

A Comparative Study between ORIF and ORIF with Mandibulomaxillary Fixation in Unfavourable Mandible Fractures

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ABSTRACT

Introduction

This study aims to evaluate the efficacy of open reduction and the combination of open reduction with mandibulomaxillary fixation (MMF) in cases of unfavourable mandible fractures.

Materials And Methods

This is a prospective study carried out from 2010 to 2015 on 60 patients with mandible fracture attending the Dept. of ENT. The diagnosis and classification of mandible fracture into favourable and unfavourable types were done on the basis of clinical and CT faciomaxillary findings. The outcomes were assessed by comparing the preoperative and postoperative occlusion, mouth opening and symmetry of mandibular ramus. Patients with favourable mandible fractures were excluded from the study.

Results

We found that out of 60 patients, 40 cases were of the unfavourable type. ORIF with MMF gave better outcome compared to ORIF alone. The data were statistically analysed using Z score and P value.

Conclusion

Initial assessment of mandible fractures into favourable and unfavourable category plays a significant role in planning the management. Management of unfavourable mandible fractures with ORIF and MMF gives functionally and aesthetically better results as compared to ORIF alone.

Keywords

Mandibular Fractures; Open Fracture Reduction; Mandibulomaxillary Fixation

Mandible fracture is one of the most common facial skeletal injuries but causes may vary from one country to another. The treatment principles of mandible fractures have changed recently, although the objective of reestablishing the occlusion and masticatory functions remains. The aim of our study is to evaluate the efficacy of open reduction alone and the combination of open reduction with mandibulomaxillary fixation in cases of unfavourable mandible fractures.

Materials and methods

This is a prospective study performed over a period of 5

years from 2010 to 2015 on 60 patients with mandible fracture attending the Department. The diagnosis and classification of mandible fractures were often done on the basis of clinical and CT faciomaxillary findings. We have assessed the outcomes by comparing the preoperative and post-operative occlusion, jaw mobility/mouth opening by measuring the inter-incisor distance and symmetry of mandibular ramus on mouth opening. Patients with favourable mandible fractures and oral submucosal fibrosis were excluded from the study.

Results

A total of 60 cases of mandible fractures were diagnosed over a period of 5 years. Out of these, 40 cases accounting for 66.67% were diagnosed as unfavourable types. We divided the study sample randomly into two groups of 20 cases each with one group undergoing ORIF alone and the other MMF and ORIF. The results

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in both groups were compared postoperatively by Z test using occlusion, mouth opening and symmetry of the mandibular rami as criteria for assessment. The P value calculated from Z test was found to be statistically significant for occlusion (0.00236), mobility (0.00804) and symmetry (0.00578) in favour of management of unfavourable mandibular fractures with ORIF and IMF.

Discussion

Fracture of the mandible occurs more frequently than that of any other bone of the facial skeleton.^{1,2} Oikarinen and Lindqvist (1975) studied 729 patients with multiple injuries sustained in RTA. The most common facial fractures were in the mandible. The distribution of facial skeletal fractures being Mandible (61%), Maxilla (46%), Zygoma(27%), Nasal Bone(19%), with a 6:2 proportion between mandibular and zygomatic fractures.^{3,4} Increased incidence is seen in males aged 21-30yrs. Most common sites of fracture was condyle 29%, angle of mandible 26 %, symphysis 22%, ramus 2%, coronoid process 1.5%. The most common mode of injury is RTA. (Table I)

Mandibular fractures are classified into (a)Simple: includes closed linear fractures of the condyle, coronoid, ramus and edentulous body of the mandible. (b)Compound: Fractures of tooth bearing portions of the mandible, into the mouth via the periodontal membrane and at times through the overlying skin. (c)Comminuted:

Usually compound fractures characterized by fragmentation of bone (d)Pathological: Results from an already weakened mandible by pathological conditions.

Mandibular fractures are also classified on the basis of stability of the fracture fragments. (a)Favourable fractures are those where the muscles tend to draw fragments together. Ramus fractures are almost always favorable as the jaw elevators tend to splint the fractured bones in place (b)Unfavourable fractures are those where the muscles tend to draw fragments apart. Most angle fractures are horizontally unfavourable. Most symphyseal/parasymphyseal fractures are vertically unfavourable.

