IMAGING EVALUATION OF MANDIBULAR TRAUMA

Adriana Pirte*, Alina Venter*

*University of Oradea, Faculty of Medicine and Pharmacy, 1 December Square, Oradea, Romania,
E-mail: pirte_adriana@yahoo.com

Abstract

Facial traumas often occur as a result of accidents or injuries at workplace, aggression or accidental falling. Their assessment is made by means of Multislice Computed Tomography (CT) due to its high resolution, providing precise information on fracture routes, bone displacement, soft tissue injuries as well as the traumatic complications in the maxillofacial area.Material and Methods: We examined 214 patients aged between 7-79 with maxillofacial trauma and who underwent CT examination in CT Department of the County Hospital Oradea. Results. Out of the 214 patients surveyed, 92 (43%) showed single lesions, the remaining 122(57%) patients had multiple lesions on viscerocranium. A number of 47 (22%) patients had maxillofacial trauma within a multiple trauma. In single lesions (92 cases i.e. 43%), the distribution was as follows: mandibular lesions in 42 patients , nasal bones lesions in 22 patients, frontal/ maxillary sinuses lesions in 16 patients, and orbital lesions in 12 patients, respectively. We grouped the 42 patients with mandibular fractures by several criteria such as: histopathologic type, number of outbreaks, topography.Conclusions. Computer tomography is the reference technique in the detection and characterization of facial trauma. Fractures of mandibula were present in 46% of those patients undergoing a single trauma. It is necessary to perform multiplanar reconstructions especially coronary sections and 3D reconstructions in order to perform a correct classification.

Key words: maxillofacial trauma, mandibular fracture.

INTRODUCTION

Lesions at the level of facial bone, orbits and adjacent tissue structures lesions may occur as part of single or multiple lesions. Severe trauma of the face is always an indication for radiological investigation (Buruian, 2006); facial trauma imaging should be performed only after the patient's vital functions and possible cervical fractures are stabilized.

Facial traumas are frequent results from traffic or working accidents, aggressions or accidental drops. The intensity of traumatism is permanently growing at the cost of urbanization, mechanization, anthropogenic accidents (Salvolini, 2002). The imaging technique of choice is the TCMD due to its high resolution in terms of space, velocity, easy collocation of the patient, small dependency on its collaboration and the possibility to realize multiplanar reconstructions in 2D or 3D (Hopper, 2006, Kraur, 2010). It is important to create coronal slices and 3D models which permits the surgeon to define the range of the fracture lines (Cusmano, 2000).

MATERIAL AND METHODS

214 patients with maxillofacial region injuries were underwent MSCT. All patients were examined in CT Department of Emergency County Clinical of Oradea. The examination was made on apparatus GE Optima 16 with MPR and 3D reconstruction.

Middle age of patients is 44 years (7 - 79 years). The persons of young and middle age (20-54 years) prevail over other victims. There was a great prevalence of men among the victims.

RESULTS AND DISSCUSIONS

Out of the 214 patients surveyed, 92(43%) showed single lesions, the remaining 122(57%) patients had multiple lesions on viscerocranium. A number of 47(22%) patients had maxillofacial trauma within a multiple trauma and were associated one of the following: traumatic brain injury, chest trauma, closed abdominal trauma, injuries of the spine or extremities(fig 1).

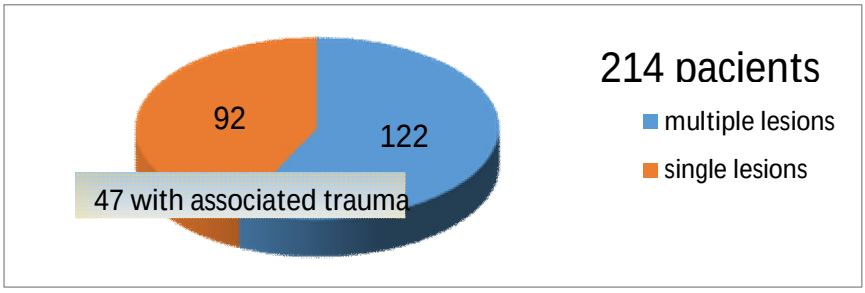

Fig 1 The distribution of traumatic lesions

Among the concomitant changes prevailed: contusion/oedema of soft tissues (27%), injuries of eyeball (21%) and of retrobulbar fatty tissue (19%), hemosinus of maxillary sinus (18%) and of ethmoid labyrinth cellules (13%).

In single lesions (92 cases i.e. 43%), the distribution was as follows: mandibular lesions in 42 patients- 46% , nasal bones lesions in 22 patients- 24%, frontal/ maxillary sinuses lesions in 16 patients- 17%, and orbital lesions in 12 patients, respectively 13%.

The main location of the jaw bone does make this bone vulnerable to trauma similar to those underwent by orbital and nasal bones. Approximately 40% of patients with severe facial lesions have one or more fractures of the mandible; in our study group these lesions were present in

46% of those patients undergoing a single trauma. One fracture line (simple fracture) or more segments of fracture (complex or comminuted fracture) can be met (Ogura, 2012). Greenstick or incomplete fractures occur in children (Alcala-Galiano, 2008). Malocclusions, trismus, swelling, pain, limitations of jaw movement and intraoral bleeding are clinical aspects related to mandibular fractures. Because most mandibular fractures communicate either directly with the external environment through a laceration or indirectly through the periodontal space, they can get secondary infection (Ogura, 2012, Hopper, 2006) . Can be classified by the localization, pattern of the fracture and biomecanical. Localization:corpus, condyle, angle, symphysis, alveolar spine, coronoid. Mechanism: coup and contra-coup leave some loose segments in the mandible. The biomechanics: is beneficial if the vectors of the masticatory muscle's force tend to reduce the fracture and unfavorable when it tends to displacement of the fragments.

