DIAGNOSIS AND TREATMENT OF THE MANDIBLE COMMINUTED FRACTURE: CASE REPORT

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SUMMARY

The mandible is a compact and mobile bone made up of noble structures that contribute to the functionality of the stomatognathic system. Mandibular fractures can be called comminuted when they affect three or more fragmented parts in the same region. The most discussed causes come from automobile accidents, firearm projectiles, pathological scenarios, and occurrences in the workplace. The present study relates scientific evidence on the management of a comminuted fracture in the left mandibular body region to a clinical case of correct diagnosis and treatment. In view of the above, the clinical and complementary tests have demonstrated the importance of diagnosing the case report, as well as the physical examination that evaluates bone crepitation, pain, edema, dilatation of adjacent tissues, facial asymmetry, and the use of computed tomography as pre- and post-operatory imaging. Open reduction with submandibular extraoral access was recommended as one of the methods indicated for this type of injury, so that stabilization with 2.0 mm system plates and fixation with a 2.4 mm reconstruction plate restored the patient's function. The relevance of the professional in identifying the type of fracture and its corrective techniques present in the literature is evident, leading to a successful surgical therapy.

KEYWORDS: Traumatology; Mandible fractures; Comminuted; Diagnosis; Fixation and reduction.

1. INTRODUCTION

The mandible is one of the most affected facial bones in cases of maxillofacial injuries[1]. Its type of impact can determine the damage to the bone; therefore, low energy collisions lead to a linear fracture line, without displacements. However, high intensity impacts can lead to complex fractures, displaced and with comminution[2].

Primary agents of mandibular fractures worldwide are motor vehicle accidents and interpersonal violence, however, incidents arising from work activities, firearms and pathological conditions also comprise causal factors[3,4,5]. During the initial evaluation, the systemic stability of the patient affected by facial trauma must be prioritized and any impasses that may cause risk to the individual's life must be solved[6]. Regarding the intervention, it ranges from a conservative maxillomandibular fixation with bars fixed on both dental arches, to a surgical approach associated with plate and screw fixation systems, depending on the individual scenario[7].

This article reports a case of a comminuted fracture in the left mandibular body region, treated by the open reduction and internal fixation (RAFI) method, through an extraoral incision. This type of trauma requires fixation with load-bearing support because the bone fragments are unable to share widespread functional loads during repair[8]. Therefore, 2.0mm system plates were used in tension zones, followed by a 2.4mm system reconstruction plate with 11 holes and 10 screws in compression zone.

In view of the aforementioned, this study aims to describe a clinical case of a comminuted fracture of the mandible in a male patient, victimized after an accident at work. The aim was also to discuss the combination of various managements involved in the diagnosis and the management established during treatment, interconnecting it with another scientific research.

2. CLINICAL CASE

A 56-year-old male patient sought treatment at the Hospital Ortopédico de Ceres/GO, after a work accident, complaining of chewing difficulty, painful symptoms in the left mandible body region, bone crepitation, alteration in the prosthesis adaptation and paresthesia in the lower lip due to inferior alveolar nerve involvement.

During physical examination, a Glasgow Coma Scale 15, submandibular and submental edema, sublingual ecchymosis, absence of skull base fracture signs and a small cut-contusion wound in the left submandibular region already sutured were found.

The patient presented a mouth opening of approximately 25mm due to pain, with no mechanical limitations. In the complementary imaging exam of computed tomography (Figure 1), a comminuted fracture was evidenced in the left mandibular body.

