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Management of Mandibular Fracture in a Peripheral Health Setting with Limited Resources: a Case Report

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Mandibular fractures are a common form of facial injury in adults and occur most frequently in males during the third decade of life. Non-surgical treatment is frequently preferred if sufficient teeth are present, even where there are quite serious dislocations.The ultimate objective of managing a mandibular fracture is to reduce and stabilize the fracture, obtain a functional occlusion, and normal anatomy of the jaw.This article aims to address the method used in the management of the current mandibular fracture and difficulties faced by the dental professionals, working in settings where availability of materials for managing fractures of the mandible is very limited.

Key words: Mandibular fracture, Management, limited resources

Introduction

The mandible is prone to multiple fractures due to its horseshoe shape. Mandibular fractures are a common form of facial injury in adults and occur most frequently in males during the third decade of life [1].

These fractures can simply be classified according to the site of occurrence such as dentoalveolar, symphiseal, parasymphiseal, body, angle, ramus, coronoid and condylar. Studies have shown varying frequencies of mandibular fracture by location. Some studies report the angle to be the most common fracture site [2, 3, 4], while others found the body [5]. The majority of mandibular fractures are related to road traffic accidents. Other causes include injury from contact sports, falls, work-related accidents, alcohol and drug abuse in addition to pathological and iatrogenic factors.

Treatment approaches range from conservative non-invasive management by 'closed' reduction and immobilization using intermaxillary fixation (IMF) to the more invasive surgical 'open' reduction with internal fixation approach. Several key factors can influence the management of mandibular fractures including the location of the fracture and the degree of displacement. In the dentate mandible, reduction must aim to restore good functional occlusion whereas less precise reduction may be acceptable if sections of the body of the mandible are edentulous or lack opposing teeth. In closed (non-surgical) reduction the bone ends or fragments are realigned either manually or using traction devices without surgically exposing the fracture site, whereas in an open (surgical) reduction the fracture site is surgically exposed during the procedure[6].

The intervention is aimed at realignment (reduction) of the fractured segments into their normal anatomic positions[7], and prevention of movement by immobilization (fixation) of the fractured bone thereby allowing osseous union to occur [6]. The ultimate goal is to restore occlusion (bite), mandibular anatomy and jaw function. This paper aims to address the method used in the management of the current mandibular fracture and difficulties faced by the dental professionals, working in settings where availability of materials for managing fractures of the mandible is very limited.

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Case presentation

A 47 year old presented to Musoma Government Hospital with a chief complain of injuries sustained to orofacial region following an assault. Clinically, on inspection, the patient presented with mild facial disfigurement due to facial swelling. He had a cut wound on the chin which extended to the left side of face at level of angle of mouth. The cut wound had been sutured in the outpatient department prior to dentists review. On palpation, there was step deformity on parasympheseal regions bilaterally, with tenderness being triggered. The rest of facial bones were normal. Intra orally on palpation he had mobility of the mandible between teeth 43 and 42 , and 32 and 33 . The tooth 33 was avulsed. Radiological evaluation confirms the lines of fracture between 43 & 42, and 32&33. The fractured segement had been displaced labially and to the right. Furthermore there was mild hematoma on floor of the mouth and a cut wound on the lower labial mucosa on right side. The diagnosis of bilateral sympheseal fracture of the mandible and cut wound on the lower lip was reached. The treatment plan included soft tissue repair and intermaxillary fixation for stabilizing the fractured segment (**fig.1**).

Figure 1. Bilateral fracture of the mandible with displacement

Figure 2. Improvised arch bar

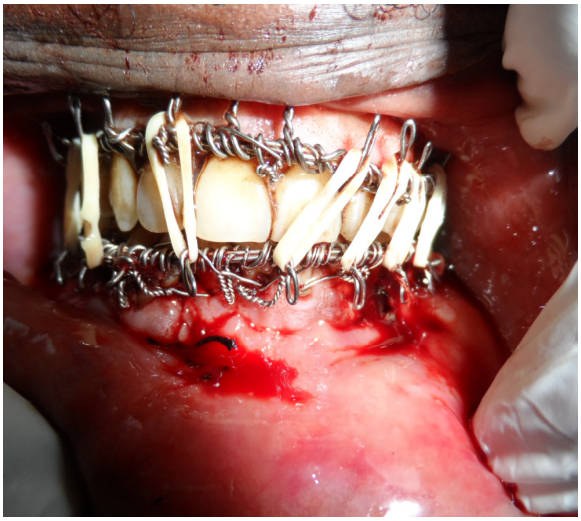

Figure 3. Showing intermaxillary fixation using improvised arch bar

Figure 4. Appearance of the patient after healing of fracture occurred extra orally