We grouped the 42 patients with mandibular fractures by several criteria such as: histopathologic type, number of outbreaks, topography.
In terms of the number of outbreaks, these were single fractures in 27 cases-64%, double fractures in 11 cases-26% and multiple fractures in 4 cases-10%.

In terms of pathology, there were partial fractures in 26 patients-62%, while the remaining 14 patients (38%) had total, complete fractures.

In terms of topography, mandibular fractures were located in the body in 12 cases i.e. 28%, at chin-rest level in 9 cases i.e. 21%, in the mandibular angle in 14 cases i.e. 33%, in the condyle and coronoid process in 15 cases i.e. 36%; combination of some of these above mentioned occurred in 8 cases i.e. 19% (fig 2,3,4,5).

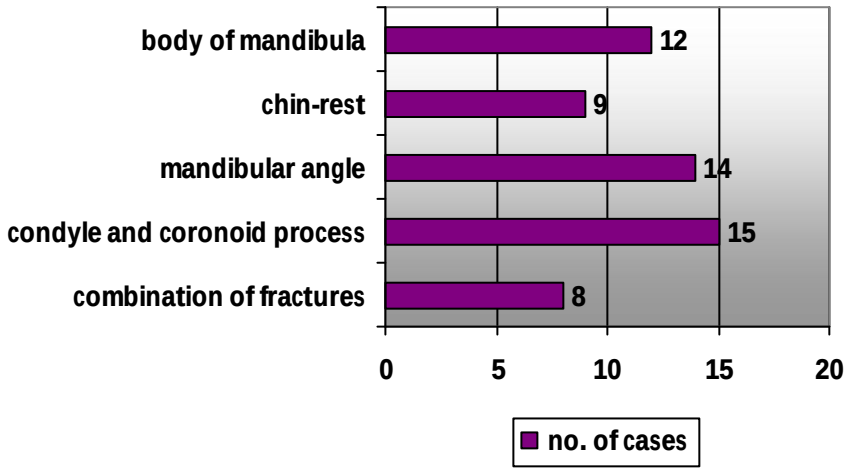

Fig 2 The topography of mandibular fractures

Fig 3,4,5Bilateral condil fractures and left angle; MPR 2D coronal, VR images.

From the point of view of relations between bone extremities at the outbreak, there may be sagittal, transverse or frontal planes displacements (Ogura,2012, Kaur, 2010, salvolini, 2002). Thus one may notice: gap, overlapping, angulation, rotation. In clinico-radiological and topographical terms there are three types of mandibular fractures as follows: fractures at the dentate portion including fractures of the mandible body and symphyseal and parasymphyseal area, mandibular angle fractures, fractures of the non tooth-bearing area where there are included the ascending branch (mandibular ramus) and its apophyses (Okura, 2012, Avery,2011).

For a long time the conventional radiography was the only imaging modality for exploration in emergency maxillofacial and jaw trauma; however the complexity of fracture trajectories are an explanation for the difficult process of identifying them(Aldescu, 1998, Haba, 2004). Radiological diagnostic related difficulties were high because of complex maxillofacial trauma, involving the orbital floor, ethmoid block, and the internal wall of the orbit (Cusmano, 2000, Cornelius, 2009).

The occurrence and improvement of computer topography (CT) due to anatomical precision of the method became the main exploration method to highlighting the trajectories of fracture, bone displacements, soft tissue lesions and complications in the cranio-maxillofacial trauma(Michel, 2012). In general, CT exploration of patients undergoing cranio-maxillofacial trauma is carried out for the viscerocranium (facial bones), including the neurocranium, orbit, mandible, temporomandibular joint (Rhea, 2005).

CT exploration practiced in emergency units makes sections in relation to different reference planes, therefore complications such as that pneumatocel, pneumo-orbit, haemosinus, and subcutaneous emphysema may be highlighted (Avery, 2011, Okuyemi, 2002, Hollier, 2003, Holbrook, 2005). Theoretically, incisions of 3-5 mm are recommended, although, in practice, there are cuts of 10 mm and, depending on the changes detected,

pathological area is studied through incisions of 2-3 mm (Kubal, 2008). It is advisable to use bone windows because, in most situations, only such windows highlight the dense structures (Aldescu, 1998). In certain situations such as: visceral injuries, limb injuries, comatose state, traumatic shock, it is not possible to make direct coronal cuts and then we use bi-dimensional reconstruction (2D)(Wittkopf, 2009).

Volumetric reconstruction (3D) brings additional diagnostic data on fracture trajectory, their relationships in space, and it is being used especially in the case of bone fragments displacements and postoperative control (Som, 2003, Salvolini, 2002).

CONCLUSIONS

Computer tomography is the reference technique in the detection and characterization of facial trauma. Fractures of mandibula were present in 46% of those patients undergoing a single trauma. It is necessary to perform multiplanar reconstructions especially coronary sections and 3D reconstructions in order to perform a correct classification, and provide information to and guiding the surgeon.

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