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ORIGINAL RESEARCH

Mandibular Ramus Fractures: A Rarity

Tejraj Pundalik Kale, SM Kotrashetti, Archana Louis, JB Lingaraj, BU Sarvesh

ABSTRACT

Aim: To determine the incidence of mandibular ramus fractures in KLE's PK Hospital and to analyze the outcome of open reduction and internal fixation of these fractures.

Materials and methods: Using a retrospective study design, records of all trauma patients who reported to the Department of Oral and Maxillofacial Surgery, KLE's PK Hospital Belgaum, between the years January 2006 to October 2011 was obtained from the medical records office. The data variables that were analyzed were the name, age, sex, cause of injury, pretreatment occlusion, treatment given, period of MMF and post-treatment occlusion.

Results: Total number of mandibular fracture cases was 298. Ramus fractures were 10 in number which accounted for 3.3% of fractures. The age range of these 10 patients was seen to be between 20 to 80 years with the average age being 35.6 years. Of these 10 patients, 9 were male and 1 was female and 7 patients were treated by open reduction and internal fixation and the remaining 3 by closed reduction. The average period of MMF was 3 days for the patients who underwent open reduction and internal fixation. There was improvement in occlusion in all 10 patients post-treatment and there was no complication reported in any of the cases.

Conclusion: Ramus fractures accounted for 3.3% of all mandibular fractures. Open reduction and internal fixation of ramus fractures ensures adequate functional and anatomic reduction.

Clinical significance: This study makes an attempt to throw a light on the increasing incidence of ramus fractures and a successful management of these fractures by open reduction and internal fixation.

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INTRODUCTION

Despite the fact that the mandible is the largest and strongest facial bone, it is very commonly fractured (second to nasal bone fractures)[1], generally occurring 3 time as often as midfacial fractures.[2] However, the incidence of ramus fractures is extremely low. According to Olson et al[3] ramus fractures are the second least common fractures with coronoid fractures being the least common. Similar results were obtained in the study done by Subashraj et al,[4] in which ramus fractures accounted for 3% of the cases.

The fractures of the ramus of the mandible are usually minimally displaced. This is due to the anatomical position of the ramus between the masseter and the medial pterygoid muscle. As a result of the minimal displacement of these fractures, most surgeons manage these fractures by closed reduction. However, mandibular fracture treatment by open reduction and rigid internal fixation provides a number of advantages. The most obvious is avoiding MMF, which results in an early return to function, easier maintenance of oral hygiene, improved nutrition, and reduced risk of airway compromise.[5]

The aim of this article is to document the incidence of ramus fractures in KLE's PK Hospital and to present the evolution of the management of ramus fractures from that of closed reduction to that of open reduction and internal fixation.

MATERIALS AND METHODS

This is a retrospective study in which the records of all trauma patients who reported to the Department of Oral and Maxillofacial Surgery, KLE's PK Hospital Belgaum, between the years January 2006 to October 2011 was obtained from the medical records office. All the patients with mandibular fractures were segregated and further the records of the patients with ramus fractures was analysed. The data variables that were analyzed were the name, age, sex, cause of injury, pretreatment occlusion, treatment given (open or closed), period of MMF and post-treatment occlusion. This is a retrospective study and is exempted from the clearance by the Institutional Review Board.

RESULTS

The number of mandibular fractures that were treated in our hospital between January 2006 to October 2011 was 298 which accounts for 43.3% of the total number of trauma cases. Of these 298 cases of mandibular fractures, there were only 10 cases of ramus fractures. Therefore the incidence of ramus fractures was tabulated to be 3.3%. The age range of these 10 patients was seen to be between 20 to 80 years with the average age being 35.6 years. Of these 10 patients, 9 were male and 1was female. All 10 patients had inflicted injury secondary to road traffic accident. The pretreatment occlusion in all 10 patients was seen to be deranged. Out of these 10 patients, 7 were treated by open reduction and internal fixation and the remaining 3 by closed reduction. The average period of MMF was 3 days for the patients who underwent open reduction and internal fixation. There was improvement in occlusion in all 10 patients post-treatment (both open and closed reduction) and there was no complication reported in any of the cases. The data collected has been summarized in Table 1.