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Figure 5. Appearance of the patient after healing of fracture occurred intra orally

Due to the limited resources, there was absence of arch bars, and the stainless steel wires which were present in the clinic were the 0.8mm and 0.3mm. The 'archbar' was designed so as to manage the fracture. The 0.8mm was cut into small pieces that could cover the 2nd molar from right to the 2nd molar on left side of both upper and lower jaw. 3 pieces of these 0.8mm wires were made into a bundle by tying them with the 0.3mm wire after which another 0.8mm wire was used to make hooks by rolling the wire over the bundle made previously. After each 2 turns a hook was created, until the entire bundle length was covered (Figure 2).

The arch bar was then fixed by passing 0.3 mm stainless steel wire ligatures around the neck of each tooth while tightening the wire. The wires were twisted tightly to anchor the bar to the dental arch. The tied wires were then cut so that the ends can be bent over the bar into an interdental space to avoid soft tissue injury. Finally the IMF was obtained by placing elastic bands (which were cut from Foley catheter) between the hooks of the upper and lower arches (Figures 3 and 4). The patient had an uneventful post-operative course and was discharged home with maxillary-mandibular fixation intact. Patient was then reviewed once every 3 weeks to assess the integrity of the arch bar and general oral hygiene. The wires, rubbers and arch bar securing maxillary-mandibular fixation were removed six weeks post-operative as the patient had a normal dental occlusion.

Discussion

The ultimate objective of managing a mandibular fracture is to reduce and stabilize the fracture, obtain a functional occlusion, and normal anatomy of the jaw. The primary consideration in the management of fractures of the mandible is to restore the function of the mandible and the masticating efficiency of the dentition. To accomplish this , the principles of fracture management must be applied (i.e reduction of the fractured bone fragments to their anatomical position; fixation that will hold the fractured bone segments in position until healing takes place; and control of infection).

Non-surgical treatment is frequently preferred if sufficient teeth are present, even where there are quite serious dislocations. Muscles action is an important factor influencing the degree and

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direction of fractured fragments of the mandible. Overcoming the forces of displacement is important in reduction and fixation of the mandibular fragments.

The arch bar has been the mainstay for the management of maxillomandibular bony injuries since World War I. The originators of this method, Sauer in Germany and Gilmer in US used an ordinary round bar flattened on one side that was ligated to the teeth with brass ligature wires. Blair and Ivy's modification was a flattened on one side that was about 2 mm in width to conform better to the teeth and provide greater stability [8], but currently open reduction and internal fixation has been deployed as the management option for mandibular fracture management especially in developed countries.

The function of arch bars whether standard or improvised is to align and hold the fractured fragments in position until healing occurred. This has been demonstrated by our method in treating the current mandibular fracture whereby the arch bars were improvised. The ultimate result with our treatment approach was the accurate approximation of the fractured segments, restoration of occlusion, and lastly patient satisfaction.

Generally speaking, the simplest method of attaining and satisfying these requirements is the best method. Methods may vary with age and general state of health of the patient, with the training and ability of the surgeon, and with the facilities and circumstances under which the patient is to be treated. A satisfactory end results may be accomplished by the use of any one of several methods, but no method is acceptable that will jeopardize the function, appearance, or safety of the patient. Our case demonstrates the success of the approach applied, the duration of the treatment was same 6weeks as in case of using standard arch bar, the only setbacks were slightly bulkiness of the improvised design and the time required to design the bar. The method can be used in rural areas where supply of the treatment materials is limited; since it enables the fracture to be treated early and therefore reduce the chance of complications which might arise due to delay in treatment. It is cost effective since it cut the cost of travelling to be used by the patient to maxillofacial centre which is far from rural Health centers. Therefore the Dental professionals should be prepared to work in a situation where there is limited supply of treatment materials and in those areas where there is enough of treatment materials especially those who are coming from developing countries where social economic status is low.

Conclusion

Fracture of the lower jaw are common in the remote and interior parts of Tanzania, and most of the patient have to travel long distances to the cities and incur extra cost which could be minimized in case the health planner did supply essential materials to these areas.

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