

PATTERN AND MANAGEMENT OF PALATINE BONE FRACTURES

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ABSTRACT

The aim of this study was to determine pattern of palatal fractures, review management options and find out other injuries associated with it. This retrospective study was carried out in the Department of Oral and Maxillofacial Surgery, Khyber College of Dentistry, Peshawar over a period of three years. All the patients having maxillofacial injuries were evaluated for the presence of palatal fractures. Orthopantomogram (OPG) and Para Nasal sinus (PNS) views were advised to each patient. CT scan and 3D CT scan were advised in cases with pan facial trauma and comminuted fractures. All the data were entered in specially designed proforma. A diagnosis of palatal fracture was made after correlating clinical and radiographic signs. The pattern of palatal fractures was determined along with associated facial injuries. A total of 65 cases of palatal fractures were found in this study. Majority of patients (33.8%) were in the 3rd decade of life. Regarding the pattern of fracture, majority (65%) were sagittal fractures. Most of these fractures (54%) occurred with maxillary Le Fort fractures, regarding management, 9% of the cases were treated with open reduction while 81% were managed with closed reduction techniques. Palatal fracture is often overlooked and is a cause of post op malocclusion in trauma patients. Patients with palatal bone fractures were mostly males in their 3rd decade of life. Sagittal fractures were common and the Le Fort fractures were associated with it. Closed reduction was done in most of the cases of palatal bone fractures.

Key Word: Palatal fracture, Management, associated fractures.

INTRODUCTION

Trauma is a leading cause of mortality and morbidity.¹ The facial region is especially prone to traumatic incidences owing to exposed and unprotected nature of this region. Maxillofacial injuries can occur in isolation or as a part of high velocity trauma affecting other parts of the body as well.²

Palate is an important bone of the mid face, which gives support to different buttresses and helps in determining facial width and architecture. It is a combination of two bones, palatine process of maxilla and horizontal plate of palatine bone.³ Palatal bone is thicker anteriorly as compared to the posterior region; it is also comparatively thinner in the midline and thicker towards the alveolus.⁴ Fractures of the midface are frequent, but palatal fractures are much rare.⁵ Palatal fractures almost never occur in isolation, they are however, found in less than 10% of patients with mid-face fractures, although some isolated studies report a much higher incidence.⁶

The pattern of palatal fracture has been described in literature by using different methods. In simplified terms fracture of the palate can be sagittal, transverse and comminuted.⁶ However, Hendrickson et al put forth a comprehensive CT based classification system which included 6 classes. These include anterior and posterior alveolar, sagittal, para sagittal, para alveolar, complex and transverse fractures.⁷ These classifications are important for anatomic localization of the fracture; however, it doesn't help the surgeon in deciding management plan of fracture. In order to solve this problem a new classification system was put forth by Park. According to Park there are four classes of palatal fractures including closed reduction, anterior treatment, anterior and palatal treatment and combined.⁸

Splits of the palate are challenging to treat because splaying of palatal bone and alveolus causes flaring of the segments and instability of lower 3rd of face especially in concurrent symphysis and condylar fractures. In the past fractures of the palate were not opened. In cases of comminution the pieces were treated by simply dissecting out and discarding the segments. However as time progressed various methods were attempted to secure and treat palatal fractures.⁹ Digital pressure is often employed for reducing palatal fractures, however often the segments are displaced in those cases, a specially designed forceps may be used to achieve reduction.⁷ Methods of fixation include arch bars, K

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wires, trans-palatal wire, or a palatal bar and mini plates.^{10,11} Other methods like figure of eight wiring and pyriform wiring have also been used to secure and stabilize palatal fractures.¹²

Palatal fractures complicate comprehensive management of patients especially in conditions of pan facial trauma and mid face fractures associated with condylar and symphysis fracture. Thus it is important to accurately diagnose and manage palatal fractures.¹³ The aim of this study was to determine pattern of palatal fractures, review management options and find out other injuries associated with it.

METHODOLOGY

This retrospective study was carried out in the Department of Oral and Maxillofacial Surgery, Khyber College of Dentistry, Peshawar over a period of three years from 20th June 2010 to 20th December 2013. Ethical approval was taken from the Institutional ethical review committee. The research protocol was explained to all the patients and an informed consent was taken. All the patients having maxillofacial injuries were evaluated for the presence of palatal fracture. After initial stabilization of the patient, a detailed history was taken from each patient followed by clinical examination. Orthopantomogram (OPG) and Para Nasal sinus (PNS) views were advised to each patient. CT scan and 3D CT scan were advised in cases with pan facial trauma and comminuted fractures. All the data were entered in specially designed proforma. A diagnosis of palatal fracture was made after correlating clinical and radiographic signs. The pattern of palatal fractures was determined along with associated facial injuries. All the patients were treated under general anaesthesia.

