

# Treatment of Unilateral Condylar and Associated Mandibular Fractures With & Without Osteosynthesis

R IKRAM Y B MIRZA M S CHEEMA

Department of Oral & Maxillo Facial Surgery, de Montmorency College of Dentistry, Lahore  
Correspondence to: Dr. Rashid Akram, Demonstrator

This study was conducted to evaluate a new method of fracture management in comparison with conventional technique. 40 dentate patients having unilateral condylar associated with mandibular fractures were treated. In 20 patients closed reduction was done with a median of 6 weeks of intermaxillary fixation. In the other 20 subjects open reduction and stabilization of the associated mandibular fracture was done by means of screw supported wiring. Intermaxillary fixation was removed after two weeks. Screw supported wiring which includes early removal of intermaxillary fixation, minimum surgical intervention, firm stabilization and short hospitalization period contributes to an effective, economic approach for the management of mandibular fractures with excellent results.

**Key words:** Trauma, mandibular fractures, osteosynthesis.

Fracture repair is a complex and dynamic process that incorporates physical and biomechanical forces into a network of coordinated interaction. Restoration of physical integrity and function of the fractured bone is the ultimate objective after healing. The goal of the surgeon is to effect a bony union as rapidly and dependably as possible with limited morbidity and complication rates. Once the principles and techniques of bony fixation have been mastered, surgeon often find ways to extend the methods of utilization according to indications.

The earliest known written record describing mandibular fracture is found in the Edwin Smith Papyrus in about 1650 BC. Papyrus is probably a copy of an original written about 3000BC by a physician associated with the pyramid builders. Papyrus described a fracture of the mandible and its treatment. He examined a man having a gapping wound in his chin, penetrating to the bone. He applied two strips on that wound bound it with fresh meat on first day. Afterwards treated it with grease, honey and lint until patient recovered<sup>1</sup>.

Mathew<sup>2</sup> has reported that the incidence of condylar process fracture is higher and comprises 25% to 50%. At least 48% of condylar process fractures are associated with other mandibular fractures and half of these being in the symphysis / parasymphysis regions.

Non-surgical management of condylar fractures produces satisfactory results. Immediate or early mobilization of the jaw and maintaining the occlusion with the help of arch bars and elastics, functional recovery was attained earlier.<sup>3</sup>

Open reduction of condylar fracture has not been the treatment of choice because of high complication rates as results of conservative treatment are reasonable.<sup>4</sup>

Maximal mouth opening of patients treated in surgical group was less than that of treated by conservative approach. The patients were able to open about 40 mm after 6 months of operation. Function after surgical procedure does not seem to be better than after the non-

surgical procedure.<sup>5</sup>

Rigid fixation produce accurate reduction and allow immediate function but the morbidity of significance is the facial nerve weakness and it is not easy to treat the fractures of condylar process with surgery.<sup>6</sup> Hidding J. et al<sup>7</sup> in a clinical radiographic study re-investigated 34 patients with condylar fracture and showed clinical results in both surgical and non-surgical groups equal.

Kyosti<sup>8</sup> elaborated an important issue in rigid fixation of condylar fractures. The condyle protects the brain in facial accidents as the weak condylar neck breaks easily and therefore no intracranial displacement is possible. A patient with previous plate fixation at the neck receives a new injury result into intracranial displacement as the safety provision does not exist any more.

The correct adaptation of the fractured borders at the relatively thin lateral cortical neck is no assurance that the mesial aspect of the fracture has also been reduced. Fixation of reduced fractures with wire ligatures, lag screw, kirschner pins and mini plates has several disadvantages.<sup>9</sup>

The surgical exposure of the condyle usually provides only limited visibility and even a small amount of incongruity of the fractured borders is sufficient to cause a remarkable degree of displacement in the fossa. The more rigid the osteosynthesis and fixation of condylar process, the higher the risk of postoperative remodeling and aberrative change in both the involved as well as contralateral joint. These aspects as well as the complications related to the surgical procedures such as hemorrhage, resorption of the condyle and facial nerve parasis have led many oral surgeons to avoid surgical management of condylar fractures in favour of non-surgical treatment.

Screw supported wiring produced good results and early removal of maxillo-mandibular fixation. Less bone cutting, minimal surgical intervention and simple approach has an edge over other techniques.

**Aims and objectives**

1. To allow early mobilization of the fractured jaw without jeopardizing the healing and remodeling process.
2. To provide firm stability while in dynamic function.
3. To contribute a simple and reliable method for the treatment of fractures.

**Materials and methods**

Forty dentate patients having unilateral condylar fracture associated with mandibular fracture were included in this study, equally divided into two groups. The patients below the age of 18 years and with associated mid-facial trauma were excluded.

