CASE REPORT

AN UNUSUAL CASE OF RAMUS FRACTURE

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ABSTRACT

Comminuted mandibular ramal fracture is rarely encountered and there hardly exists any consensus or evidence-based treatment protocol in literature on internal fixation of these fractures. The authors aim to present a case of left sided comminuted mandibular ramal fracture, associated with contralateral parasymphysis fracture, that was treated with Open Reduction and Internal Fixation (ORIF) under GA; with an emphasis on classification of ramal fracture and their fixation protocols

KEY WORDS

Ramus Fracture, ORIF, Osteosynthesis

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INTRODUCTION

Despite mandible being the largest and strongest facial bone, it is very commonly fractured, generally occurring 2-3 times as often as midfacial fractures.[1] The incidence of ramus fractures is extremely low, the second least common fractures with coronoid fractures being the least common.[2-5] In general the ramus fractures are minimally displaced due to its anatomical position 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 maxillo-mandibular fixation (MMF), which results in an early return to function, easier maintenance of oral hygiene, improved nutrition, and reduced risk of airway compromise.[6] In the scope of this article, the authors aim to present a rare case of comminuted ramus fracture that was treated with open reduction and internal fixation (ORIF) under general anesthesia.

CASE REPORT

45 years old male reported to our department, following a road-traffic accident 5 days earlier. Patient was primarily taken to another hospital and treated for other physical injuries; thereafter, referred to our institution for definitive management of maxillofacial fractures. On clinical examination, patient presented with several soft tissue abrasions and lacerations in lips, chin, malar regions and temple; swelling in left side of the face with trismus [Figure 01]. On palpation, crepitus was appreciated in the left ramal-condylar unit area.

Figure 01: Pre Operative Profile Photograph

Fig 02: Pre Operative 3D CT.

Figure 03: Right parasymphysis fracture fixed with 2.5 mm 4 holes titanium miniplate in lower border and 2.0 mm 4 holes with bar titanium miniplate along the superior osseosynthesis line

Figure 04: 2.0 mm 3D plate fixed in ramus region, along with load bearing fixation in the lower border with 2.5 mm miniplate

Figure 05-Immediate Post-OP OPG

Intraoral inspection revealed avulsion of several teeth in anterior maxilla, with multiple fractured. CT scans revealed comminuted fracture in left mandibular ramal-condylar unit, parasymphysis fracture in right side of mandible, with multiple edentulous areas due to avulsion of several teeth [Figure 02].

Surgical management included open reduction and internal fixation with titanium miniplates. Following insertion of IMF screws in maxillary arch and fixation of Erich's arch bar in mandibular arch, the left ramal-condylar unit was accessed via a 3 cm long extra-oral incision extending in left periangular region, approximately 1.5 cm below the lower border of mandible; whereas the fracture segments in right parasymphysis region was reached through the existing laceration in chin. After anatomic reduction of the fracture segments, osteosynthesis was achieved with 2.5 mm and 2.0 mm titanium miniplate systems. Comminuted left ramal-condylar unit was fixed with 1(one) 2.5 mm 6 holes with bar titanium miniplate and 2.5 x 8 mm titanium screws along the posterior border of ramus & angle, and one 2.0 mm strut miniplate stabilizing the comminution with 5 (five) 2.0 x 5 mm titanium screws [Figure 04]. Whereas, right parasymphysis fracture was fixed with 2.5 mm 4 holes titanium miniplate and 2.5 x 10 mm screws in lower border of mandible, and 2.0 mm 4 holes with bar titanium miniplate in superior osteosynthesis line [Figure 03]. Following fixation of both the parasymphysis and ramal areas, IMF was released.

DISCUSSION

Mandibular ramus provides attachment to masseter muscle laterally, medial pterygoid muscle medially, with pterygo-masseteric sling at the lower border; and this anatomy facilitates minimum displacement of ramus when it gets fractured. Because of this obvious reason, most of surgeons manage this fracture by closed treatment. However, there are certain hostile limitations of closed reduction such as prolonged MMF, non-maintenance of oral hygiene, risk of airway compromise, noncompliance of patient, deprivation of nutrition and delayed recovery.[6]

Structurally, the area between the subcondyle and angle of the mandible is considered as ramus of the mandible. Essentially, fracture lines pass through these areas, for instance, line either running obliquely from sigmoid notch to the posterior border of the mandible, running horizontally from anterior border to posterior border of the mandible, or running from coronoid process to posterior border of the mandible. Furthermore, fractures extending vertically downward from sigmoid notch to the lower border of the mandible were included as a ramus fracture. Classification of ramus fractures proposed by Agarwal et al.[7] in Indian population, categorized them into 5 types according to the 5 repetitive patterns.

