



**Research Article**

## **CHALLENGES IN THE SURGICAL MANAGEMENT OF ANGLE FRACTURE: A CASE SERIES**

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### **ABSTRACT**

Mandibular fracture is the 2nd most common fracture of the face after nasal bone and 10th most commonly fractured bone in the human body. Anatomic part of the mandible are the symphysis, parasymphysis, body, angle, ramus, coronoid process, condyle, and alveolus. Various treatment modalities have been performed in the treatment of mandibular fracture in angle, such as closed treatment using suspension wire, arch bar, open fixation using miniplate, compression plates, locking plates performed.

In this case series we like to analyze the outcome of mandibular angle fracture with analysis of outcome of open reduction and internal fixation using miniplate with different modality of treatment, stabilisation and occlusion, post operative sequelae, comparing jaw dysfunction, complication associated.

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### **INTRODUCTION**

The mandible is the largest and strongest of the facial bones, its prominence, position, lack of bony support and its mobility make the bone prone to fracturing. Mandibular fracture is the 2nd most common fracture of the face after nasal bone and 10th most commonly fractured bone in the human body. Anatomic parts of the mandible are the symphysis, parasymphysis, body, angle, ramus, coronoid process, condyle, and alveolus. There are three weak points of the mandible that often dictate where a mandibular fracture will occur. These weak points are the neck of the condyle, the angle, especially if a third molar is present; and the mental foramen region.

In the posterior mandible, the high incidence of fractures of the angle of the mandible is attributed to a thinner cross-sectional area relative to the neighbouring segments of the mandible, the curvature of trajectories in the angle region, forces from the masticatory apparatus, and the presence of third molars, particularly those that are impacted; which weaken this region. Mandibular angle fractures are often isolated or associated with symphyseal or condylar fractures while biangular mandibular fractures (BMF) are instead a rarity. To analyze the biomechanics, Potter and Ellis found in a series of studies that "the incidence of complications after fractures of the mandibular angle are inversely proportional to the rigidity of the fixation applied."

This was contrary to conventional wisdom, which generally stated that more stability led to fewer complications. Barber *et al* pondered "how a plating system that you know is less rigid than other plating systems can lead to fracture healing and

optimum clinical results and minimum complications with no maxillomandibular fixation used postoperatively. Facial fractures and have a high complication rate (0%-32%). The angle also has limited intraoral access making treatment difficult. It also leads to rotation of the proximal and distal fracture segments and causes displacement of the ramus in unfavorable fractures. Treatment of mandibular angle fracture is often challenging and generates the highest frequency of complications with rates as high as 32%.<sup>(4)</sup> The complications described most frequently are mandibular asymmetry, temporomandibular joint pain, malocclusion, transient facial nerve palsy, wound infection, osteosynthesis failure and pseudoarthrosis.

The intervention is aimed at reduction of the fractured segments into their normal anatomic positions, and prevention of movement by immobilization of the fractured bone thereby allowing osseous union to occur. The ultimate goal is to restore occlusion, mandibular anatomy and jaw function. Treatment approaches range from conservative non-invasive management by 'Closed' reduction and immobilization using Intermaxillary fixation (IMF) to the more invasive surgical 'Open' reduction with internal fixation.

In this case series we like to analyze the outcome of mandibular angle fracture with analysis of outcome of open reduction and internal fixation using miniplate with according to the principles outlined by Champy. Different modality of treatment, stabilisation and occlusion, post operative sequelae, comparing jaw dysfunction, complication associated. Post operative sequelae – such as post operative pain, bony and soft

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tissue infections, nonunion, nerve injury, osteomyelitis, malocclusion, and malunion.