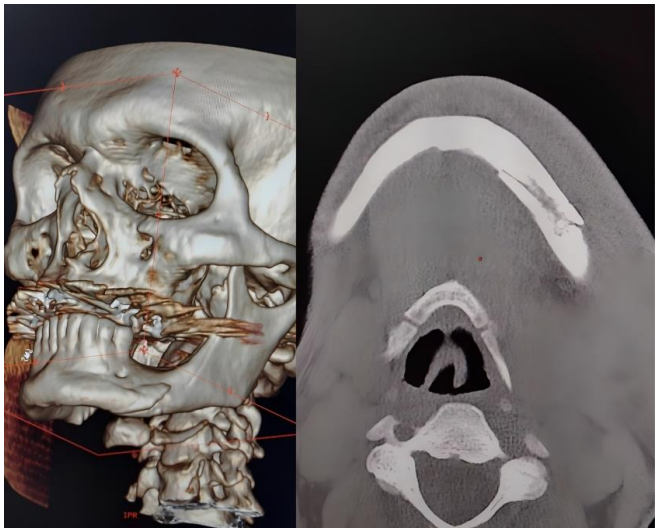

Figure 1. Computed Tomography. **Source:** The authors, 2023.

After appropriate preparation of the patient with all the pre-operative exams, he was submitted to open reduction and fixation surgery of the facial fractures, which started with anesthetic induction and nasotracheal intubation, and thus, the submandibular access was performed (Figure 2).

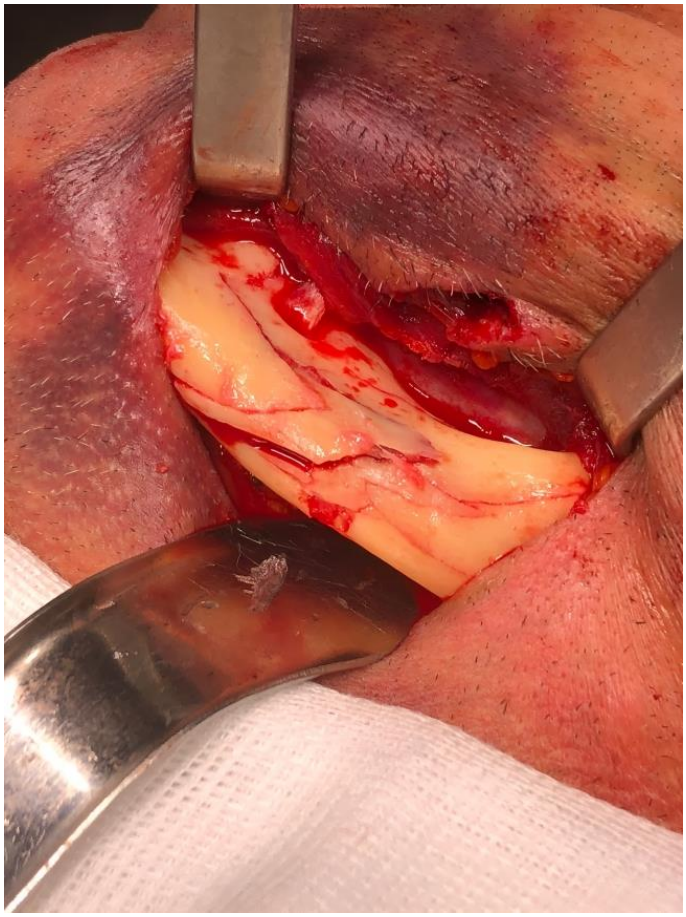

Figure 2. Submandibular access. **Source:** The authors, 2023.

After identification and reduction of the fractures, a 2.0 mm system plate with 7 holes and 6 screws and a 2.0 mm system plate (Figure 3) with 5 holes and 4 screws were installed, both in the tension zone, followed by a 2.4 mm system plate (Figure 3) with 11 holes and 10 screws in the compression zone.