RESULTS

A total of 65 cases of palatal fractures were found in this study. Out of these 85% were males and 15% females with a male to female ratio of 5.67:1 (Fig 1). The mean age of patients in current study was 32 ± 12.47 years. Majority of patients (33.8%) sustained palatal fractures in 3rd decade followed by 4th and 2nd decade (Table 1). Regarding the pattern of fracture, 65% were sagittal fractures, 32% para-sagittal while 3% were transverse fractures (Fig 2). Most of these fractures (54%) occurred with maxillary Le Fort fractures followed by Zygomatico-maxillary complex (ZMC) plus Le Fort fractures (9%) and mandible plus Le Fort fractures (9%). 7.7% of the cases were pan-facial traumas (Fig 3). Most of the patients i.e., 81% were managed with closed reduction techniques, while 19% of the patients were treated by open reduction and internal fixation using titanium micro-plates and stainless steel wires.

DISCUSSION

In order to provide accurate diagnosis and treatment plan to patients it is important to understand

the manner in which trauma affects different bones of the facial region. In the current study, palatal bone fractures were found in 85% of male patients. This trend is in accordance with studies done in other parts of world like Brazil¹⁴, United Arab Emirates¹⁵ and Turkey.¹⁶ Studies done on the pattern of maxillofacial injuries in Pakistan show similar results¹⁷, however these results are contradictory to study done in Greece where lower male to female ratio was encountered in maxillofacial trauma patients.¹⁸ The reason for high prevalence of injuries in males may be due to the fact that males spend more time outside home and are thus more prone to road traffic accidents. Moreover rate of

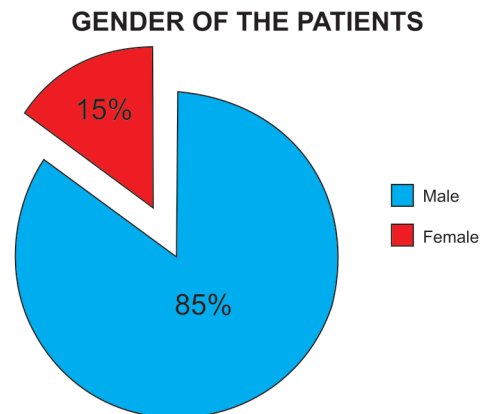


Fig 1: Gender distribution of patients with palatal fractures

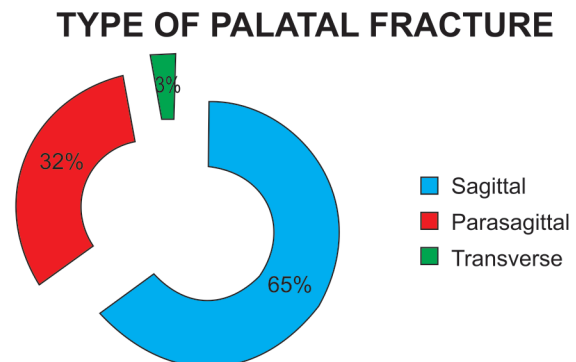


Fig 2: Pattern of palatal fractures

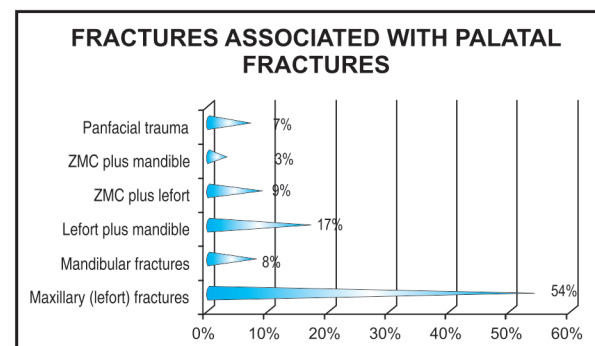


Fig 3: Associated fractures seen in patients with palatal fractures

TABLE 1: AGE DISTRIBUTION OF PATIENTS WITH PALATAL FRACTURES

S. No.	Age Groups	n	%
1	0-10	2	3.1
2	11-20	9	13.8
3	21-30	22	33.8
4	31-40	17	26.2
5	41-50	10	15.4
6	51-60	5	7.7
	Total	65	100.0

interpersonal violence and fights are also high in males as compared to females.

With regards to age, it was found that majority of patients with palatal fractures were in their 3rd decade of life. This is in accordance with studies done internationally where majority of trauma is reported to occur in 3rd decade of life.^{19,20} Studies done in Pakistan on pattern of maxillofacial injuries report similar findings. According to Cheema out of a total of 702 patients, maxillofacial injuries were most common in 3rd decade followed by 2nd decade.²¹ 2nd and 3rd decade of life is considered as active period during which individuals are involved in outdoor activities and sports. This pre disposes them to an increased chance of trauma and interpersonal violence incidents.

