase the patient's comfort (Schneider *et al.*, 2000). During last decade, IMF screws become self-drilling which are hand inserted without predrilling and power equipment (Coletti *et al.*, 2007). This provides additional safety against contamination by infectious aerosols and blood or saliva splashes generated during drilling with handpieces and avoids thermal necrosis of the bone or the mucosa (Pigadas *et al.*, 2008).



Figure 1. Second-generation self-drilling Titanium IMF screw (10 mm)

## Case Report

A 25 year-old woman from Phyu Township, Bago Region came to University of Dental Medicine, Yangon with the complaint of pain at lower right posterior region for 4 days. Via through history taking, she is primary school teacher and suffered a motorcycle accident on her way back to home from school last 4 days ago. There is no initial loss of consciousness after accident and had sent to Phyu Township Civil Hospital. At hospital, cleansing and dressing were done for lacerations and abrasions from face, leg and arm areas and no admission for hospital had been made.

On the day after injury, patient decided to go to outside private Dental clinic due to severe sharp shooting pain from right side of lower jaw. Dental Surgeon noticed there is fractured mandible via clinical examination and urged patient to look for treatment at University of Dental Medicine, Yangon.

On examination, there were two sites of fractures in the mandible: right angle area and left parasymphysis area. It was confirmed by panoramic radiograph. There was no comminution or severe displacement.

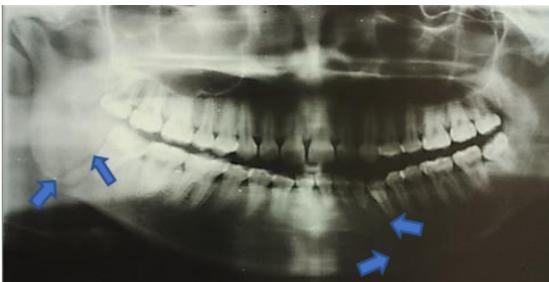


Figure 2. Pre-operative Panoramic Radiograph showing fractures present at right angle and left parasymphysis area

Screw insertion site was determined after identifying all anatomic landmarks both clinically and radiographically.

Particular attention was paid to the mental and infraorbital nerve and the tooth roots, most importantly the canine root which is the longest of the tooth roots. Screws are inserted superior, and lateral to the canine root in the maxilla and inferior and lateral to the canine root in the mandible. Root tip of canine is usually located parallel to the cusp tip of canine and 3 times of distance between cusp tip of the crown and cemento-enamel junction (Purmal *et al.*, 2013). It is checked clinically and confirmed by preoperative panoramic radiograph.

One IMF screw was placed at junction of attached and reflected mucosa, i.e. mucogingival junction between permanent canine and first premolar of each quadrant, total of four screws (AO Surgery Reference, 2019). MMF was achieved by 0.4 mm diameter stainless steel wire by passing through the milled channels, present at capstan-style heads of IMF screws of same quadrant, i.e. total of two intermaxillary wires were used.

Operation time was only 26 minutes which was relatively short while compared to other conventional MMF techniques. And technique was easy and patient was satisfied with the treatment procedure.



Figure 3. Immediate Post-operative Photo after MMF

Patient was advised to take liquid diet only for 5 weeks and not to do any contact

sports for 6 weeks. Postoperative radiological assessment was made to access screw location and potential injury to adjacent tooth roots. Maxillomandibular fixation period was for 5 weeks and two intermaxillary wires were released after clinical assessment was made when sufficient union between two fracture segments have been achieved.



Figure 4. Post-operative Panoramic Radiograph

Four IMF screws was removed 1 week after intermaxillary wires were released. During the removal of IMF screws, it took only 12 minutes to remove all 4 IMF screws and only mild discomfort was present. Overall patients' convenience level on treatment is significantly high and as treatment outcome, acceptable pre-injured occlusion can be restored.

IMF screws need shorter operation time to insert and remove, lesser incidence of glove perforation and higher patients' convenience level. Moreover, stable occlusion can also be achieved after MMF using IMF screws. Most common limitations of IMF screws are mucosal overgrowth around screw insertion site and iatrogenic tooth root contact which can be avoided by making systematic and through preoperative clinical and radiological assessments (Cornelius & Ehrenfeld, 2010).

As conclusion, because of its usefulness outweighs limitations, use of IMF screws for achieving MMF is a

practicable alternative in mandibular fracture management.

## COI

The authors declare there is no potential conflict of interest.

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