REMOVAL OF TITANIUM PLATES IN POST-OPERATIVE PATIENTS WITH MAXILLOFACIAL TRAUMA A FIVE YEARS RETROSPECTIVE STUDY

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Abstract

Objective: *To evaluate the reasons for removal of the titanium plates in patients with maxillofacial trauma and to compare findings with national and international studies.*

Materials and Methods: *A Retrospective descriptive study was carried out on the Hospital data from 2013 to 2018 for plates removal after approval from the Ethical Committee. Variable included age, gender, anatomical location, reason for removal of the plates, types of the plates removed and duration after initial surgery. The data was analyzed through SPSS version 17.*

Results: *A total of 521 patients had underwent open reduction and internal fixation from 2013 till 2018 out of 797 total trauma patients. Plates removal had been done in 140 patients (26.87%). The mean age was 24.5 years with S.D +14.43 years. There were total 94 (67%) males and 46 (33%) females and male to female ratio was 2:1 in the study. The most common cause was the patient's request/demand 34.28%, the most frequent bone was the mandible (67.12%). Angle of mandible was the most frequent site (26.42%) for plate removal. Majority of the plates were removed within 6 months after fixation. Mini plates (2mm) were removed in 96 (68.57%) cases, micro plates (1.5mm) were removed in 42 (30%) cases and titanium mesh was removed in 2 (1.42%) cases.*

Conclusion: *This study had comprised predominantly of young males who had undergone plate removal, the most common site being the mandibular angle and the demanded plate removal as commonest cause. Miniplates were most frequently removed. Resorbable plates should be encouraged to avoid 2nd surgery for plates*

Key Words: *Maxillofacial Trauma, Titanium Plates, Mandibula Angle*

Introduction

Internal fixation using bone plates and screws had been used in the facial region since late 19th century[1]. In the maxillofacial region, modern internal fixation devices have gained more popularity since 1978 when Champy adapted techniques from Michelet et al and nowadays these devices form an important part in the management of facial bone trauma, orthognathic and maxillofacial reconstructive Surgery[2,3,4,5].Titanium plates have become commonplace for open reduction and internal fixation in maxillofacial trauma. Titanium is considered to be bio inert and presents fewer complications.

Complications may include growth disturbance, pain, infection, palpability, extrusion, neurosensory changes, metal allergy, psychological problems, security issues (security walk through gates) and hardware malfunction which may necessitate hardware removal[2,4,6,7]. Plate infection is among the commonest cause for plate removal[8,9]. And the commonest site for plate removal had been the mandible[8,10].

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The documented removal rate of titanium plates ranges from 7% to 33.8%.

The aim of this study was to evaluate the reasons for removal of the titanium plates in patients with maxillofacial trauma and to compare our findings with national and international studies.

Materials and Methods

Ethical approval was obtained from the Ethical committee before commencing with the mentioned study. The data from 2013 till 2018 of all the trauma patients operated in the Department of Oral and Maxillofacial Surgery, Khyber Girls Medical College/Hayatabad Medical Complex Peshawar was obtained from the record room of the Institution. A Retrospective descriptive study was carried out. Variables comprised age, gender, anatomical location, reason for removal of the plates, types of the plates removed and duration after initial surgery. The data was analyzed through SPSS version 17.

Results

A total of 797 trauma patients were operated from 2013 till 2018. Out of these 521 patients underwent open reduction and internal fixation. One hundred and forty 140 patients (26.87%) had underwent plate removal. Total of 94

(67%) males and 46 (33%) females were encountered in the study with a male to female ratio of 2:1. The mean age in the present study had remained 24.5 years with S.D +14.43 years ranging from 3-63 yrs.

Majority of the patients i.e. 41 (29.28 %) were in the second decade followed by third decade 37 (26.42%) and first decade 24 (17.14%) respectively. (Table 1).

Majority of the plates i.e. in 94 (67.14%) cases were removed from the mandible. There were 46 (32.85%) cases of plate removal in the midfacial region comprising 25 (17.85%) cases and from fronto zygomatic region, 12 (8.57%) cases for inferior orbital rim and 7 (5%) cases for zygomatico maxillary buttress region in a descending order respectively. Among mandible bone, angle was the commonest location for plate removal that comprised of 37 (26.42%) cases followed by mandibular body 31 (22.14%) cases, parasymphysis 13 (9.28%) cases and 13 (9.28%) cases in symphysial region respectively. (Table 2)

The most common reason for plate removal in our study was the patient's demand n- 48 (34.28%) cases followed by n-38 (27.14%) cases of infection, n-29 (20.71%) cases of pain after plating and planned removal due to age factor and others in 25 (17.85%) cases. (Table 3)

Mini plates (2mm) were removed in 96 (68.57%) cases, micro plates (1.5mm) were removed in 42 (30%) cases and titanium mesh was removed in 2 (1.42%) cases. (Table 4)

In 94 (67.14%) cases the plates were removed in six months duration after the initial surgery followed by 30(21.42%) cases of plate removal in eight months, and in 16

