ORIGINAL ARTICLE

Management of Mandibular Symphysis and Para Symphysis Fractures Using a Single Mini Plate With Erich Arch Bar: Our Experience

Parveen Akhter Lone, Padam Singh*, Kamal Kishore*, Mohit Goel*

Abstract

Study was undertaken to study the use of single mini plate with Erich arch bar instead of two mini plates in fractures of the symphysis and Para-symphysis regions of mandible. To evaluate prospectively the clinical outcome, bony union, occlusal relationship, and complications associated with Single mini plate with Erich arch bar fixation of the symphysis and Para-symphysis fractures. A prospective study was conducted on patients with maxillofacial injuries reporting to the department of oral & maxillofacial surgery, IGGDC, Jammu, from January 2013 to February 2014. A total of 100 patients indicated for open reduction and semi-rigid fixation of isolated non-comminuted symphysis and para symphysis fractures were included in the study. Intraoral, open reduction & semi rigid fixation of non-comminuted symphysis and para-symphyseal fractures was performed using a single 2mm, 6-hole mini plate & 2 X 8mm mono cortical screws and Erich arch bars under general & local anesthesia. Patients with occlusal discrepancies were kept on 2 weeks of inter maxillary fixation by using elastics.The most common cause of the symphysis and para-symphyseal fractures was road traffic accidents followed by interpersonal rivalry, fall, sports injury, animal hit. Majority of the patients were between 20 - 45 years of age. Males sustained more injuries than females. All patients achieved bony union and there was no case of non-union, plate exposure or tooth injury. However malocclusion in 3% and wound infection (4%) were noted. For non-comminuted symphysis and para-symphysis mandible fractures, the application of single mini plate with mono cortical screws along with arch bars offers good surgical outcomes in most patients with minimal complications.

Key Words

Para Symphysis, Erich Arch Bar, Mini Plates, Fracture Mandible , OPG, Mandible

Introduction

There has been an increase in number of traffic accidents and interpersonal violence contributing to an increase in the frequency of maxillofacial trauma & mandibular fractures. (1,2) The symphysis is one of the most frequently fractured sites in the mandible after the angle and the condyle making up 18-20 % of the mandibular fractures in adults.(3)The objective of management of symphysis and para-symphyseal fractures include absence of pain, satisfactory dental occlusion, maximum inter-incisal opening (40 mm) and mandibular / facial symmetry.(4) Fractures of the symphysis and para symphysis are treated by open reduction with non-compressive miniplate fixation via the intraoral approach using the principles of Champy (5) and colleagues. Champy and colleagues found the "ideal lines of osteosynthesis" (tension band principle) and they advocated the use of two plates anterior to the mental foramina and use of one plate distal to it with a period of post-operative intermaxillary fixation (IMF) for about 3-4 weeks. But the use of two miniplates in the symphysis and para symphysis regions is associated with many postoperative complications like damage to the tooth

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roots, plate exposure and dehiscence of the surgical wound.(6) So, we conducted this study to assess the effectiveness of ORIF with one plate and arch bar, in the management of symphysis & para symphysis fractures of mandible.

Material and Methods

A prospective study was conducted in the Department of Oral & maxillofacial Surgery, Indira Gandhi Government Dental College, Jammu on the patients with maxillofacial injuries reporting to the department of oral & maxillofacial surgery from January 2013 to February 2014. History, etiology investigations, type of fracture, associated injuries, treatment given, complications & follow up was mentioned. Plain posterior anterior, occipitomental, submentovertex, OPG, CT scan when required was done in patients. An accurate assessment of the fractures was made including the site and type of fracture, the amount of displacement, amount of pain or discomfort, anesthesia in the distribution of inferior alveolar nerve, marginal mandibular nerve paresis, the status of dental occlusion, any associated temporo mandibular joint (TMJ) dislocation, or any other functional deficits. A total of 100 patients indicated for open reduction and semi-rigid fixation of isolated non-comminuted symphysis and para symphysis fractures through intra-oral approach were included in the study. Patients were treated by ORIF by using one 6 whole miniplate fixed at lower border of mandible. MMF was achieved using arch bars. An intraoral degloving incision was used for symphysis and para-symphyseal with care taken to avoid injury to the mental nerve and its branches. Reduction was achieved by putting the patient into normal dental occlusion and MMF. Once this was established, ORIF was done using 2mm six hole mini plate with gap with 2.0 X 10mm screws under general & local anesthesia. Sutures were removed after 7 days post operatively. All the patients had undergone 1 week antibiotic therapy with Amoxicillin 500mg + clavulanic acid 125mg three times a day and analgesic therapy with Diclofenac sodium 50mg +serratiopeptidase 10mg two times a day for five days. Patients with occlusal