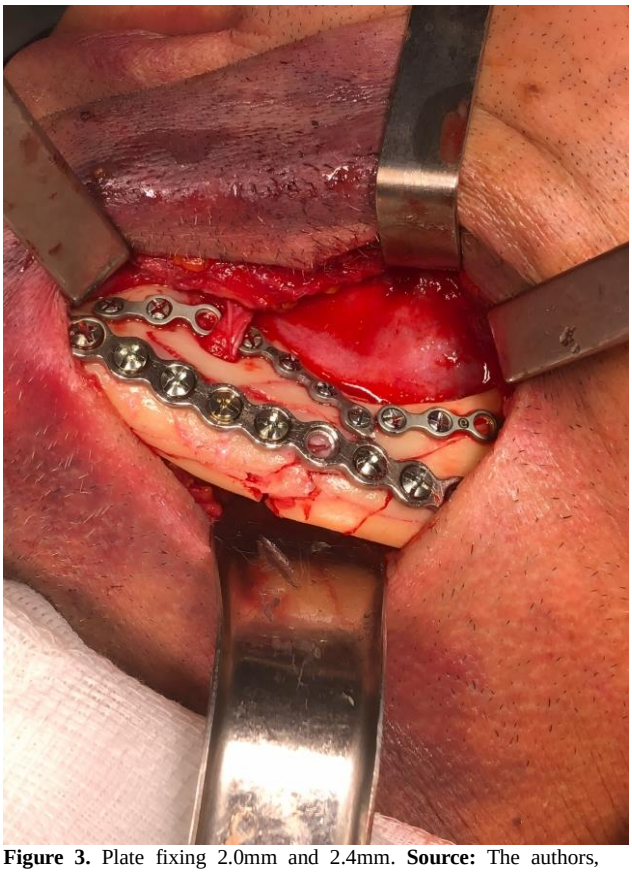

Figure 3. Plate fixing 2.0mm and 2.4mm. **Source:** The authors, 2023.

For the synthesis of the surgical access, vicryl 4.0 and nylon 5.0 threads were used, performing suture by layers. The immediate post-operative tomography (Figure 4) showed a well-reduced fracture and osteosynthesis material in position.

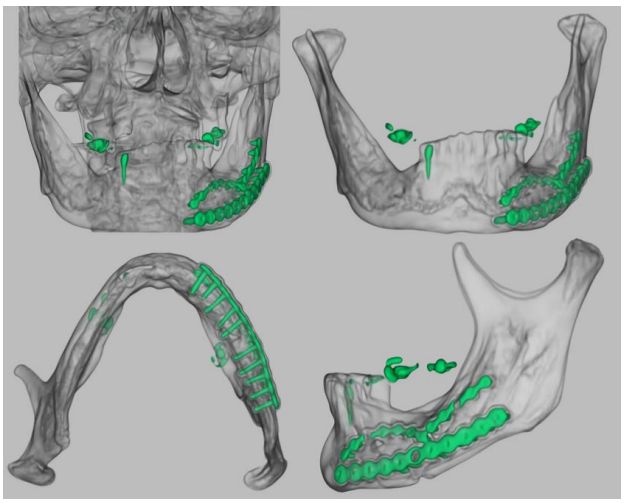

Figure 4. Tomography performed post-operative. **Source:** The authors, 2023.

In the 7-days post-operative period, the suture was removed, and the patient had a good clinical evolution, satisfactory healing (Figure 5), no signs of infection or dehiscence, no facial pain and a mouth opening of

about 35mm.

Figure 5. Healing. **Source:** The authors, 2023.

The case was followed for 7 months with no pain, no functional limitation, and improvement of paresthesia. The patient's function and esthetics were satisfactorily restored.

3. DISCUSSION

Facial trauma consists of physical injuries including the upper, middle, and lower thirds[9]. These, when located in the oral and maxillofacial region, are highly prevalent in hospital emergencies, and the mandible is the most affected bone[10].

The mandible fractures represent between 36 to 70% of the cases[11], and for decades, their causes have been discussed in the literature, being interpersonal violence and automobile incidents the most common etiological factors[10], followed by falls and accidents at work[5].

According to Pogrel (2016)[12], these damages can be classified as simple, green branch, complex and comminuted, the latter being the result of multiple segments as elucidated in the current exposure. Regarding location, the mandibular angle and condyle are more vulnerable, and subsequently the parasymphysis and mandibular body areas[10].

