

## Rational for Maxillofacial Fracture Plate Removal

SADIQ ALI<sup>1</sup>, MUHAMMAD AFZAL KHAN<sup>2</sup>, SHAHBAZ KHAN<sup>3</sup>, ASHFAQ UR RAHIM<sup>4</sup>, UMER HUSSAIN<sup>5</sup>, MUHAMMAD NAUMAN<sup>6</sup>, ZAHID IQBAL<sup>7</sup>

<sup>1</sup>Assistant Professor, Department of Oral & Maxillofacial Surgery, Faryal Dental College

<sup>2</sup>Assistant Professor, Bolan university of medical and health sciences, Quetta, Balochistan

<sup>3</sup>Senior lecturer/HOD, Department of Dental materials, Bolan university of medical and health Sciences, Quetta, Balochistan.

<sup>4</sup>Professor/HOD, Department of Oral & Maxillofacial Surgery, Faryal Dental College

<sup>5</sup>Assistant Professor, Department of Oral & Maxillofacial Surgery, Trauma Centre Sandeman Provincial Hospital Quetta

<sup>6</sup>Registrar, Department of Oral & Maxillofacial Surgery, Faryal Dental College

<sup>7</sup>Professor/HOD, Department of Prosthodontics, FMH College of Dentistry, Lahore

Correspondence to: Sadiq Ali, Email: [dr.sadiq.mds@gmail.com](mailto:dr.sadiq.mds@gmail.com), Contact: 00923144264682

### ABSTRACT

**Aim:** To estimate indications and frequency of plate removal in patient treated for maxillofacial fractures.

**Method;** In this retrospective study, records were reviewed from March 2015 to March 2018, over a period of 3 years. 139 Maxillofacial trauma patients treated with Open reduction and Internal Fixation with 202 plate,

**Result;** In 139 patients, 202 plates were implanted for bone fractures. In total, 128(92%) were male and 11(8%) were female, 32(23.02%) had revisited with complaint and subsequently 47(23.26%) plates were removed. Mandible was commonest location where majority of the plates 32(68.08%) were removed. Most common reason for plates removal was infection 20(42%). Minimum time for plate in situ was 3 months.

**Conclusion;** the reason for plate removal is multifactorial. Establishing measures to minimize plate related complication and avoid patients from further invasive procedures.

**Keywords:** Facial Bone Fracture, Osteosynthesis Plate, Plate Removal Trauma.

### INTRODUCTION

Osteosynthesis with mini plate is a reputable approach for facial bone fractures.<sup>1, 2</sup> It bears advantages over other practices of reduction and fixation of fracture bones, like accurate per op fracture segment stability, eliminate or reduced time for maxillo mandibular fixation and near to constant stability for moveable jaws bones.<sup>3,4,5</sup>

Despite its distinguished results mini plates system has some potential risk to the patient. As a foreign body it can cause infection, sensitivity, palpability, risk of hard ware fracture and exposure.<sup>6,15</sup>

Now the question is that "should surgeon remove this hard ware prophylactically when they accomplished their objectives i.e. healing of bone fracture is completed". Literature is still not in harmony and no local study available, about the statement "plate should be removed prophylactically", but there is consensus that plate with symptoms should be removed<sup>6</sup>. Some studies advocate removal of asymptomatic plates<sup>7,8,9,10,15</sup> while others backed detention until symptoms appear<sup>11,12,13,14</sup>. Symptoms e.g. infection exposure thermosensitivity, palpability are the main elements involved in the eventual removal of Osteosynthesis plates and screw<sup>16</sup>.

### MATERIALS AND METHODS

This study/inquiry was conducted in oral and maxillofacial surgery department, civil hospital (Bolan University of Medical and Health sciences), Quetta from March 2015 to February 2018. This department serves greater part of Baluchistan and to some extent of Afghanistan for Oral and Maxillofacial problems. After approval of ethical committee, we checked clinical records of 193 patients with facial bone

fracture and have been managed with open reduction and internal rigid fixation with 202 plates and 32 patients reported back for removal of their plates. Following variables were noted; Age, Sex, Inserted Plate no, No of removed plates, Location, Reasons for plate removal, Time duration of plates in Situ.

All data was collected by researcher himself on prescribed proforma. The collected information was entered in SPSS version 21 and analyzed through it. The quantitative data like Age, Sex, Inserted Plate no, No of removed plates, Location, Reasons for plate removal, Time duration of plates in Situ was presented by mean and standard deviation. Data was stratified for age, gender to address the effect modifiers; post stratified independent sample test was applied. P-value  $\leq 0.05$  was considered as significant.

The decision for removal of plates was taken on basis of patient's report of symptoms, surgeon's clinical evaluations/examination; radiological finding and patients discharged slips.

### RESULTS

See descriptive analysis in table 1. Total 202 plates were placed in 139 patients, 128(92%) male and 11(8%) female with maxillofacial fracture. Thirty two patients (23%) with 78 plates reported back and subsequently underwent with their 47 plates (23%) removal with 30(93.75%) male and 2(6.25%) female ratio. Age range was 21 to 63 years (mean age 28 years).