Fig 1. Pre Operative Radiograph Showing Fracture Bilateral Fracture Mandible

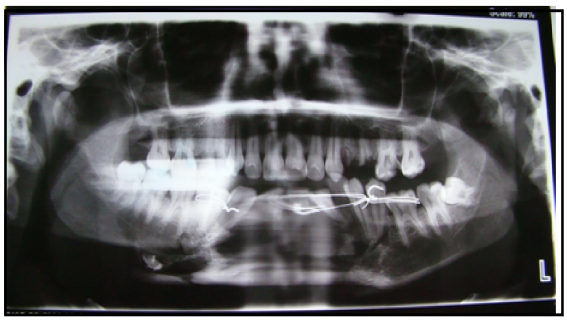


Fig 3.Post Operative Radiograph Showing Single Plate Showing Single Plate In Symphysis Fracture

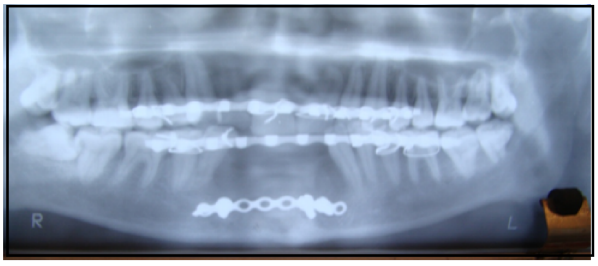


Fig 2. Post Operative Radiograph Showing Erich Arch Bar & Single Plate At Lower Border of Mandible

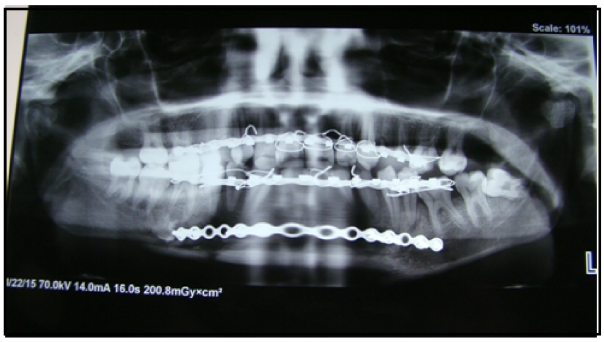


Fig 4. Post operative radiograph showing single plate RT para symphysis mandible with Erich arch bar

Fig 5. Radiograph showing single plate at lower border with Erich arch bar

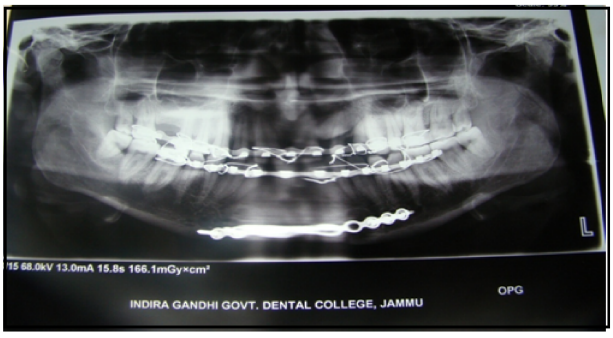


Table-1. Showing Causes of Injury

	Road Traffic Accidents (RTA)	Interpersonal violence	Fall	Sports injury	Animal hit
Males	61	9	6	5	1
Females	13	2	3	0	0

Table-2. Showing Complications

		1st wk	2nd wk	3rd wk	4th wk	2nd month	3rd month	4th month	5th month	6th month
Wound infection		3	4	2	0	0	0	0	0	0
Paresis in the distribution of mandibular or inferior alveolar nerves	Pre-op	2	2	1	1	0	0	0	0	0
	Post-op	1	1	1	1	0	0	0	0	0
Tooth damage		0	0	0	0	0	0	0	0	0
Plate exposure		0	0	0	0	0	0	0	0	0
Malocclusion		8	0	0	0	0	0	0	0	0
Tenderness& mobility at the fracture site after 6 weeks						0				

