

Original Article

Pattern and treatment of mandible body fracture

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Received June 23, 2013; Accepted June 30, 2013; Epub July 8, 2013; Published July 15, 2013

Abstract: The aim of this research was to study of treatment of mandibular body fractures (MBF). A retrospective study of 66 patients with mandibular body fracture was realized with subjects was present clinical and image diagnosis; were analyzed socio-demographic variables, etiology, sign and symptoms of fracture, type of treatment and complications. Was executed a statistical and descriptive analysis with Chi-square with statistical significance with $p < 0.05$. The average age was 34 year with 55 male patient; the more common etiology were physical violence and motorcycle accident. The 45.5% present only MBF; patients with multiple fractures show clinical relations between MBF and contra lateral mandibular angle fracture; 54 patients were treated with open reduction without statistical relations with symptoms ($p = 0.244$) or displacement of fracture ($p = 0.309$); the 54.2% of surgical cases present an extraoral approach, using the intraoral approach when the fracture present poor displacement ($p = 0.0074$); the complications more common were suture dehiscence and infections of surgical site. We conclude that the initial choose of treatment was not related to variables analyzed; when exist a minor displacement of MBF can be indicated an intraoral approach for reduction and fixation technique.

Keywords: Maxillofacial trauma, mandible fracture, trauma pattern

Introduction

Mandible fractures represent close to 25% of maxillofacial fractures [1]; in relation to etiology, mandibular body fractures (MBF) represent between 11% to 36% of all mandible fractures being personal violence the principally factor [2]. In this direction, King et al. [2] showed that when co-exist two mandible fractures, the body was a third more prevalent area of fracture, after parasymphysis and condylar process.

Treatments of mandibular body fracture present some controversial situation [3]. For one hand, maxillomandibular fixation (MMF) present, in a historic perspective, good results when stability of fracture was evaluated [4]. Advantages of this procedure are the reduced cost due to the absence of surgical treatment and hospitalization, less invasive procedure and low sensitivity to the professional experience [3]. For other hand, surgical treatment with open reduction and internal rigid fixation (IRF) allow the prompt recovery of the occlu-

sion, reconstitution of anatomical osseous morphology, rapid return to the work (considering good nutrition and verbal communication) and maintenance of periodontal tissue [5].

IRF and MMF allow the basic conditions for osseous repair with an acceptable occlusion; Villarreal et al. [6] demonstrated that IRF allow a more rapid osseous repair; after 2 month of evaluation of surgical treatment group and non-surgical treatment group, the repaired bone not present statistical difference between IRF or MMF. For post operatory complications, Dodson et al. [5] found no statistical differences between patients with IRF (4.9% of complications) and patients with MMF (11.3% of complications).

In the case of surgical treatment can be used intraoral or extraoral approach. Simples or anterior fractures could be treated by intraoral approach and comminutes or more posterior fractures could be treated by extraoral approach [7]. However, for fracture stabilization, the

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osteosynthesis is indicated [8]. Michelet & Champy [9] established osteosynthesis with more light fixation and intraoral approach related to biomechanical directions of the mandible. Other situation is associated to stronger osteosynthesis related to multiples fractures, type of patient and post operatory function [10]. Lag screw technique is other options for osteosynthesis in MBF; advantages of these techniques are diminished surgical time and the absence of plate adaptation [11]. Ellis [11] demonstrate an effective technique with minor complications and intraoral approach. The aim of this research was to recognize the pattern and treatment of MBF with emphasis on surgical treatment analysis.

Patients and method

Was design a retrospective study, analyzing the patient with MBF in three region of Brazil and were included patients with clinical and image (radiography or computed tomography) evaluation and were excluded the patients without image evaluation and the patients without follow-up after surgical or non-surgical treatment (at least 6 month); all the patient signed informant consentient for include in this research and was approval by the ethics committee of State University of Campinas, with a number of protocol 1268; the authors declared non funding received for this research.

The clinical records were evaluated to recognized the socio-demographic characteristic, etiology of trauma, sign and symptoms (dental occlusion, paresthesia and initial pain, facial volume, open mouth, asymmetry, equimosys and others) and diagnosis of maxillofacial trauma, being executed an analysis of type of fracture, locals of fractures, displacement of the bone fragments (5 mm or lest and 5 mm or more); the second group of variables were related to surgical treatment analyzing the characteristic of the surgical intervention; all surgical patient were treated with tension and compression technique, being evaluated the surgical approach and osteosynthesis (2.0 or 2.4 IRF). Complications of treatment were evaluated with a minimum of 6-month follow up.