Majority of the plates from mandible 32(68%) followed by zygoma 9(19%) and maxilla 6(12%). In mandible, angle was the most common location where plates 16(34%) were removed, of which, 10 plates had been inserted intra orally. In zygoma out of 16, 9 plates were removed which have been placed extra orally at the time of primary management.

Received on 14-02-2021

Accepted on 21-05-2021

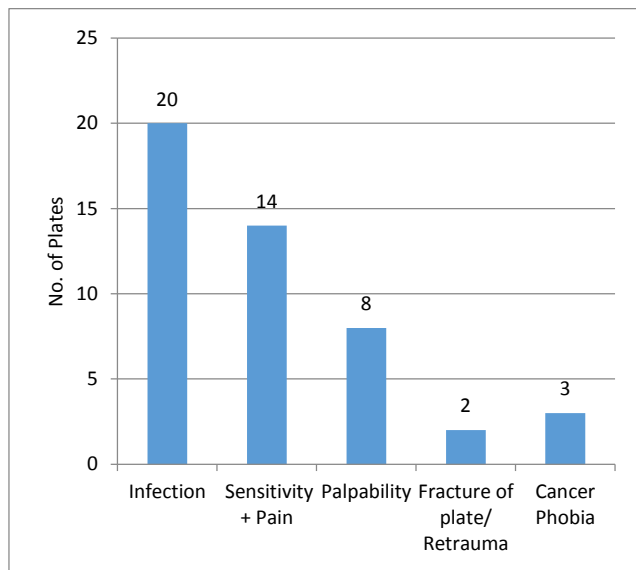
Table 1 Descriptive Analysis of 32 Patients

1.	Gender:	Male - 30(93.7%) Female -02(6.25%)
2.	Age Range:	21-63 years
3.	No of inserted plates	One plate Two plate Three plate
4.	No of plate inserted	Extra Orally – 42 Intra Orally - 36
5.	No of plate removed	47
6.	Time range for plate(removed) in Situ	3 to 36 Months

Table 2: Total Plate and insertion approach

S.No	Location	Total Plate and insertion approach	Plate Removed with %
1.	<u>Mandible:</u>	55 EO = 22 IO = 33	EO = 09 IO = 23
a.	Angle:	EO = 09 IO = 12	EO = 06 IO = 10
b.	Symphysis:	EO = 01 IO = 14	EO = 01 IO = 07
c.	Para Symphysis:	EO = 03 IO = 04	EO = 01 IO = 03
d.	Body:	EO = 05 IO = 03	EO = 00 IO = 03
e.	Condyle:	EO = 04	EO = 01 IO = 00
2.	<u>Maxilla:</u>	07 EO = 04 IO = 03	EO = 02 IO = 04
3.	<u>Zygoma:</u>	16 EO = 16	EO = 09
a.	<u>Frontozygomatic suture</u>	EO = 11 EO = 03	EO = 11 EO = 03
b.	<u>Body</u>	EO = 02	EO = 02
c.	<u>Arch</u>		

EO=Extra oral, IO=intra oral



Infections 20(42.55%) was the most common reason for removal of plates. Other reasons, Sensitivity accounted for 14(29.78%). probability 8(17.02%), fracture of plate due to re trauma 2(4. 25%).

## DISCUSSION

In our set-up asymptomatic plate removal after cessation its function is not a routine exercise, however symptomatic plates remove frequently. In total 32 patients have to be evaluated and managed for their symptomatic plate. Male to female ratio was 93.75:6.25, which is obviously according to universal trauma patient data<sup>1,20</sup>. Total 47 (23.26%) plates removed from 32 (23.02%) patients. Plate removal per plate in literature is very wide in range (3.7% to 40%)<sup>16,17,18</sup>. In a study by O’Connell et al<sup>6</sup>, the plate removal (P.R) rate is 3%. these low rate, he attributed to mainly to patient compliance. Poor compliance in our patient is main problem. Due to low education level, oral hygiene maintenance, uncertain antibiotic protocol (which include any aspect related to antibiotic) can contribute higher PR per plate. The main reason for plate removal was infection and/or exposure in our study (n-20) (42. 5%).This is the same value that has been evaluated in previous reports<sup>19</sup>.

One patient was in the opinion that plate inserted for the management of his fracture could cause cancer and demanded to extricate all his plate 3(6.4%). literature exclude any relation between tumor formation or allergic reactions and commercially pure titanium<sup>13</sup>.

In this research, 32 (68%) of plate removed were from mandible, 19(19%) from zygoma and 6(12.76%) from maxilla. Of mandible, 16(34%) plate from angle, of which 10 plates were from external oblique ridge which had been placed intra orally. Other studies also mentioned angle as key site for higher complication rate.<sup>6</sup> thin mucoperiosteal covering and biomechanical forces in the angle region during mastication may add to leading proportion of complication<sup>1,6</sup>.