DISCUSSION

The incidence of ramus fractures in KLE's PK Hospital is 3.3 %. Our results were similar to other studies by Olson et al[3] and Subashraj et al.[4] The reason for the low incidence of ramus fractures can be hypothesized to be the anatomical position of this structure, enveloped on either side by the pterygomasseteric sling. The low incidence of ramus fractures can also be attributed to the lack of a proper definition for these fractures. Ramus fractures are defined as those in which the fracture line either runs vertically from the sigmoid notch to the posterior border of the mandible or horizontally from the anterior border of ramus of mandible to posterior border of ramus of mandible. Very often there are fracture lines seen on the mandible that run vertically downward from the coronoid process to the posterior border of the ramus of the mandible (Figs 1 and 2). These fracture lines can be included in the classification of ramus fractures.

A significant observation in our study is that, out of the 10 cases seen in the last 5 years, 6 cases have presented in the past 6 months. This observation leads us to believe that there is an increase in the incidence of ramus fractures in

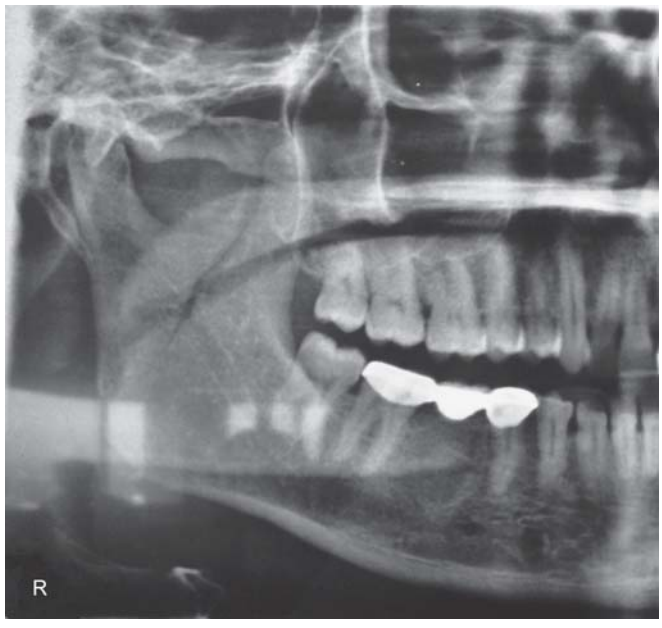

Fig. 1: Fracture line seen in patient 1 running from coronoid process to posterior border of ramus of mandible; to considered in classification of ramus fractures

Table 1: Details of patients with mandibular ramus fracture

Sr. no.	*Age*	*Sex*	*Cause of injury*	*Date*	*Pretreatment occlusion*	*Treatment given*	*Period of MMF*	*Post-treatment occlusion*
1	24 yrs	Male	Road traffic accident	05/06/2007	Deranged	Closed reduction	6 weeks	Restored to normal
2	32 yrs	Male	Road traffic accident	23/02/2008	Deranged	Open reduction and internal fixation	3 days	Restored to normal
3	48 yrs	Male	Road traffic accident	18/08/2010	Deranged	Open reduction and internal fixation	3 days	Restored to normal
4	79 yrs	Male	Road traffic accident	09/11/2010	Deranged	Closed reduction	6 weeks	Restored to normal
5	33 yrs	Male	Road traffic accident	14/05/2011	Deranged	Open reduction and internal fixation	3 days	Restored to normal
6	37 yrs	Male	Road traffic accident	28/07/2011	Deranged	Closed reduction	6 weeks	Restored to normal
7	28 yrs	Male	Road traffic accident	24/08/2011	Deranged	Open reduction and internal fixation	3 days	Restored to normal
8	51 yrs	Male	Road traffic accident	03/09/2011	Deranged	Open reduction and internal fixation	3 days	Restored to normal
9	24 yrs	Male	Road traffic accident	16/09/2011	Deranged	Open reduction and internal fixation	3 days	Restored to normal
10	39 yrs	Female	Road traffic accident	07/10/2011	Deranged	Open reduction and internal fixation	3 days	Restored to normal

Fig. 2: Fracture line seen in patient 2 running from coronoid process to posterior border of ramus of mandible; to considered in classification of ramus fractures