Data were analyzed descriptively with Microsoft Office Excel 2007 software (Microsoft Corporation®). Statistical analysis was executed with a BioStat 5.0® software with Qui-Square test and p value < 0.05.

Results

Sixty-six patients, 55 male (83.3%) and 11 female (17.6%), with average age of 30.4 year (range 14 to 75 year) with unilateral or bilateral fracture of mandibular fracture were treated at the Division of Oral and Maxillofacial Surgery; the age group with more fractures range 21 to 40 years.

The principal etiology of trauma was associated to violence corresponding to 28.8% of patients (19 cases), motorcycle accident in 21.2% (14 cases), fall in 19.7% (13 cases), car accident in 12.1% (8 cases), bicycle accident in 7 patients (10.6%) and pedestrian or work accident in 5 patients (7.6%)

Thirty one patients (46.7%) presented MBF of right side, 28 patients (42.4%) presented MBF of left side and only seven patients presented bilateral MBF of witch four patients showed exclusively mandibular fracture and the other three patients were associated to facial middle third fracture. Thirty patients (45.5%) presented isolated MBF and 36 patients presented other maxillofacial fracture.

Of patients with other maxillofacial fractures (36 cases), 25 presented other mandibular fractures how mandibular angle; 10 patients presented condylar process fracture been four cases ipsilateral, four cases contralateral and two cases bilateral fractures; finally, mandibular symphysis were fractured in three cases. Nine subject presented dentoalveolar trauma and cranial trauma was present in six patients (9.1%) in relations to high energy trauma.

Sign of MBF how facial edema, limited open mouth, asymmetries and equimosys were presented in 54 patients (81.8%); only 44 patients (66.6%) presented symptoms how malocclusion, altered sensation or pain; was not present statistical relations between sign of fracture and symptoms of fracture ($p=0.244$). Displacement of fracture how exclusively criteria of choose for surgical treatment don't showed relations with surgical indications ($p=0.309$).

Twelve patients, full dentate, with minor displacement fracture were evaluated and treated with MMF for 4 week without initial complications of treatment. In 54 patients (82%) was indicated surgical treatment. Twelve patients

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Table 1. Distribution of internal rigid fixation and the surgical approach

Tension area	Compression area	Surgical Approach
2.0 plate with four monocortical screw	2.0 plate and bicortical screw (N=38)	Extraoral (N=18)
		Intraoral (N=20)
	2.4 plate and bicortical screw (N=10)	Extraoral (N=8)
		Intraoral (N=2)

without surgical treatment presented unilateral fracture and only four cases presented other maxillofacial fractures (2 cases with intracapsular condylar fracture, one case with contralateral mandibular angle fracture treated with open approach and internal rigid fixation and one case with zygomatic bone fracture).

In 48 of 54 patients with surgical treatment was possible realized a complete analysis with adequate follow-up (more than 6 moth); the surgical approach used were submandibular in 26 patients (54.2%) and intraoral in 22 patients (45.8%); intraoral approach was related to minor displacement of osseous fragment, (minor than 5 mm) and was statistically associated with this approach ($p=0.0074$). The 48 patients were treated with tension and compression area; on tension area, in all of cases, were installed a 2.0 plate with four or five hold and four monocortical screw (two in each fractured segment); on compression area, 38 patients received 2.0 plate with bicortical screw been 18 cases treated with submandibular approach and 20 with intraoral approach; in ten patients was used 2.4 plate on compression area with bicortical screw been submandibular approach used in eight patients and intraoral approach in two patients (**Table 1**).

Post-surgical complications were present in 8 subjects (12.2%). Five of this presented dehiscence of suture (intraoral approach) with exposition of tension zone plate; the treatment in this patient was with irrigation clorhexidina (0.12% solution daily) for 3 – 4 week; after 10 week was removed this plates with local anesthesia; three cases presented postoperative infections (one intraoral approach and two submandibular approach) treated with oral antibiotic therapy and posterior remove of plate.