The pattern of palatal fractures most commonly encountered were sagittal fractures followed by para sagittal and transverse fractures. In a study done by Pollock, 8 cases of palatal fractures were reviewed, one was sagittal while 3 were para sagittal.³ This is in contrast to findings of current study. In another study by Hendrickson commonest palatal fracture was para sagittal and para alveolar. The sagittal fractures divide the palate at the level of mid palatal suture. According to Melson, this suture ossifies between the second and third decade thus in younger adults the mid palatal suture presents a potential site of weakness. As majority of patients in current study belonged to younger age group, the frequently encountered fracture type was also found to be sagittal fracture.²² In contrast the para sagittal split is encountered in older adults as the bone lateral to vomerine attachment of maxilla is thin. Transverse fracture of the palate is a rare fracture and occurrence in current study depicts the severity of trauma that was encountered in patients.

In the current study there was only one isolated case of fracture palate. The rest of palatal splits were associated with fractures in other part of facial skeleton. Among these the commonest fractures were maxillary Le Fort fractures followed by Le Fort plus mandibular fractures in addition to ZMC plus mandibular and

pan facial traumas were also encountered. Worldwide studies on pattern of maxillary fractures indicate that Le Fort fractures are the most common fractures involved with palatal splits. Among Le Fort, Le Fort II fractures have the highest percentage of involvement with palatal splits.²³ According to Denny, palatal fractures involvement occurs most of the time with Le Fort fractures.²⁴ In another study done by Rehman in the current department, majority of fractures associated with palatal fractures were of Le Fort II type.²⁵ The type and pattern of fracture seen depends to a great extent on the mechanism and severity of injury received by patients. Thus when the central part of face receive trauma, it is absorbed by palate and the maxilla fractures along the line of weakness. However, in cases of lateral blows it is the ZMC that receives force thus fracturing the zygoma along with palatine bone. In this study different fracture patterns were encountered. Cases of mandibular fractures and pan facial traumas were also found. This correlates with severity of trauma that patients are often presenting with when reporting to a maxillofacial surgical unit. In a study by Rutanargusa on palatal fractures, mandibular fractures was second common fracture pattern followed by pan facial traumas. It was concluded that palatal fractures were often found in cases of severe trauma where they were associated with other severe skull and facial bone injuries.²⁶

All the patients of palatal fractures were operated under General anesthesia after considered medically fit by hospital's anesthetist. In present study 9% of patients were treated by open reduction and internal fixation. Out of these cases, pyriform wiring was done in one patient while 5 patients were treated by open reduction and internal fixation (ORIF) with a 4 hole Titanium microplates. The rest of the palatal bone fractures were managed closely with intermaxillary fixation (IMF) and by reduction and fixation of other associated fractures. In literature various methods have been described for stabilization of palatal fractures. These include splints, orthodontic braces, arch bars for IMF, pyriform wiring and internal fixation with mini or micro plates.²⁷ Every method is associated with pros and cons, thus case selection prior to treatment is important. Ratanarugusa compared the results of wiring and IMF vs ORIF in palatal bone fractures and found no significant difference regarding post operative complications and hospital stay in both groups. However, the length of procedure was significantly longer in ORIF group.²⁸ This is an important factor to be considered in government care hospitals due to increased patient inflow. Thus methods like pyriform wiring, figure of 8 wiring and IMF can prove to be of benefit in such cases. Chen CH in a case review of 162 patients with palatal fractures concluded that inter-molar wiring fixation is a much less time-consuming and

more cost-effective method for satisfactory treatment of sagittal fractures of the palate.⁶ However, Rimmel found more complications when fractures were treated closely with wire and splinting.²⁸

Park S devised an algorithm for management of palatal fractures and gave a treatment based classification system. The key elements were possibility of closed reduction, surgical exposure, site of fixation, and stability of the segment. According to Park in cases of anterior fracture and minimal displacement only IMF should be adequate, however with problems in occlusion or a complaint of malocclusion in post operative period open reduction should be considered as an option.⁸ Similar approach was adopted in current study. It was found that cases where palatal fracture was associated with Le Fort II and symphysis fracture there was problem with achieving stable occlusion due to rotation and splaying of the mid facial segments.

CONCLUSION

Palatal fracture is often overlooked and is a cause of post operative malocclusion in trauma patients. Patients with palatal bone fractures were mostly of male gender in their 3rd decade of life. Sagittal fractures were common and the Le Fort fractures were associated with it. Closed reduction was done as a treatment modality in majority of patients with palatal bone fractures.

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