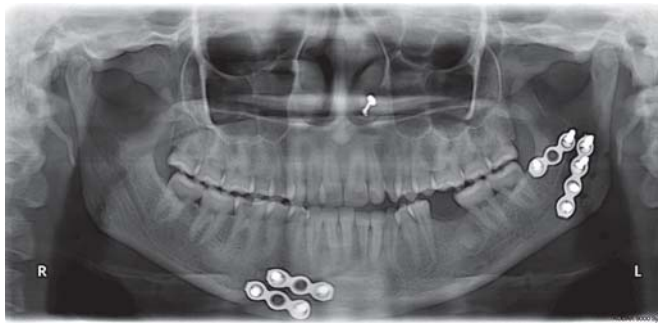

Fig. 3: Left ramus fractures plated at 2 points accompanied by parasymphysis fracture

Fig. 4: Left ramus fractures plated at 2 points accompanied by angle fracture (patient 3)

Fig. 5: Left ramus fractures plated at 2 points accompanied by angle fracture (patient 4)

the past 6 months. This could be attributed to the increased velocity road traffic accidents.

The ramus of the mandible lies between the condyle and the angle of the mandible. The angle of the mandible is considered in association with the dentate portion of the mandible and hence most fractures of the angle are treated by open reduction and internal fixation. In contrast, the condyle of the mandible is not considered in the dentate segment and hence are treated by closed reduction. Since, the ramus of the mandible lies in between the angle and the condyle, there is confusion as to whether it should be considered in dentate segment or edentate segment and hence, the confusion. Ramus fractures are conventionally treated by closed reduction because of the difficulty in access to these fractures and also because these fractures seldom cause derangement of occlusion. However, treatment by open reduction and Rigid Internal fixation provides a number of advantages like early return to function, easier maintenance of oral hygiene, improved nutrition, and reduced risk of airway compromise. Also ORIF results in a functional as well as anatomical reduction of the fracture.

Ramus fractures are seldom seen alone. In all our 10 cases, ramus fractures were seen in combination with other fractures like symphysis, body, parasymphysis or subcondylar fractures. In our study there was no particular site that fractured commonly with the ramus.

All 7 cases were approached extraorally. Reduction and fixation of the ramus of the mandible intraorally or transbuccally is difficult due to the limited access. Extraoral Risdons submandibular incision provides adequate access for the reduction and fixation of the ramus of the mandible. However, this approach to the ramus requires expertise due to the close proximity of the marginal mandibular nerve, the facial artery and vein.

Because of the large rectangular surface area of the mandible, ramus needs to be plated at 2 points. If it is plated only at the upper border or lower border, it will result in torquing forces that will lead to opening up of the fracture on the opposite side. Hence these fractures need to be fixed at 2 points (Figs 3 to 5).

CONCLUSION

Ramus fractures have a low incidence. Open reduction and internal fixation of the ramus with 2 plates, provides a good functional and anatomic outcome and hence should be considered the protocol for management of ramus fractures.

There are no evidence-based literature on the management of ramus fractures. This study makes an attempt to throw a light on the increasing incidence of ramus fractures and a successful protocol for the management of the same.

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ABOUT THE AUTHORS

Tejraj Pundalik Kale (Corresponding Author)

Professor, Department of Oral and Maxillofacial Surgery, KLE's VK Institute of Dental Sciences, Nehrunagar, Belgaum, Karnataka-590010 India, Phone: 09448472891, e-mail: tejrajkale@yahoo.com

SM Kotrashetti

Professor and Head, Department of Oral and Maxillofacial Surgery, KLE's VK Institute of Dental Sciences, Belgaum, Karnataka India

Archana Louis

Postgraduate Student, Department of Oral and Maxillofacial Surgery, KLE's VK Institute of Dental Sciences, Belgaum, Karnataka India

JB Lingaraj

Reader, Department of Oral and Maxillofacial Surgery, KLE's VK Institute of Dental Sciences, Belgaum, Karnataka, India

BU Sarvesh

Lecturer, Department of Oral and Maxillofacial Surgery, KLE's VK Institute of Dental Sciences, Belgaum, Karnataka, India