Table 1: Age distribution for plate removal

S.no	Age group	Cases (n)	percentage
1.	3 - 9 yrs	24	17.14 %
2.	10 - 19 yrs	41	29.28 %
3.	20 - 29 yrs	37	26.42 %
4.	30 - 39 yrs	19	13.57 %
5.	40 - 49 yrs	8	5.71 %
6.	50 - 59 yrs	5	5 %
7.	≥60 yrs	4	2.85 %
Total		140	100 %

p-value for frequency of dental visit was 0.399 NS

Table 2: Anatomic location for plate removal

S.no	Anatomic location	Cases (n)	percentage
1.	Mandibular angle	37	26.42 %
2.	Mandibular body	31	22.14 %
3.	Fronto zygomatic suture	25	17.85 %
4.	Parasymphysis	13	9.28 %
5.	Symphysis	13	9.28%
6.	Inferior orbital rim	12	8.57 %
7.	Zygomatico maxillary buttress	7	5 %
8.	Titanium mesh (orb floor, frontal bone)	2 (each)	1.42 %
Total		140	100 %

Table 3. Reasons for plate removal

S. no	Reason	Cases (n)	percentage
1.	Psychological/Demanded plate removal	48	34.28 %
2.	Infection	38	27.14 %
3.	Pain	29	20.71%
4.	Planned removal/age factor	25	17.85%
Total		140	100%

Table 4. Types of hardware removed

S.no	Types of hardware	Cases (n)	percentage
1.	Mini plates (2mm)	96	68.57%
2.	Micro plates (1.5mm)	42	30%
3.	Titanium mesh	2	1.42 %
Total		140	100 %

Table 5. Duration between initial surgery and plate removal

S.No	Duration	Cases	percentage
1.	6 months	94	67.14 %
2.	8 months	30	21.42%
3.	12 months	16	11.42%
Total		140	100 %

Discussion

Plate removal in the oral and maxillofacial trauma patients had been one of the controversial topic in oral and maxillofacial practice. The proponents of the plate removal are of the opinion that the titanium plates can cause potential complications and growth and psychological disturbances and should be removed once healing has occurred.[11,12] Contrary to this, the opponents argue that removal may expose patients to second surgical trauma and potential threat to the vital structures, who may also need provision of general anesthesia, and the inherent expense involved in the removal process[6].

One hundred and forty patients (26.87 %) had underwent plate removal in our study is nearly matching the removal rate of 22.6% by Park H et al.[10] there were 94 (67%) were males and 46 (33%) were females with male to female ratio of 2:1. Male to female ratio in our study had been in accordance with the study by Rehman et al and Park et al.[8,10] Majority of the traumatized patients in our department were males who underwent open reduction and internal fixation. This may be a reflection of the cultural factor that females most often are restricted at home and do not actively participate in outdoor activities.

Patients from the second decade were most frequently encountered accounted as 41 (29.28 %) followed by third decade 37 (26.42%) cases. Most the patient for plate removal had been from the young age group below 30 years. Age range in our study is consistent with the study conducted by Rehman et al and Rouse R who had documented age ranging from 4 - 60 yrs.[8,10,12] In all these studies, plates had been removed in patients younger than 30 years. Majority of the traumatized population in our community are the victim of the road traffic accidents especially motor bike accidents are young males. This factor may contribute to the young age group for the plate removal.

Vast majority of the plates were removed from the mandible accounted as 94 (67.14%) cases compared to mid facial 46 (32.85%) cases. This is an agreement with previous studies.[8,10,14] Mandibular angle was the most common location for plate removal that accounted 37 (26.42%) cases followed by mandibular body 31 (22.14%) cases in our study which is an agreement with the previous studis.[8,14] In the midfacial region comprising 25 (17.85%) cases of plate removal from fronto zygomatic region, 12 (8.57%) cases for inferior orbital rim and 7 (5%) cases for zygomatico maxillary buttress region in a descending order respectively. This is also same to the previous study.[8,10] Unique phenomenon in our study had been noted that none of the plate had been removed from the subcondylar region contrary to the study by Rehman et al and Park H et al.[8,12] The study conducted by Bakathir et al also shows no removal from condylar region.[14] This might be due to the reason that majority patients in our set up had been treated by indirect fixation for the subcondylar fractures without open reduction and internal fixation. Angle had been the commonest site in the mandible in our study contrary to the symphysis and parasymphysis or body. There can be underlying reason of lower blood supply, denser bone, enhanced gravity factor in the posterior regions leading to accumulation of the saliva and the presence of the third molar tooth in some cases contributing to the infection in the vicinity of the titanium hardware.

The commonest reason for plate removal in our study was the patient's demand and were 48 (34.28%) cases followed by 38 (27.14%) cases of infection, 29 (20.71%) cases of pain after plating and planned removal due to age factor and others in 25 (17.85%) cases. This is in contrast to the other studies wher infection and age was considered common causes.[8,14,15] Our results were in accordance with the study conducted by Park H et al as far as the demanded plate removal by the patient's community was concerned.[10] We had noticed one common factor among our patients who have the perception of developing oral cancer with the hardware they carry in their body and they frequently request for the removal of the plate after healing had occurred.

In 94 (67.14%) cases the plates were removed in six months duration after the initial surgery followed by 30 (21.42%) cases of plate removal in eight months, and in 16 (11.42%) cases the plates were removed in 12 months period after the initial surgery. This is in agreement with the study conducted by Bakathir et al where most plates were removed during first year after insertion. In children aged less that 10 yrs had undergone plate removal within 3 months in our set up. Reason for earlier plate removal in children was to prevent bone formation over the metallic hardware which may later increase the surgical morbidity while removing the plates. Literature supports plate removal within 12 months after insertion[4,6].

Conclusion

Based on this study the incidence of bone plates bone plates removal was relatively low and the most common site was mandible and mandible and cause was patient demand followed by infection.

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