**Case 1**



Pre Operative Xray

**Case 1**



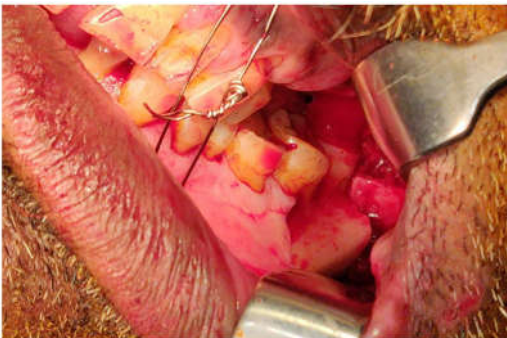
Inter operative

**Post Operative**

**Case 1**



**Case 3**

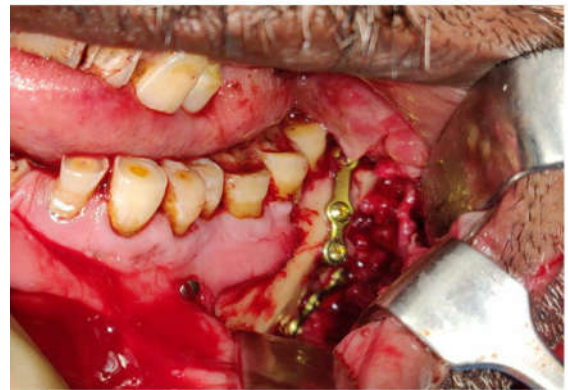


**Case Report 1**

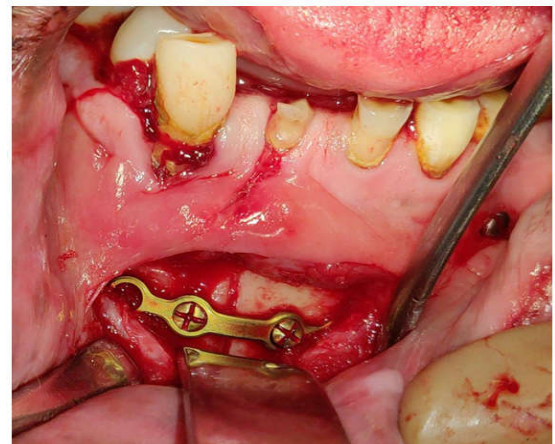
A 28 years old male patient reported to rv dental college with chief complaint of road traffic accident with a sustained injury to face. The had History revealed alleged fall from a bike. He

have history of pain and improper bite, no history of loss of conscious, no history of ent or nasal bleeding, no history of vomiting or seizure. Patient with alleged history of pain in the left side of his face. On clinical examination showed swelling and truisms, tenderness at the mandibular angle, palpation bilaterally, and post-traumatic malocclusion (left posterior pre contact). Step noted on 38 region, vestibular tenderness noted on left third molar region OPG reveals fracture of left side mandible. Treatment performed are closed reduction of right parasymphysis done using arch bar, then tooth of fracture line 38 removed, reduction of fracture one using intra oral vestibular approach, using one 4 hole with gap plate ans secured with 2mm screws. Closure done using 3-0 vicryl, pressure dressing done, patient followed up, after 4 week arch bar is removed, patient followed for 3 months

**Case 3**



**Case 3**



**Case Report 2**

A 19 years old male patient reported to rv dental college with chief complaint of road traffic accident with a sustained injury to face. No history of loss of conscious, no history of ent or nasal bleeding, no history of vomiting or seizure. Patient with alleged history of pain in the right side of his face. On clinical examination showed swelling, tenderness at the mandibular angle, lower step noted, vestibular tenderness on 48 region noted and post-traumatic malocclusion OPG reveals fracture of l right side mandible. Treatment performed, then tooth of fracture line 48 removed, reduction of fracture one using intra oral vestibular approach, using one 4 hole with gap plate ans secured with 2mm screws. Closure done using 3-0 vicryl, pressure dressing done, patient followed up 1 week, 4 week, 3 months interval

**Case 2**

**Pre operative occlusion**



OPG reveals right angle fracture



**Case Report 3**

A 44 years old male patient reported to Rv dental college with chief complaint of road traffic accident with a sustained injury to face. No history of loss of conscious, no history of ENT or nasal bleeding, no history of vomiting or seizure. Patient with alleged history of pain in the left side of his face. On clinical examination showed swelling, tenderness at the mandibular angle, lower step noted, vestibular tenderness on 48 region noted and post-traumatic malocclusion OPG reveals fracture of 1 right side mandible. Treatment performed, then tooth of fracture line 48 removed, reduction of fracture one using intra oral vestibular approach, using one 6 hole with gap plate ans secured with 2mm screws. Closure done using 3-0 vicryl, pressure dressing done, patient followed up 1 week ,4 week, 3 months interval

**Case 2**

Intra operative picture



Fracture segment identified



Fracture segment identified



Occlusion



**Case Report 4**

A 45 years old female patient reported to Rv dental college with chief complaint of road traffic accident with a sustained injury to face. Patient have known history of hypertension since 5 years No history of loss of conscious, No history of ENT or Nasal bleeding, No history of Vomiting or Seizure. Patient with alleged history of pain in the left side of his face. On clinical examination showed swelling, tenderness at the mandibular angle, step noted, vestibular tenderness on 38 region noted and post-traumatic malocclusion.OPG reveals fracture of left side mandible. Treatment performed using trans buccal approach, fracture reduction and fixation using trocar one 4 hole with gap plate ans secured with 2mm screws. Closure done using 3-0 vicryl, pressure dressing done, patient followed up 1 week, 4 week, 3 months interval