The second most common bone where plates 9(19%) have been removed, was from zygoma. Over the zygoma fronto zygomatic suture 5(10.6%) and zygomatic arch2 (4.2%), thin soft tissue may cause irritation and infection. Minimum time for plate in situ was 3 months. Patient with concern of cancer phobia came even earlier for plate removal. After three months, came back and subsequently his all three plates have been removed. Majority of the patients had removed plates after 10 months of treatment.

## CONCLUSION

According to this retrospective study one cannot conclude wether to extricate non functional asymptomatic plates, but it is evident that taking measures to minimize the complication related to plates e.g. minimum exposure of surgical site, use resorbable or light weight plates and screws, strict antibiotic protocol and education of the patient, can avoid patient for further surgery, financial burdens.

## REFERNCES

1. Thoren H, Snall J, Hallermall W, Kormi E, Tornwall J: Policy Of Routine Titanium Miniplate Removal After Maxillofacial Trauma. J Oral And Maxillofacial Surg. 2008; 66; 1901-1904
2. Fox AJ, Kellman RM. Mandibular Angle Fractures: Two-Miniplate Fixation And Complications. Arch Facial Plast Surg 2003; 5(6):464–469

3. Schmidt BL, Perrott DH, Et Al: The Removal Of Plates And Screws After Le Fort I Osteotomy. *J Oral Maxillofac Surg* 56:184, 1998
4. Horster W: Experience With Functionally Stable Plate Osteosyn- Thesis After Forward Displacement Of The Upper Jaw. *J Maxillofac Surg* 8: 176,1980
5. Egbert M, Hepworth B, Myall R, Et Al: Stability Of Le Fort I Osteotomy With Maxillary Advancement: A Comparison Of Combined Wire Fixation And Rigid Fixation. *J Oral Maxillofac Surg* 53-243, 1995
6. Connell OJ, Morphy C, Ilkneag Wiani C, Adley C, Kearns G, The Fate Of Titanium Miniplates And Screws Used In Maxillofacial Surgery: A 10-Year Retrospective Study. *Int J Oral Maxillofac Surg* 2009; 38: 731-735.
7. Alpert B, Seligson D: Removal Of Asymptomatic Bone Plates Used For Orthognathic Surgery And Facial Fractures. *J Oral Maxillofac Surg* 54:618,1996 Cross 13 Of ART 3
8. Cawood M. Small Plate Osteosynthesis Of Mandibular Fractures. *Br J Oral And Maxillofac Surg* 1985: 23: 77-91
9. Michelet FX, Deymes J, Dessus B. Osteosynthesis With Miniaturized Screwed Plates In Maxillofacial Surgery. *J Maxillofac Surg* 1973: 1: 79-84.
10. Spiessl B. Rigid Internal Fixation Of Fractures Of The Lower Jaw. *Reconstr Surg Traumatol* 1972: 13: 124-140.
11. Brown JS, Trotter M, Cliffe J, Ward- Booth RP, Williams ED. The Fate Of Miniplates In Facial Trauma And Orthog- Nathic Surgery: A Retrospective Study. *Br J Oral Maxillofac Surg* 1989: 27: 306-315
12. Haug RH. Retention Of Asymptomatic Bone Plates Used For Orthognathic Surgery And Facial Fractures. *J Oral Maxillofac Surg* 1996: 54: 611-617.
13. Matthew IR, Frame JW. Policy Of Consultant Oral And Maxillofacial Surgeons Towards Removal Of Miniplate Compo- Nents After Jaw Fracture Fixation-A Pilot Study. *Br J Oral Maxillofac Surg* 1999: 37: 110-112.
14. Schierle HP, Schmelzeisen R, Rahn B, Pytlik C. One- Or Two-Plate Fixation Of Mandibular Angle Fractures? *J Cranio Maxillofac Surg* 1997: 25: 162-168
15. Chaushu G, Manor Y, Shoshani Y, Taicher S: Risk Factors Contributing To Symptomatic Plate Removal In Maxillofacial Trauma Patients. *Plast Reconstr Surg* 105: 521e525, 2000
16. Murthy AS, Lehman JA: Symptomatic Plate Removal In Maxillofacial Trauma. A Review Of 76 Cases. *Ann Plast Surg* 55: 603e607, 2005 20.
17. Islamoglu K, Coskunfirat OK, Tetik G, Et Al: Complications And Removal Rates Of Miniplates And Screws Used For Maxillofacial Fractures. *Ann Plast Surg* 48:265, 2002
18. Rallis G, Mourouzis C, Parakosta V, Papanastasiou G, Z Achariades N: Reason For Miniplate Removal Following Maxillofacial Trauma. *J Cranio-Maxillofac Surg* 2006: 34, 435 439.
19. Mulk N U, Tareen M, Hamad, J, Rehman, H U, & Khan, C: Frequency of Maxillofacial Skeletal Injuries According To Age Site And Cause. *Pakistan Orthodontic Journal* 2008: 10(2), 116-119. Retrieved From <https://www.Poj.Org.Pk/Index.Php/Poj/Article/View/246>
20. Bhatt V, Chhabra P, Dover MS. Removal Of Miniplates In Maxillofacial Surgery: A Follow-Up Study. *J Oral Max- Illofac Surg* 2005: 63: 756-760.