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One Miniplate Fixation for Mandibular Symphysisand Parasymphysis Fracture a stable and cost effective optionas against two plate fixation: A retrospective study

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Abstract:-*Mandibular symphysis and parasymphysis fractures are very common fractures of the lower arch. In this retrospective study we compared outcomes of fixing mandibular symphysis and parasymphysis fractures with one mini plate andtwo mini plates. In this study, 40 patientswith fracture in symp-parasymphysis regionwere randomly divided into two groups. Group 1 patients received single 2.5 mm titanium miniplate along with arch bar to create tension banding at the superior border in order to provide effective stabilization of fracture segments. And Group 2patients received two 2.5 mm titanium miniplates . Parameters assessed were: duration of surgery, fracture stabilization, occlusion and wound dehiscence. Significant difference was seen in avg duration of surgery. Single 2.5 mm miniplate for mandibular symphysis and parasymphysis fractures is a time saving and cost effective technique with post-operative outcomes similar to conventional 2 plate fixation.*

Keywords*:-Parasymphysis fractures,Single miniplate , arch bars,Two miniplates*

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I. Introduction

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.Their incidence and aetiology are influenced by social, cultural, and environmental factors[1,14]. Road traffic accidents (RTA) and interpersonal violence (IPV) are the most common causes of mandibular fractures followed by fall and sports injuries [2]. Management of any traumatic injury to bony skeleton of face includes the restoration of the pre-existing form, function and aesthetics. According to Champy et al.[4],the ideal lines of osteosynthesis'' should be followed in the mandible which uses monocortical miniplates in the region of optimal stress to neutralize tension. So according to Champy there is a need for two miniplates plates for adequate fixation in the symphysis and parasymphysis region. But Spiessl introduced tension band as an archbar which provided stabilization and was able to overcome rotational forces at alveolar portion of fractures and eliminated splaying previously encountered at the alveolar part of the fractured bone. Need for tension banding is evident to get satisfactory stabilization during mastication regardless of the size and type of plates used.

The purpose of this study is to compare the clinical outcomeafter using a single 2.5 mm (4 holes with gap) miniplate and two 2 mm miniplates (4holes with gap) in symphysis/parasymphyseal fractures.

II. Materials and Methods

Forty patients who reported to the Deptt of Dental surgery , KAP Vishwanatham govt medical college from 2016-2018 with mandibular symphysis and parasymphysis fracture, who matched the inclusion criteria were included in this retrospective study with 20 patients in each of the two groups formed. Inclusion Criteria included Age group: 20–50 years, simple or compound (unfavourable) fracture in the symphysis or parasymphysis region of the mandible, Fractures amenable to treatment using intra-oral approach butpatients with comminuted fractures, additional fractures at other sites on the mandible,pan facial trauma andedentulous patients were excluded.40 patients who matched the inclusion and exclusion criteria were assigned into two groups equally—Group 1 and Group 2.In Group 1,Fracture was treated using a single 2.5 mm (4 holes with gap) stainless steel miniplate fixed at inferior border of mandible and in Group 2,fracture was treatedusing two 2.5 mm (4 holes with gap) stainless steel miniplates fixed according to the principles of Champy.(Fig- 1 and 2)
The following parameters were evaluated:

- Duration of surgery
- Wound infection
- Tooth damage
- Plate exposure

- Paresis in the distribution of mandibular or inferior alveolar nerve
- Malocclusion
- Tenderness& mobility

III. Results

A total of 40 (30 males, 10 females) patients with a mean age of 30 years were selected for this study. The most common etiology was road traffic accident (80 %) followed by falls (10 %). There were two cases of interpersonal violenceand two case of accident at construction site. Mean duration of surgery in Group 1 patients was 30 min and in Group B patients was 45 minutes. Immediatepost-operative reduction and stability achieved was comparable in both group of patients. Occlusion was deemed satisfactory in all patients. In all patients, there was no fracture segment mobility noted post-operatively. Certainly there were more complications associated with (two plate) fixation method with 4 of them showing infection and plate exposure. One case showed post-operative parasthesia whereas no complication was reported with one plate fixation method. Reduction in implanted material has made the procedure easy, reliable and cost effective.