**Case 4**



**Case 4**



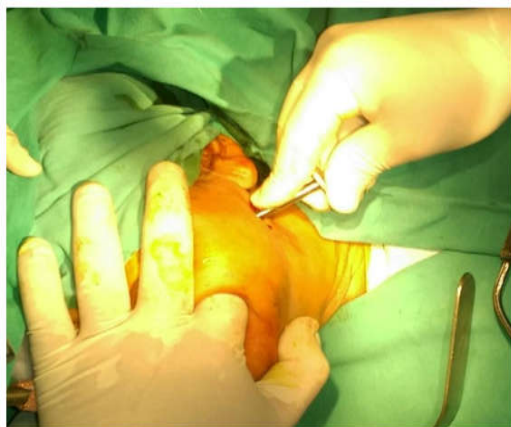
**Case report 5**

A 32 years old female patient reported to rv dental college with chief complaint of road traffic accident with a sustained injury to face. Patient have known history of hypertension since 5 years No history of loss of conscious, No history of ENT or Nasal bleeding, No history of Vomiting or Seizure. Patient with alleged history of pain in the left side of his face. On clinical examination showed swelling, trismus, tenderness at the mandibular angle, step noted, vestibular tenderness on 38 region noted and post-traumatic malocclusion.OPG reveals fracture of left side mandible. Treatment performed using trans buccal approach, Fracture Reduction And Fixation Using Trocar one 4 hole with gap plate ans secured with 2mm screws. Closure done using 3-0 vicryl, pressure dressing done, patient followed up 1 week, 4 week, 3 months interval

Case 4



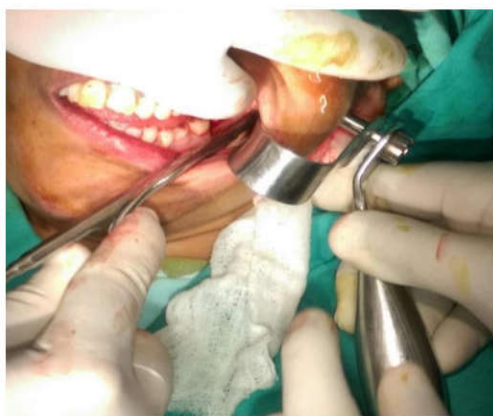
Case 4



Case 4



Case 4



## DISCUSSION

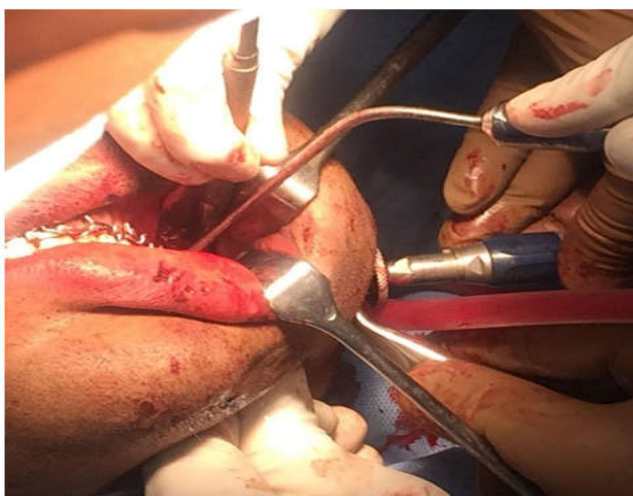
The mandible is a U-shaped bone containing thick buccal and lingual cortices and a thin medullary cavity. This bone consists of two parts mandibles that unite at the midline symphysis. It is formed by intramembranous ossification.

S.no	Age /sex	Commordites	Site fracture	Approach	Treatment	Associated treatment	Complication
1	26/M	Nil	Angle and parasymphysis	Intra oral approach	Closed reduction of parasymphysis and ORIF Of right angle of fracture	Fractured tooth removed	Nil
2	19/M	Nil	angle	Intra oral approach	ORIF Of right angle of fracture	Fracture tooth removed	Nil (difficulty to access )
3	40/M	Diabetic ,hypertension	Angle and body	Intra oral approach	ORIF Of right angle of fracture	ORIF of parasymphysis fracture	Extraoral scaring
4	45/M	HYPERTENSION	angle	Transbuccal approach	ORIF Of right angle of fracture	No treatment	Nil
5	32/M	NIL	Angle	Intra oral approach	ORIF Of right angle of fracture	No treatment	Nil

**Case 5**



**Case 5**



Muscle attachment and their neutralising forces also play a primary role in the pattern and direction of the fractures. It is the displacing forces of the muscles of mastication impact favourableness.