Fig.6 Etiology of Symphyseal and Para-Symphyseal Fracture

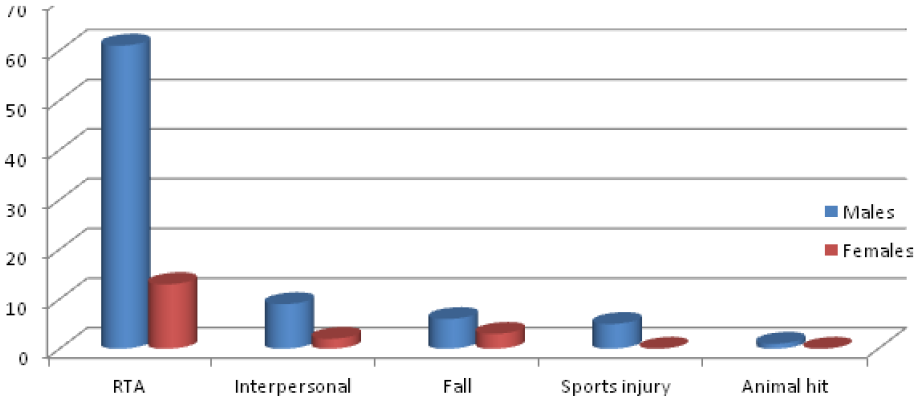
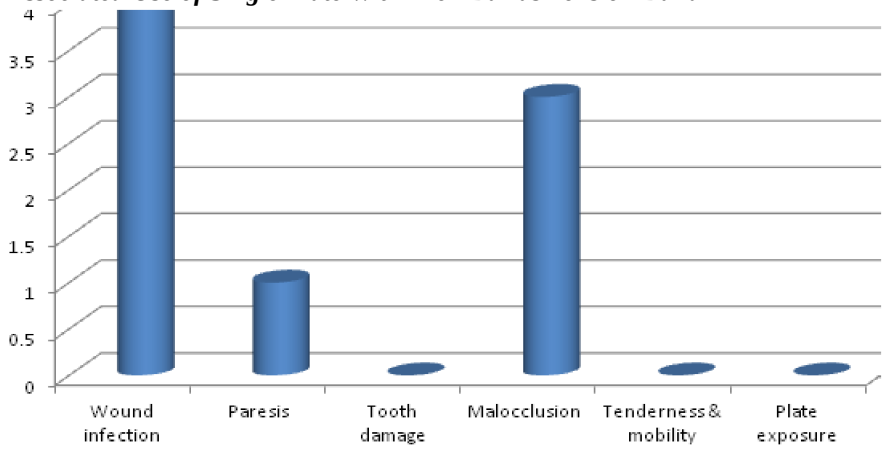


Fig.7 Complications Associated Use of Single Plate With Arch Bar as Tension Band



discrepancies were kept on two weeks of inter maxillary fixation by using elastics. Patients were assessed weekly for four weeks, and then monthly for six months, to observe any wound infection, paresis in the distribution of mandibular or inferior alveolar nerves, tooth damage, malocclusion, tenderness, & mobility at the fracture site after 6 weeks. Post-operative OPG was done after one week &at three and six months to determine evidence of bony healing. Physiotherapy was advised to avoid TMJ stiffness. Mobility of TMJ and the time of return to work were also noted.

Results (*Table 1-2; Fig 1-7***)**

The most common cause of the symphysis and para-symphyseal fractures was road traffic accidents (74%) followed by interpersonal violence (11%), fall (9%), sports injury (5%), and animal hit (1%). Males sustained more injuries than females (82%) where as 18% were females .Majority of the patients were between 20 - 45 years of age (91%) with a mean age of 29 years. 87 patient had para symphysis and 13 patient had symphysis fractures.

The preoperative paresthesia was noted in 2 patients with para symphysis fracture and 1 patient with para symphysis fracture after surgery all of which resolved within 6 weeks.(7, 8) patients had malocclusion after surgery for which IMF with elastic was done for 10 days the patients with wound infection were given antibiotic therapy until the infection resolved. All patients achieved had bony union and there was no case of non-union, plate exposure or tooth injury. However, following complications were noted: malocclusion 3% and wound infection 4%.The average time of return to work was 1 month after surgery.