The objective of the treatment of mandibular fracture is to reestablish normal occlusion and masticatory function. Conservative treatment to achieve this is performed by immobilizing the mandible for the healing period by intermaxillary fixation which is achieved by dental wiring, archbars, cap, splints and gunning splints.^{5,6} Operative treatment of mandibular fractures involves intraoral or extraoral opening of the fracture site and direct osteosynthesis with transosseous wires (Schwenzes 1982), lag screws (Niederdelmann 1982), bone plates (Schilli 1975, Spiessel 1976) or locking plate/screw which was initially developed by Raveh et al.^{7,8,9} Closed reduction is usually carried out in cases of non-displaced favourable fractures, grossly comminuted fractures (to reduce stripping of periosteum), children in developing dentition, coronoid fractures without impingement on zygoma and condylar fractures. Open reduction is done in following cases - displaced unfavourable fractures, severely atrophic edentulous mandibles, complex facial fractures, mandibular non-unions / malunions, condylar fractures.

Many researchers recommended closed reduction because of problems of surgical approach, such as infection, injury to nerves and blood vessels and scar formation.^{10,11,12} However, compared to previous open reduction, it is currently more widely used by minimizing complications such as TMJ pain and arthritis and mouth opening limitation via accurate reduction of bony fragments with the development of surgical instruments and surgical approaches. However, there is plenty of controversy over the selection of either closed or open reduction to treat mandibular fractures depending on

Table I: Causes of injury of facial skeleton

CAUSE OF INJURY	N	%
Road traffic accident	33	55
Work-related/ self-fall	12	20
Assault	15	25
Sports injury	0	0
Miscellaneous	0	0
Total	60	100

displacement severity and fracture site.

Hence, unfavourable mandible fractures require special attention as biomechanics of the facial skeleton has to be taken into account and can significantly alter the postoperative results. The mandible provides support to the dentition during biting and chewing. As this bone swings from the cranium, forces generated when a bolus of food is compressed between the teeth results in a fulcrum effect that generates tension and compression zones. Early explanations of mandibular biomechanics assumed a simple beam with forces along the top of the beam always creating tension zones superiorly and compression zones inferiorly. In the simple beam model, a fracture of mandible body is distracted superiorly and compressed inferiorly when a force is applied to the dental surface anteriorly. Unfortunately, not all aspects of mandible function follow this simple model. Irregularities of the mandibular bone make some areas potentially more unstable than others and thus resulting in unfavourable varieties. For example, the potential for torque and rotational motion appears to be greater in the symphyseal and parasymphyseal region, making fractures in this region usually unfavourable. The angle region, having thick bone superiorly and thin bone inferiorly, also presents similar problem.

Kroon and co-workers first noted that depending on where the food bolus was placed along the mandibular dentition, the location of the compression and tension zones could change from compression to tension and vice versa. In our study, we have tried to achieve normal occlusion first by doing maxillomandibular fixation to counteract distracting muscle pull and afterwards securing the reduction with orif at the fracture site, comparing results with reduction obtained using orif alone. The results in both groups were compared postoperatively by z test using occlusion, mouth opening and symmetry of the mandibular rami as criteria for assessment. Angles classification was used to determine the pre and post operative occlusion. Inter-incisor distance was used to assess mouth opening with < 4cm considered as reduced mouth opening. Symmetry for jaw was determined by presence of deviation. The p value calculated from z test was found to be statistically

significant for occlusion (0.00236), mobility (0.00804) and symmetry (0.00578) in favour of management of unfavourable mandibular fractures with orif and mmf as compared to ORIF alone.

Conclusion

Classification of mandible fractures into favourable and unfavourable categories plays a significant role in planning the management. Unfavourable mandible fractures usually do not follow the simple beam model of compression and tension. ORIF and MMF give functionally and aesthetically better results as compared to orif alone in unfavourable mandibular fractures.

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