Use of Miniplates in Parasymphysis Fractures : A Survey Conducted Among Oral and Maxillofacial Surgeons of India

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Received: 14 March 2012 / Accepted: 15 July 2012 / Published online: 16 September 2012
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Abstract Aim of the study was to find out the number of miniplates used by Indian Oral and Maxillofacial Surgeons for parasymphysis fractures. A survey was done among Oral and Maxillofacial Surgeons of India at the 34th annual meeting of Association of Oral and Maxillofacial Surgeons of India. Four questions were given to each individual to find out their opinion regarding use of miniplates in parasymphysis fractures. Eighty-eight per cent of Indian surgeons were in favour of using intra-operative or post-operative intermaxillary fixation. Thirty-eight per cent responded in favour of using single miniplate for parasymphysis fracture instead of using two miniplates. Fifty-four per cent maxillofacial surgeons use various modifications depending on different conditions. Forty-two per cent of maxillofacial surgeons accepted that lower arch bar can be used as a tension band. Use of miniplates for the treatment of parasymphysis fracture varies from centre to centre and from surgeon to surgeon. Though miniplates are best used following Champy's principle, still many surgeons use single miniplate. Arch bars placed for intermaxillary fixation can be used as a tension band, again eliminating the need for upper plate.

Keywords Miniplates · Parasymphysis · Fracture · Tension band

Introduction

Miniplates are placed according to Champy's principle. Champy and co-workers refined the work of Michelet et al. after carefully considering the biomechanics of mandible and have described the osteosynthesis line for placing the miniplates in the mandible. In the mandible a line drawn at the base of the alveolar process corresponds to the line of tension and monocortical plates and screws can be fixed along this line. In the parasymphysis region, another line is drawn near the lower border to neutralize the tension forces, as torsional forces in the parasymphysis region are very high [1, 2]. The principle of osteosynthesis according to Champy is to re-establish the mechanical qualities of the mandible, hence he advised the use of two miniplates in anterior region [1]. One was at the inferior border, and second 5 mm above the lower plate. Champy did not advice use of intra-operative or post-operative intermaxillary fixation, but many authors feel the need of intra-operative or small period of post-operative intermaxillary fixation. Most surgeons who treat mandibular fractures with miniplate osteosynthesis technique still use Inter Maxillary Fixation (IMF) as a method of fracture reduction, in belief that this is essential to achieve a normal occlusion or recommend post-operative IMF for a small period [3, 4]. So, if routinely arch bars are placed for intermaxillary fixation, then lower arch bar can be used as a tension band which eliminates the need of upper (tension) plate. Some surgeons think that application of arch bar to the teeth may prohibit the rotational force [5]. In vitro studies had shown that the amount of force in the symphysis area is same as that of mandibular body area, so symphysis/parasymphysis fractures can be managed by single plates like that of body fracture [6, 7]. Many authors have used various modifications for parasymphysis fractures instead of using two miniplates [8, 9]. So the treatment of parasymphysis

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fracture using miniplates varies from surgeon to surgeon, centre to centre. Keeping these facts in mind a survey was done among Indian Oral and Maxillofacial Surgeons to find out whether they really follow Champy while using miniplates for parasymphysis fractures.

Study Design

The present survey was done among Oral and Maxillofacial Surgeons of India at the 34th annual meeting of Association of Oral and Maxillofacial Surgeons of India (AMOSI) held at Coimbatore, Tamilnadu (India) from 1–4 December 2010. Survey was conducted to find about number of miniplates used by Indian Oral and Maxillofacial Surgeons for parasymphysis fractures and also to know about any modification used by them for the same. A questionnaire consisting of four questions were given to each individual to find out their opinion. The aim of the survey was to find out the number of miniplates used along with arch bars for parasymphysis fractures.

Two hundred Oral and Maxillofacial Surgeons were given a questionnaire and after response to questionnaire (Table 1) the forms were taken back. Questionnaires were for isolated displaced dentulous parasymphysis fractures.

1. Whether you use arch bars for IMF?
2. Whether you feel the need of intra-operative/post-operative IMF?
3. How many plates do you use for parasymphysis fractures?
4. Can arch bar be used as a tension band eliminating the need of upper plate in parasymphysis fractures?