The principle of favourableness is grounded on the direction of a fracture line as viewed on radiographs in the horizontal or vertical plane.

Closed treatment refers to External Fixation Devices and Mandibulo-Maxillary Fixation (MMF) which is based on the principle that when the teeth of a fractured segment are in correct occlusion, then the bone fragments to which they are attached will, in most cases, also be satisfactorily reduced. Healing of the bone occurs by secondary intention with callus formation in the same way as a long bone in a cast heals. The

mandible must be immobilized for 4-6 weeks for most fractures. The average weight loss is 10-15 pounds. Open techniques of mandibular repair are divided into Rigid and Semi-Rigid Fixation. A small amount of movement of the proximal and distal segments occurs causing healing with periosteal callus formation. This technique is useful for superior border wiring. Adequate exposure is a key component of proper open reduction of mandible fractures. Either an external or an intraoral approach can be used for access to angle and ramus fractures. The external approach can provide better visualization and access to the inferior border, but the marginal mandibular nerve may be placed at risk. A tension band plate is sometimes placed on the superior border of the fracture line to closely approximate this area, because it tends to separate. This is referred to as the Champy's Technique. The tension band plate can also be used in the wider section of the vertical mandible. This is sometimes used in body and angle fractures. Care must be taken to avoid the dental roots. The tension band can be used in combination with a larger bicortical fracture plate or may be used alone, with reliance on the muscles of mastication for fixation.

Internal fixation is achieved by locking the screw to the plate rather than compressing each fragment of bone to the plate. One usually places a minimum of four screws in the plate, two on each side of the fracture line.

**Management of Teeth in the Line of Fracture**

Amaratunga in his review of 191 patients with 226 fractures, has used the following criteria for removal of teeth in the line of fracture. Absolute indications for tooth removal: Longitudinal fracture involving the root, Dislocation or subluxation of tooth from its socket, Presence of peri-apical infection, Infected fracture line, Acute pericoronitis. Relative indications for tooth removal: Functionless tooth which would eventually remove electively, Advanced caries, Advanced periodontal disease, Doubtful teeth which could be added existing dentures, Teeth involved in untreated fractures presenting more than 3 days after injury. It is desirable that all teeth not covered by these conditions be retained. Management of teeth retained in fracture line, Good quality intra-oral peri-apical radiograph, Institution of appropriate antibiotic therapy, Splinting of tooth if mobile, Endodontic therapy if pulp is exposed, Immediate extraction if fracture becomes infected, Follow-up for 1 year with endodontic therapy if there is demonstrable loss of vitality.

**Transbuccal System**

A Trocar is an instrument with a sharp triangular point at one end, typically used inside a hollow tube, known as a cannula or sleeve, to create an opening into the body through which the sleeve may be introduced, to provide an access port during surgery. The main component of the transbuccal system is the handle, equipped with either an attached (as illustrated) or fixed cannula. The trocar (also known as obturator) is used to penetrate the soft tissues with a pointed tip.

**Complication**

Haemorrhage, Carotid Injury, Facial Nerve Injury, Infection, Avascular Necrosis, Osteitis and Osteomyelitis, Malunion, Delayed and Non-Union, Temporomandibular Joint Ankylosis, Malocclusion, Increased Facial Width and Mandibular Rotation, Implant Failure, Scars.

In this case series all the patients received appropriate antibiotics, analgesics, nutritional supplements. Patient have been explained about complication associated with the procedure, analysis of this case series we could see satisfactory reduction in all the cases with less complication. The extraoral stab incision made for all Transbuccal cases healed without scarring at the end of 1 month post-operatively. There were no cases of Hypertrophic scar formation in our study.

## CONCLUSION

To conclude this case series functional outcome of cases treated with Transbuccal approach and Intraoral Approach is assessed, it shows there were no cases of wound dehiscence, non-union, mal-union or plate removal, There was no significant difference in the recovery of incisal mouth opening measures at different time intervals. Minimum scarring noted on transbuccal approach

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