Fig- 1 One plate fixation with arch bar

Fig- 2 Two plate fixation

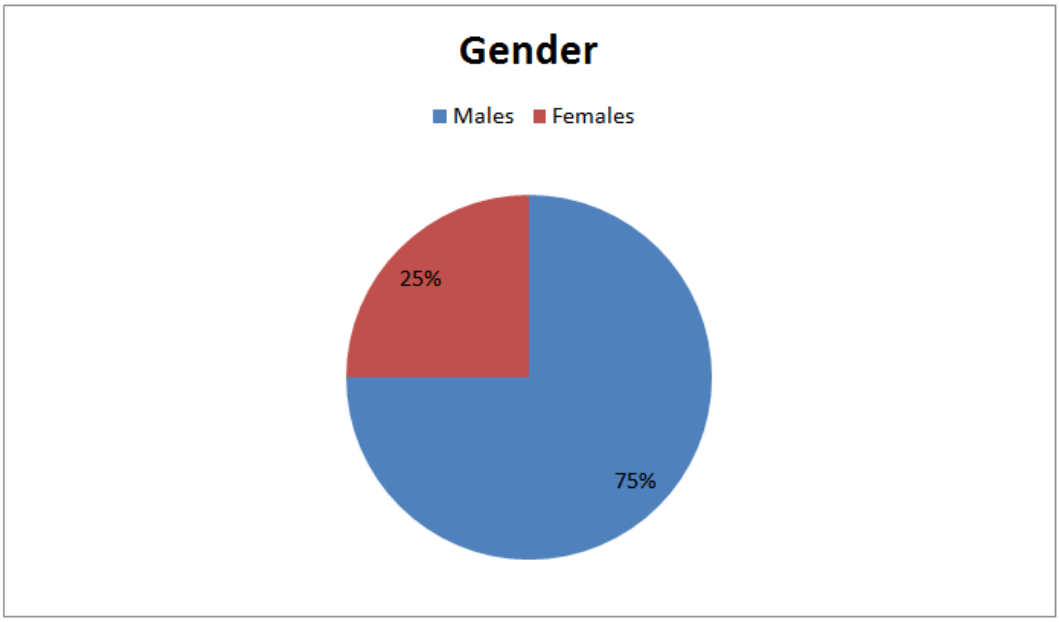

Fig-3: Gender distribution

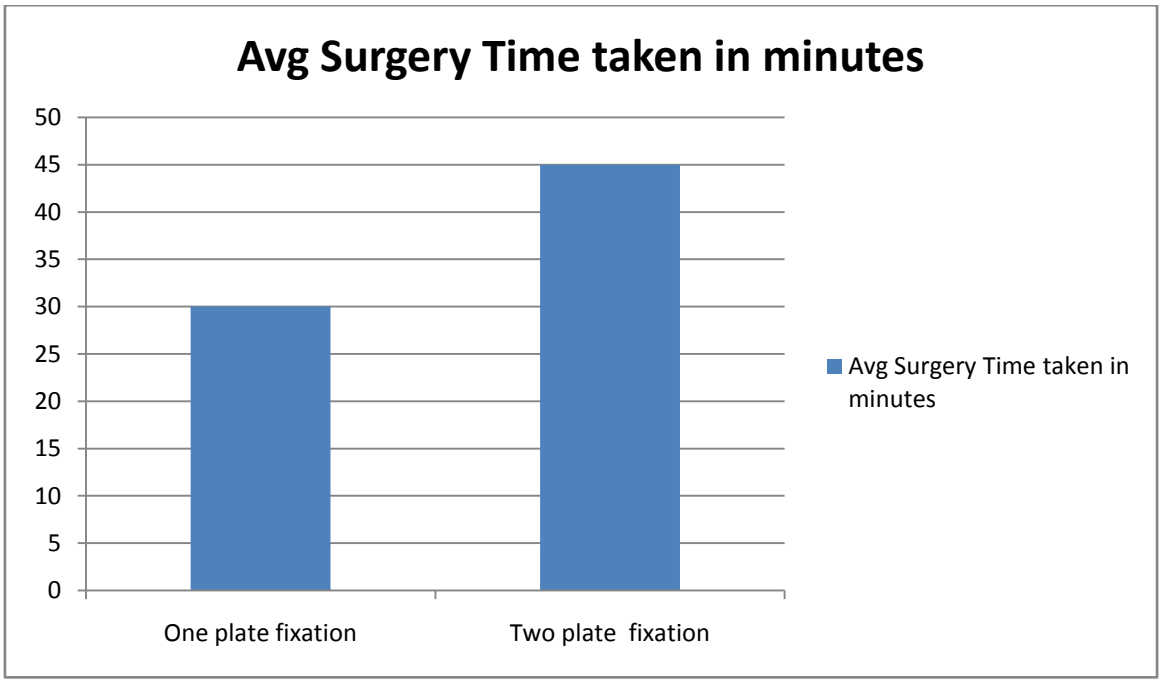

Fig-4. Avg Time taken to complete case

Table-1. Showing Complications

SR. NO	PARAMETER ASSESSED	TWO PLATE FIXATION	ONE PLATE FIXATION
1.	Wound infection	4	-
2.	Paresis in the distribution of mandibular or inferior alveolar nerves	1	-
3.	Tooth damage	-	-
4.	Plate exposure	4	-
5.	Malocclusion	-	-
6.	Tenderness& mobility	-	-