Stainless steel arch bar with hooks, Erich Arch Bar was adopted with the dental arch and ligated to it by soft stainless steel wire of 0.45 mm. Heavy pull 1/8 inch rubber elastics were used for maxillo-mandibular fixation.

Twenty patients were treated by maxillo-mandibular fixation with arch bar and rubber elastics. Maxillo-mandibular fixation was continued for six weeks. In other twenty patients besides maxillo-mandibular fixation, the associated mandibular fracture was exposed intraorally, four screws 2 mm diameter, 6 mm length were inserted on either side of the fracture line in symphysis / parasymphysis region. Stabilization was done by putting figure of eight wiring around the screws. Maxillo-mandibular fixation was removed after two weeks and the patient was advised soft diet and jaw exercises. Follow up of the cases was done every two weeks for six weeks and thereafter monthly for six months.

**Results**

Forty dentate patients having unilateral condylar and associated mandibular fractures were treated in this study.

In twenty patients closed reduction was done with a median of 6 weeks of maxillo-mandibular fixation followed by periodic mobilization and jaw exercises. In the other twenty patients, open reduction and stabilization of the associated mandibular fracture was done by means of screw supported wiring. Screws were inserted on either side of the fracture line and figure of eight wiring was done around the screws. Maxillo-mandibular fixation was removed after a period of two weeks and jaw exercises instituted. Forty patients were seen in a period of six months.

The average vertical opening one month after release of intermaxillary fixation was 40 mm in surgically treated patients whereas it was 31 mm in patients treated with conventional method. Conventional method means that maxillo-mandibular fixation was done for a period of 6 weeks.

Lateral excursion towards the non-fractured side was restricted in both groups immediately after release of intermaxillary fixation. It was 3 mm in patients treated with the conventional method and 4.8 mm in patients

managed with screw supported wiring. Early improvement in restriction was seen in surgically treated patients.

Post-operative protrusive movements were limited in 20% cases treated with conventional technique. Patients treated with the new methodology showed normal post-operative protrusive movements.

Ninety five percent of the patients managed with screw supported wiring at symphysis or parasymphysis area showed perfect occlusion, whereas there was malocclusion in 20% patients in other groups. In 35% patients treated with conventional method, occlusion was not without discrepancies. Perfect occlusion in that group was seen in 45% cases. Marked deviation towards the fractured side was observed in 20% patients treated without open reduction of mandibular fractures at symphysis / parasymphysis area, whereas it was within the normal limits in surgically managed patients.

Patients treated with conventional method exhibited complications frequently more than those treated with this technique. Resorption of the condyle was seen in one case where condyle was fractured at the neck area and intermaxillary fixation was prolonged over a period of 6 weeks treated with conservative approach.

Table 1: Post-operative protrusive movements

Protrusive Movements	Group A	Group B
Absent	0%	0%
Limited	20%	0%
Normal	80%	100%

Table 2: Post-operative lateral excursion towards non-fractured side one month after release of inter-maxillary fixation

Lateral Movement	Group A	Group B
2 - 3 mm	75%	30%
4 - 6 mm	25%	60%
7 mm and above	Nil	10%

Table.3 Post-operative complications

Complications	Group A	%age	Group B	%age
Infection	Nil	Nil	1	5
Mandibular asymmetry	4	20%	Nil	0
Malocclusion	4	20%	1	5
Reduced opening	Nil	0%	Nil	0
Pain located to joint / Masticatory Muscle	2	10%	Nil	0
Marked deviation (>4 mm)	4	20%	Nil	0%
Impaired Masticatory function.	1	5%	Nil	0%
Ankylosis	Nil	0%	Nil	0%
Resorption of condyle	1	5%	Nil	0%

Follow-up period was 6 months, Group A treated by conservative approach, Group B treated by surgical approach.

**Discussion**

This method which includes early removal of maxillo-mandibular fixation, less bone cutting, minimum surgical intervention, contributes a simple approach for the

management of fractures in oral and maxillo-facial traumatology. Soft stainless steel wiring supported by screws are economical, simple to use and biologically well tolerated. It is three dimensionally stable and allow post-operative occlusal adjustments.

Pain, crepitations and clicking in the temporomandibular joint are the most common symptoms of dysfunction of stomatognathic system in an average population<sup>10</sup> as they were seen in this study. None in the surgical treated group but four in the non-surgically managed patients had pain, crepitation and clicking in the temporomandibular joint. Timmis et al<sup>11</sup> observed an improvement in temporomandibular joint pain as well as decrease in the incidence of temporomandibular joint clicking in patients treated with shorter immobilization period than the others treated with six weeks of intermaxillary fixation. Deviation on opening movements were also common in the non-surgically treated patient. Increased distance (> 2 mm) was found in the non-surgically treated patients after one month release of intermaxillary fixation. It was more than 4 mm in four patients treated with conservative approach after one month release of intermaxillary fixation. Deviation more than 4 mm were frequently found in the oldest age group which might induce a dual bite situation. Despite the more severe nature of the fractures, younger patient experienced less symptoms of dysfunction and less complaints than in older patients. This may be due to the poor condition of dentition and chewing ability in older patient group.