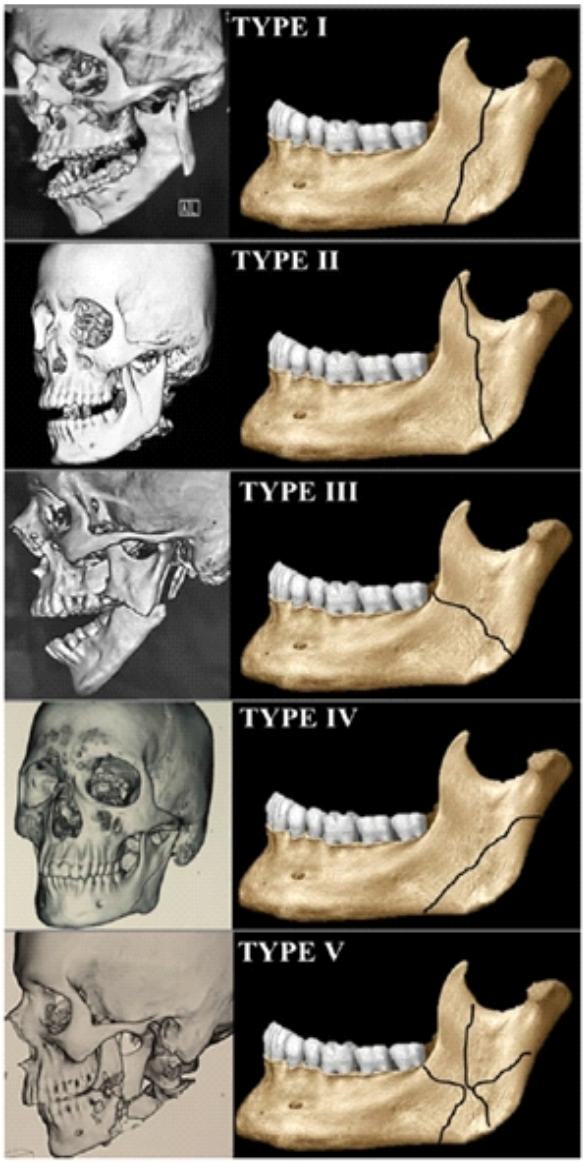

Fig 06: Classification of ramus fracture

Type I: Vertical/oblique fracture line extending from the sigmoid notch to either the inferior border or angle of mandible.

Type II: Vertical/oblique fracture line extending from coronoid process to either the inferior border or angle of mandible.

Type III: Horizontal fracture line extending from anterior border to posterior border of ramus of mandible.

Type IV: Oblique fracture line extending from posterior border of ramus to inferior border of mandible (separating the angle segment).

Type V: Comminuted fracture of ramus of mandible (may cause isolated fractures of the coronoid, condyle, and the angle of mandible)

Mandibular ramus is located between dentate (angle/body) and nondentate (condyle and coronoid) part of the mandible. There are no clear indications and contraindications about open or closed treatment of these fractures. Management of these fractures is still an enigma; however, certain aspects of treatment remain amenable to personal opinions and clinical impression.

Ramus fractures are often associated with fracture in other sites of mandible and seldom occur isolated, similar to our patients.[8,9] In cases where ramal fractures is treated conservatively, the concomitant fractures should be subjected to ORIF.[8]

When ramus fractures are treated with ORIF, Risdon's submandibular, retromandibular, transmasseteric, or trans-parotid incisions are used for surgical exposure. Intraoral or transbuccal approaches only give limited access in this region.[9]

In this case, osteosynthesis was achieved by load sharing fixation using 2.0 mm 3-D or strut plate for its larger cross-sectional area to prevent both torque and splaying, with load bearing fixation in the lower border with 2.5 mm 6 holes with bar miniplate. [Figure 05].

Essential for consideration during plating is the position of the mandibular canal. Complications with open reduction may include risk of inferior alveolar nerve paresthesia, facial palsy, parotid fistulas, or surgical scars[8,18]. Postoperative trismus due to stripping of the musculature can also occur and can be managed with the use of physiotherapy and muscle relaxants.[6,8]

CONCLUSION

Comminuted mandibular ramus fracture is rarely encountered and it seeks special consideration in internal fixation because of the larger surface area that is pertinent to preserve the optimal function of masticatory musculature. In our case, the 5 screws fixation with 3D miniplate provided optimal load-sharing function, and the 2.5 mm load-bearing fixation proved to be sufficient to withstand the forces of mastication.

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