Results

In the survey conducted among 200 maxillofacial surgeons of India 90 % regularly use arch bars for intermaxillary fixation. Eighty-eight percent of Indian surgeons were in

favour of using intra-operative or post-operative inter-maxillary fixation. Thirty-eight per cent responded in favour of using single miniplate at inferior border avoiding use of upper plate for parasymphysis fracture. Most of the surgeons were in favour of using 2.5 mm 4 hole titanium plates with bar, and screws advised by them were of 2.5 × 8 mm dimension. There was no standardization about brand of implants used. Various modifications were used by different surgeons depending on different conditions especially when fracture line runs closer to mental foramina. Fifty-four percent maxillofacial surgeons use these modifications. Forty-two percent of maxillofacial surgeons accepted that lower arch bar can be used as a tension band and can eliminate the need for upper plate.

Discussion

Miniplates placed according to Champy's ideal lines should be placed within 10 mm of the superior border. But in the anterior part of the mandible, in front of premolar, torsional movements were more and were higher when they were near the mandibular symphysis. So, anterior to the mental foramina, additional torsional forces were opposed by putting another plate 4–5 mm below the sub-apical plate [1]. These two plates counteracted the torsional as well the compressive forces. But in many, in vitro three dimensional studies the anterior body and canine fracture have similar maximum torsion movements [6, 7] and these values indicate that for a symphyseal fracture as well as for the body fracture, treatment with one bone plate should be sufficient.

Intra-operatively, most surgeons use inter-maxillary fixation for fixation of fracture segments with miniplates, so pre-operatively or intra-operatively arch bars are placed. Many authors have also suggested a small period post-operative inter-maxillary fixation with the use of miniplates, again for which arch bars were needed [3, 4]. Many authors faced problem in restoring exact maxillo-mandibular occlusion without inter-dental fixation [10] also many authors concluded that in case of comminuted fracture plating alone was not sufficient. But Champy did not advice inter-maxillary fixation intra- or post-operatively. So the treatment plan for parasymphysis fractures varies a lot among various oral and maxillofacial surgeons. In our study also 88 % of Indian oral and maxillofacial surgeons believe in intra-operative or post-operative inter-maxillary fixation.

In a study done by Rix et al. [9], a modification was used for parasymphysis fractures which are in close proximity to the mental foramen to avoid trauma to the nerve. Instead of the customary two plates, only one plate was placed above the foramen and supplemented with loop wiring which included two or more teeth on either side of fracture line and

Table 1 Response to questionnaires

Questionnaires	Yes (%)	No (%)
Arch bar used for IMF	90	10
Intra-operative/post-operative IMF	88	12
Single plate can be used for parasymphysis fractures	38	62
Modification for parasymphysis fractures	54	46
Lower arch bar place for IMF to be used as a tension band	42	58

their results were significant even with the use of this modification. In a study by Feller et al. [8], they used combination of miniplate and microplate for osteosynthesis of parasymphysis fracture because of limited space available in mental foramen and apical region. The results suggested that treatment of fractures in the inter-foramina region with a combination of microplate and miniplate will be stable enough for early mobilization. In the present study also, a large number of surgeons were in favour of using various modifications for parasymphysis fracture depending on various conditions like use of supplemented loop wiring, use of microplate instead of upper miniplate, etc.

Many studies showed that tensile forces exist at the superior border of mandible during function so there must be some method of preventing distraction of the alveolar border to achieve uniform compression across the length of fracture [1, 2]. This brought about the tension band concept which can be in the form of a small miniplate at superior border or in the form of various arch bars at the alveolar segment. In mandible, a line drawn at the base of the alveolar process corresponds to the line of tension and monocortical plates and screws can be fixed along this line. In the parasymphysis region, another line is drawn near the lower border to neutralize the tension forces, as torsional forces in the parasymphysis region are very high. Champy had used upper plate as tension band but in our study 42 % of surgeons think lower arch bar can be used as a tension band and eliminate the need for upper plate.

In two in vitro three-dimensional studies of loads across the fracture site, authors found high torsion movements for symphysis fracture. According to them, the anterior body and canine fracture have similar maximum torsion movements [6, 7]. These values indicate that for a symphyseal fracture as well as for the body fracture, treatment with one bone plate should be sufficient. In a study done by Bolurian et al. [3] single miniplate was used for mandibular fractures along with 2 weeks of maxillo-mandibular fixation. In our study group also, 38 % of surgeons were in favour of using single miniplate in parasymphysis fracture.

Conclusion

This survey among Indian Oral and Maxillofacial Surgeons had made us conclude that use of miniplates for the

treatment of parasymphysis fracture varies from centre to centre and from surgeon to surgeon. Though miniplates are best used following Champy's principle, still many surgeons use single miniplate and were satisfied with their results. Many modifications can be used depending on different conditions. Arch bars placed can be used for inter-maxillary fixation and can also act as tension band, again eliminating the need for upper plate.

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