After the physical and complementary exams, the patient was found to have a comminuted fracture in the left mandibular body after an accident at work. According to studies performed by Motta Júnior et al. (2010)[13], falls and incidents by professional occupation correspond to 19.2% of cases, and the mandibular body is the most affected region in these scenarios (44.4%)[13].

These patients may also present very particular signs and symptoms, so the clinical examination is considered the first and most important analysis performed on these patients[15].

In this report, numerous signs suggestive of mandibular fracture could be noted. Bone crepitation, limited mouth opening, sublingual ecchymosis, pain, submandibular and submental edema were some of the findings in patients affected by these lesions, which is evidenced by the mentioned case[14].

Complementary exams have the purpose of concluding the diagnosis already assumed during the physical exam[16]. According to Imai *et al.* (2014)[16], the ideal imaging exam in these situations consists of panoramic radiographs and computed tomography. The latter has obtained greater preference, since they present different cuts and three-dimensional vision, contributing to the capture of important structures, such as the inferior alveolar nerve, which when affected, can lead to possible paresthesia[9], as in the patient in question.

The use of the Glasgow coma scale as a pre-surgical evaluation mechanism is fundamental to categorize the level of consciousness of the patient victim of craniofacial complex fractures and its possible influence during treatment[17]. This analysis is made from a system composed of four criteria: eye opening, pupil reactivity, verbal, and locomotor responses. This combination totals a score of 3 to 15, and as the scale level increases, the greater the level of lucidity[18], therefore, the patient had no alteration in consciousness[17], because he had a score of 15.

When dealing with surgical fixation, many authors consider closed technique mandible-maxilla block (BMM) treatment to be the safest in cases of parasymphatic and mandibular condyle fractures[19]. For comminuted areas, open reduction, and internal fixation (RAFI) with the help of load-sharing and load-bearing systems is recommended[20,2,21,22], because these methods provide shorter treatment time and fewer complications, allowing early return of function[23].

Thus, in this study, the patient was submitted to an open surgery through submandibular extraoral access [20,24]. 2.0mm plates were used, allowing favorable reduction of the large bone fragments by simplifying the fracture, which enabled fixation using a 2.4mm reconstruction plate. These types of appliances follow the AO (load bearing) guidelines in which the plate is responsible, above all, for supporting the masticatory functional load[3].

Decision taking on when and how to intervene in a mandibular comminution is crucial for the positive outcome of the case. Thus, in consensus with the literature, the immediate approach is widely advocated[20], as proposed in this case. This treatment, when delayed, tends to promote healing without anatomical reduction, which may cause facial asymmetry and malocclusion by repair by second intention[25].

After 7 days, the suture was removed and satisfactory healing, absence of infection signs and a mouth opening of about 35mm were noted. After discharge by the oral and maxillofacial surgery and traumatology specialty, the patient remains in a 7-month postoperative follow-up, without painful symptoms and functional limitation, describing a 90% improvement of paresthesia and obtaining effective aesthetic-functional results.

That said, the relevant discussion is in the mention that techniques and materials, first used in the 1960s,

still not only resonate, but are also consolidated as standard, in post-modernity and especially, in the treatment of fractures with comminution.

4. CONCLUSION

The treatment of mandibular fractures can be conservative or include extensive reconstructions. Therefore, the management of these cases should involve the experience of the professional and, above all, the complexity of the injury. The early evaluation of the extent and severity of the trauma associated with its intervention, allows a low rate of complications and especially the resolution of the causality and removal of externalized painful symptomatology.

In this report, the patient was submitted to open surgery and rigid internal fixation with plates and screws, achieving bone healing and favorable post-operative outcomes. The technique, when well indicated, allows a quick return to normal physiological function, optimizing the result of the therapeutic resource used and directly affecting the patient's quality of life.

Therefore, it is essential that the entire team has control of the process, since from the reception of the patient until the time of discharge, prioritizing the post-surgical follow-up. Thus, the role of the oral and maxillofacial surgeon in the management and prognosis of these complications is very important.

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