Unusual longitudinal fracture of coronoid process of mandible: A case report

Pravin N Lambade, Tapan K Saha, Dipti Lambade, R S Dolas

ABSTRACT

Introduction: Though fractures of the mandible are relatively common injuries, the coronoid process fractures have extremely rare occurrence. Reports of longitudinal fracture of the coronoid process of the mandible are very rare. On literature search, only two previously reported cases of such type of fracture were found. Case Report: We report a very rarely occurring longitudinal fracture of the coronoid process. The clinical features, diagnosis, mechanism of fracture and treatment modalities are discussed along with comprehensive review of literature. Conclusion: Though the incidence of longitudinal fracture of the coronoid process of mandible is very rare, its diagnosis is of utmost importance. When such fracture occurs in association with fracture of zygomatic bone or condylar process of the mandible we strongly advocate vigorous mobilization of the mandible after a short period of intermaxillary fixation to avoid post operative complications like diminished mouth opening, trismus and ankylosis.

Keywords: Longitudinal fracture, Coronoid process, Sigmoid notch, Temporalis

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INTRODUCTION

Though fractures of the mandibles are relatively common injuries, the coronoid process fractures have extremely rare occurrence [1]. The coronoid process constitutes the upward continuation of the anterior border of the mandible. It mainly gives insertion to the temporalis muscle. This broad, radiating muscle arises from the temporal fossa and the temporal fascia of the coronoid process. Its fibres form a tendon which passes deep to the zygomatic arch and insert on the entire medial aspect of the anterior border and the anterolateral aspect of the coronoid process. In addition, fibres of the masseter muscle insert on the lateral aspect of the coronoid process and the lines of stress also pass vertically on the coronoid process. Fractures of the coronoid process may be transverse or longitudinal. The transverse fracture is the usual type in which the fracture line extends from the sigmoid notch on the posterior border of the coronoid process to appoint on the anterior border of the ramus or coronoid process [2]. In longitudinal fracture (the present case) the fracture line traverses the long axis of the coronoid process extending from the apex inferiorly [3].

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Transverse or horizontal type coronoid fractures contribute the greatest percentage to the overall number of fractures of the coronoid process [1]. Literature search revealed only two previously reported cases of vertical type of coronoid process fracture. This article reports a case of very rarely occurring longitudinal fracture of the coronoid process.

CASE REPORT

A 21-years-old male patient reported with the chief complaint of pain in the left temporo-mandibular joint (TMJ) region and difficulty in mastication since six days. He had sustained a blow by the elbow on the right angle of the mandible during the inter-university football match. Clinical examination revealed, moderate swelling over the right angle of the mandible and right TMJ region extra-orally with adequate mouth opening. The TMJ movements were normal including lateral excursive movements. There was no step defect in the right angle or ramus of mandible. Intra-orally occlusion was de-aranged on right side with 2–4 mm open bite in the premolar-molar region with ecchymosis in the right retromolar region. Incomplete fracture of the ramus was suspected. Radiological examination (orthopantomogram) revealed a sharply defined radiolucent line extending from the apex of the right coronoid process of the mandible to the mandibular foramen, where a slight deviation was identified, and then extending inferiorly to the angle of the mandible in (Figure 1). There was another fracture in the symphysis region with the fracture line extending from the apices of the right mandibular central and lateral incisors to the inferior border of the mandible. The diagnosis of fracture right coronoid process with minimal displacement along with fracture in the left parasymphysis region was made. Under nasoendotracheal intubation Erich arch bar fixation was done in maxillary and mandibular dental arches. The fractures were reduced by taking patient’s occlusion as a guide. The inter-maxillary fixation was done. Satisfactory pre-injury occlusion was achieved. The maxillo-mandibular fixation was kept for three weeks. The patient was followed up for six months post operatively without any esthetic or functional problems.