IV. Discussion

Fractures of symphysis and parasymphysis of the mandible are very common[1]. The key to successful management of these fractures is to understand the principle of accurate fracture reduction, reestablishment of occlusion, and stable internal fixation. The basic requirement of rigid fixation is to provide adequate stability to prevent interfragmentary motion even with active mandibular movements.This can be achieved by accurate close approximationof fracture fragments and ensuring larger contact areas in regions that are under compressive forces [5]. Many modalities like bone reconstruction plates, lag screws, geometric bone plates and miniplates are available to achieve internal fixation of body/symphysis fractures. Primary bone healing promotes direct extension of cutting cones (osteocytes)across the mimimal gap present between fractured bone fragments. This type of bone healing occurs without external callus formation, thereby shortening the time period required for remodelling and consolidation [6, 7]. Spiessl[3]and Prein and Kellman [8]stressed on the two fundamental principles required to obtain adequate rigid internal fixation. First, the fixation needs to support full functional loads. Second, absolute stability of the fracture constructmust be achievedwhich is the prerequisite for sound healing and a low rate of infection. Ellis and Walker[9]found a high rate (28 %) of complications after fracture fixation using two non-compression miniplates. This suggests that there could be several factors contributing towards development of complications rather than just biomechanical considerations. The disruption of the blood supply to the lateral mandible by stripping off the periosteum for fixation of miniplates at the inferior border may be one reason for the less favourable clinical results of two plate fixation techniques. Two plate fixations take more time and longer operation time exposes the bone to a higher bacterial contamination. Successful bone healing is a delicate balance between sufficiently rigid internal fixation and the preservation of the bony and soft tissue environments required for fracture consolidation [10].In this study the application of a single 2.5 mm bone plate at the inferior border of mandible required comparatively less time, minimal periosteal stripping and provided good anatomical reduction. Champy et al. did not advocate the usage of such IMF procedures pre-operatively, intraoperatively or postoperatively [4, 11]. Some authors however believe that performing inter-maxillary fixation (IMF) with arch bars and wires will always be the best way to guarantee occlusional integrity during fracture plating. So most surgeons prefer to employ some kind of intermaxillary

fixation prior to open reduction of mandibular fractures and the most commonly used technique is through placement of arch bars. Arch bars or dental splints can also serve as the tension band for the anterior region [12]. We believe that placement of a sturdy stable lower arch bar could eliminate the need for two miniplates in the symphysis and parasymphysis regionPlacing two miniplates potentially increases the chances of mental nerve injury, injury to teeth roots, chances of infection and exposure of osteosynthesis implants.[15]Rix et al. [11]followed Champy's principle, but used a modification for parasymphysis fractures in close proximity to the mental nerve. Instead of two miniplates, only one was placed above the foramen and supplemented with bridlewiring which included two or more teeth on either side of the fracture line with satisfactory results. Tams et al.[13] in their in vitro three-dimensional study of loads across the fracture site observed high torsional moments and 'negative bending' moments. Their findings further validate usage of single and stable mini-plate in Group A patients to counteract the forces generally seen in symphyseal and parasymphyseal fractures.

V. Summary and Conclusion

This study attempts to compare retrospectively the outcomes of fixing mandibular symphysis and parasymphysis fractures with one single mini plate and conventional fixation using two mini plates. We observed that a single 2.5 mm (4 holes with gap) stainless steel mini-plate providesadequate stability in symphyseal and parasymphysealfractures with relatively shorter operating time when compared to conventional two plate fixation technique. Though miniplates are most commonly placed according to Champy's principle, symphysis/parasymphysis fractures can also be managed by placing a single stronger miniplate along with arch bars, which act as effective tension bands to counter the forces resulting in fewer potential complications like wound dehiscence and iatrogenic injury to the tooth roots.

Conflict of interest

All authors declare that they have no conflict of interest.

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