The patients treated with conservative method were kept immobilized for a period of six weeks to allow osseous stabilization at the fracture site. The surgically managed patients has intermaxillary fixation for approximately two weeks. Laterotrusive and protrusive movements were analyzed after one month release of intermaxillary fixation. Significant difference in mouth opening, laterotrusive and protrusive movements was found between two treatment groups. Patients treated with the new method showed earlier improvement of mouth opening, lateral and protrusive movements. It may be due to shorter immobilization period results in less muscular disuse atrophy and earlier functional adaptation of the patients jaw movements.

Intracortical wire ligatures for fixation often split the bone, ligatures secured by screws without direct contact to the bone withstand strong tractional forces.<sup>12</sup> The tremendous efficiency of the fixation forces produced by screws can be seen when evaluating the contact area of a single screw versus a wire. A several hundred fold increase is noted with screw. In addition, fixation forces directed in the long axis of the screw are stable in all dimensions due to the rigidity of the screw itself. It has been suggested if meticulous water cooling is used during hole preparation osseointegration of screws may occur.<sup>13</sup> Wire is unable to maintain fixation forces when used in direct contact with the bone. The smallest amount of resorption of bone

around a wire hole results in its inactivation. Because the force of a wire is directed across such a small area of bone, its inactivation occurs soon after placement.

### Conclusion

Generally plating is considered as a better solution for the management of all types of fractures of the facial bones which is questionable as it is not the rule in all cases. However, it is essential that alternative and new techniques of the fracture management should be evolved. Screw supported wiring can be used as an additional method combined with intermaxillary fixation to achieve better results. Well placed and firmly applied wiring around screws can provide satisfactory immobilization of the fractured mandible.

### References

1. Lipton JS (1982): Cited by Bruce and Fonseca. History of Mandibular fractures in Fonseca and Walker's Oral and Maxillo-Facial Trauma Philadelphia. W. B. Saunders Company 1991; 16: 359.
2. Mathew B. Hall. Condylar fracture: Surgical Management. J. Oral & Maxillofac Surg. 52: 1189-1192, 1994.
3. Robert V. Walker: Condylar fractures, non-surgical management. J. of Oral & Maxillofac Surg 52: 1185-1188, 1994.
4. Lizuka T. Lindqvist et al: Severe bone resorption and osteoarthritis after mini plate fixation of high condylar fractures. Oral Surg. Oral Med. Oral Pathol. 72: 400, 1991.
5. Zide MF and Kent JN: Indication of open reduction of mandibular condylar fractures. J. of oral & Maxillofac Surg: 41: 89, 1983.
6. R. Alexander and M.M. Stark: An accurate method for open reduction and internal fixation of high and low condylar process fractures. J. of Oral Maxillofac Surg: 52: 808-812, 1994.
7. Hidding - J. Walf - R., Pinge D: Surgical versus non-surgical of fractures of the articular process of the mandible. J. Carinomaxillary Fac Surg: 20: 345-347, 1992.
8. Kyositi S. Oikarinen: Surgical versus non-surgical treatment of unilateral dislocated low sub-condylar fractures (Discussion) J. Oral & Maxillofac Surg: 353-60, 1994.
9. Joram Raveh et al: Open reduction of the dislocated fractured condylar process. J. Oral & Maxillofac Surg: 47: 120-126, 1989.
10. Dahlstrom L., Kahnbeg K. Lindahl L: 15 Years follow up of condylar fractures. Trauma, Preprosthetic Surgery. Int. J. Oral Maxillo-Fac Surg. 18:18, 1989.
11. Timmis, D.P., Aragon, S. B. Van Sickels, J.E.: Masticatory dysfunction with rigid and nonrigid osteosynthesis of sagittal split osteotomies. Oral Surg. 62: 119-123, 1986.
12. Frank Halling And Hans - Albert Merten. Auxiliary devices for open reduction and fixation of displaced mandibular angle fractures. J. Oral Maxillo-Fac Surg. 1247-1250, 1991.
13. Patel M. F., Langdon J.D.: Titanium mesh (Timesh) Osteosynthesis: A fast and adaptable method of semi-rigid fixation. Br. J. Oral Maxillo Fac. Surg. 29: 316-324, 1991.