Discussion

The retrospective studies are associated to limitations how sample selection and variables analyzes; however, important information could orient some clinical situation in the surgical

practice. As other facial trauma paper, MBF were more prevalent in the men group [1, 2]. Our result showed that the etiologic were related to personal violence and motorcycle accident; the result of King et al. [2] showed some relations with fire gun, fall and personal violence. Gassner et al. [1] showed association with life style activities how fall and sport activities. These differences exist basically by differences with population composition and because there are a few paper address the MBF. For this sample, the patients live in three major urban center of Brazil with similar condition and composition.

For results of this research was not present statistical relations with sing and symptoms of patient and treatment choose; based in this results is unable to find any element for surgical or non-surgical treatment choose. However, in our service there is a tendency for surgical treatment based in the advantages on IRF [3]. For 12 cases of non-surgical treatment, nine was realized in the first years of this study, show the evolution of our service for led to surgical treatment and IRF. Is possible that this condition was associated to use of computed tomography how routine exams from the third year of evaluation of this research; this exam allows to recognize tridimensional osseous displacements when compared to radiograph exams.

Incomplete fractures, non-displacement fractures, good occlusion, good facial esthetic and adequate open mouth have been suggested for non-surgical treatment, because this conditions can be associates with first intention osseous reparation [12]. For complications analysis, Lamphier et al. [13] showed more complications in patients with non-surgical treatment when compared to open reduction and fixation; however, was not demonstrate any relations between the variables and non-surgical treatment.

When there is indication for surgical treatment, the choose of surgical approach is an important factor. For Toma et al [14], 78 patients with

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body, angle and ramus fracture were treated with extraoral approach (n=36) and intraoral approach (n=42) showed that in seven patients with intraoral approach was necessary executed and extraoral approach presented 43% complications related to this conditions; for unique approach (internal or external approach only) was not possible describe any statistically complications. In the series cases of Collins [15], only intraoral approach was used show only one case of complication related to failure of post-operative indications. In our cases, no patient presented intraoral and extraoral approach for MBF treatment; when necessary, the approach was extended for better visibility and in some cases was used transbuccal trocar and internal rigid fixation.

The authors believe that surgical approach have relations with the presence of other mandible fractures it difficult to obtain adequate occlusion and reduction; 54,2% of our sample presented extraoral approach allow the direct observations of medial and lateral mandibular bone with proper reduction and adequate dental occlusion. However, surgical experience and preferences of surgeon is associated to surgical approach in other facial fractures [16] and could be present in MBF treatment.

In the sequence of Scolozzi et al. [17], the MBF were treated by reconstruction plates show extraoral approach for angle and ramus fractures and intraoral approach for symphysis and parasymphysis fracture; in the mandible body, were used 11 extraoral approach and 2 intraoral approach. In our sample, in 10 patients were used 2.4 plates with 8 extraoral and 2 intraoral approaches. This situation shows that more complex fractures are treated by extraoral approach possibly by better visualization and reduction.

For the postoperative evaluations, our sample show suture dehiscence (five cases) and infections (three cases); if more complex trauma is treated with surgical options, more "procedures-related" complications can be present when compared to non-surgical treatment [3]. However, these complications not need other major surgical operation; other research showed that in 25 patients with non-union of mandibular fractures [18], 39% was present in mandible body with association to multiple fractures of mandible, comminuted fracture,

late treatment (five days) and poor surgical experience. Lamphier et al [13] show 17.7% of complications in surgical treatment of mandibular fractures; infections, non-union and suture dehiscence were more prevalent. We believe that in intraoral approach there is more suture dehiscence and plate exposition because displacement fractures habitually present an oral mucosa lacerations allowing plate exposition by difficulty in applying mucosa suture; however is not observed major problems because the plates can be remove after 10 week with local anesthesia with minor risk of infections.

Finally, we can conclude that our sample don't exist relations within variables analyzed and treatment choose; although it was observed positive relation between minor displacement and intraoral approach, the approach and internal rigid fixation was a choose of surgeon based in particular principles; its necessary others research for establish statistically more objective criteria for analyzed of surgical and non-surgical treatment and surgical approach. Displacement of fracture, dental occlusion and proper reduction are important for the surgical choose.

Disclosure of conflict of interest

The authors declare that they have no competing financial interests.

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