Discussion

The treatment of symphysis and para-symphyseal mandibular fractures has evolved significantly over the past few years. Newer methods have been tried and older ones have had improvements. Historically, mandibular fractures were treated with closed reduction and a course of prolonged maxilla mandibular fixation.introduced the concept of maxilla mandibular fixation.(7) Wire osteosynthesis was subsequently supplanted as the preferred treatment of fractures by open reduction and internal fixation with titanium hardware including lag screws and plates.., The approach to rigid plate fixation has likewise been modified with progressively smaller plates and less reliance on compression in the treatment of these fractures. The treatment of mandibular fractures has been in a constant state of evolution with goals to restore function and pre morbid occlusion. Champy *et al* (5) described a novel and currently the most accepted concept of using non-compression mono cortical plates in the regions, referred to as "Champ's lines of osteosynthesis" Champy et al did a series of experiments and recommended osteosynthesis of para-symphyseal fractures by fixation of two miniplates, one at the inferior border of the mandible and the other below the apices of teeth to act as a tension band, to neutralize the torsional forces generated during mastication and to allow optimal healing at fractured site.8

The use of two miniplates is associated with many complications, therefore, the efforts to find the alternates of recommended procedure of double mini plate fixation are continuing. Therefore, we decided to use arch bar as tension band with single miniplate as an alternative to double miniplates. Accordingly, Salua *et al* (9) in a survey reported that 38% of Indian oral and maxillofacial surgeons were in favor of using single miniplate for para-symphysis fractures while 62% use two miniplates. 42% of maxillofacial surgeons accepted that lower arch bar can be used as a tension band.(10)

There are few studies reported in the literature that has modified the standard two miniplates in para-symphyseal fractures. One study used combination of mini plate and micro plate, while in another study optimal results were achieved by using single mini plate and arch bar. The main goal of both studies was to reduce the quantity of implanted material without compromising the required stability and optimal healing of bone. It was seen that one of the mini plate was completely replaced with arch bar to act as tension band. Cost of the implants was increased in first study due to higher costs of micro plate and micro screws while was reduced to half in the second technique respectively. (11)

In our study, the main cause of para-symphyseal fracture was road traffic accidents followed by interpersonal violence and they overwhelmingly occur in young males. Road traffic accidents (RTA) have been reported as a leading cause of mandible fractures in many third world countries while interpersonal altercations are mainly responsible in the developed countries. The gender bias with predilection for males was also reported in other studies (12,13)

Likewise, Bolourian R, Lazow S and Berger J (14) in a prospective study concluded that the use of a single 2.0 mm miniplate adapted along Champy's line of ideal osteosynthesis and stabilized with four 8.0 mm

monocortical screws plus 2 weeks of IMF was a viable treatment modality for mandibular fractures Longwe E A, Zola M B, Bonnick A and Rosenberg D,(15,16) reported the identical results in a retrospective study.Chritah A, Lazow S K. and Berger J R (17) in a similar prospective study concluded that a single 2.0 mm locking miniplate adapted along Champy's line of ideal osteosynthesis and stabilized with four 8.0 mm monocortical screws plus 1 week of IMF was a reliable and effective treatment modality for mandibular fractures.In a pilot study, Saluja *et al* (18) found no statistical significant difference between three groups one of which used one titanium miniplate along with Erich's arch bar for 6 weeks, the other two used 2 titanium miniplates across the fracture site, one with Erich's arch bar for 6 weeks and other without Erich's arch bar.The use of single plate is associated with minimal post-operative complications were in accordance with other results. (19-21).

However, Kimura A *et al* (3) in an in-vitro study suggested that perpendicular double miniplate fixation is more suitable for fixing mandibular symphysis fractures1in comparison to single miniplate and parallel double miniplates.

Conclusion

For non-comminuted symphysis and para-symphysis mandible fractures, the application of single mini plate with mono cortical screws along with arch bars offers good surgical outcomes in most patients with reduction or elimination of the complications commonly associated with the use of two miniplates like damage to root apices and plate exposure.

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