DISCUSSION

The fractures of the coronoid process have extremely low incidence. Fractures can be of transverse or longitudinal type, of which former occurs more frequently. The coronoid process though considered a relatively weak part of the mandible rarely fractures as it is protected from direct trauma by the zygomatic arch, is situated deep and covered with muscles [1]. The various factors which prevent coronoid process fractures are: 1) muscle attachments - the temporal muscle inserts on the entire medial aspect the anterior border and the anterolateral aspect of the coronoid process. Fibres of the masseter muscle insert on the lateral aspect of the coronoid process. Both the temporal is and masseter muscles protect the coronoid process from injury and their fibres which are placed vertically prevent the longitudinal fractures, 2) temporal crest - it is a bony ridge that extends from the tip of the coronoid process inferiorly and becomes increasingly prominent as it descends. The function of this structure is the attachment of the deep tendon of the temporal is muscle as it inserts on the medial aspect of the mandible. The coronoid process is triangular in shape on transverse cross-section because of the temporalis crest withickest aspect being parallel to the long axis and in the middle of the process antero-posteriorly, 3) zygomaticomaxillary compound - this acts as a principal shield in preventing injury to the coronoid process, especially when the mouth is in closed position, 4) temporal trajectories - the tracts of strengthened trabeculae of cancellous bone are called trajectories which coincide with the lines of stress on the mandible and maxilla. Temporal trajectories are located on the long axis of the coronoid process, making it one of the strongest areas of the mandible.

Coronoid process has no articulation with the cranial base, hence indirect trauma (contour cope injury) can not result in its fracture as in case of condylar process [7].

The fracture of the coronoid process mostly result from the direct, penetrating trauma or if there occurs concomitant sudden and violent contraction of the temporalis muscle at the time of impact [9].

The radiological diagnosis of coronoid fracture is not easy to make. Fracture with little or no displacement are difficult to demonstrate on anterior-posterior and lateral skull views. Lateral oblique view of mandible and orthopantomogram are of more value to demonstrate this type of fracture [6].

Treatment depends on the degree of displacement of the fractured coronoid and severity of symptoms. If marked malocclusion is present and the patient complains of severe pain, intermaxillary fixation for three weeks will relieve the symptoms and encourage prompt healing. In simple coronoid fractures with no displacement or malocclusion, treatment is not always recommended. The muscular spasm of the temporalis is usually sufficient to hold the fractured fragment in position until healing occurs. When the osseous fragment is large and obstructs mandibular functions or
if there is marked lateral displacement that prevents osseous contact with the ramus, intra-oral, open reduction and intraosous wiring or plating can be performed [5]. Most of the authors consider the fractures of the coronoid process to be uncommon [6–8]. Thoma et al. [4], reported an incidence of 1.2% of coronoid process fractures in a survey of 170 jaw fractures, whereas Kruger et al. [8], reported 1% involvement of the coronoid process in a survey of 540 jaw fractures. According to the recent statistics, coronoid fractures constitute 0.6–4.7% of all facial bone fractures, making coronoid process the least fractured portion of the mandible [8]. The fracture of the coronoid process presents with various degrees of trismus, sometimes associated with swelling in the zygomatic arch and posterior open bite. Intra-orally there may be swelling or ecchymosis in the soft tissues of the retromolar region and slight malocclusion. The lateral crossbite which is seen initially, is mainly attributed to muscular spasm and usually self-correcs after 1–2 weeks [9]. Coronoid fractures are usually associated with condylar and zygomatic arch fractures. When condylar fractures co-exist with coronoid fractures emphasis should be directed to the condylar fractures. When the fracture of zygomatic arch is associated with coronoid fracture it is important to appreciate that union may occur between fragment of zygomatic arch which have undergone medial displacement and the detached coronoid process. Following elevation of the zygoma, mobilization of the mandible should be encouraged to prevent the ankylosis [10].

CONCLUSION

The incidence of fracture of the coronoid process of mandible is very rare and when it occurs, transverse type is more common. Longitudinal or vertical fractures have extremely rare incidence with only two previously documented cases. Diagnosis of this type of fracture is very important. This fracture is best demonstrated by orthopantomogram. The treatment is either intermaxillary fixation or open reduction with internal fixation. When such fracture occurs in association with fracture of zygomatic bone or condylar process of mandible we strongly advocate vigorous mobilization of the mandible after a short period (two weeks) of intermaxillary fixation to prevent post operative complications like diminished mouth opening, trismus and ankylosis.

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Author Contributions

Pravin Lambade – Substantial contributions to conception and design, Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Dipti Lambade – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

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Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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REFERENCES