THE ROLE OF THE CT EXAMINATION IN THE SURGICAL MANAGEMENT OF A PATIENT WITH FACIAL COMPLEX TRAUMATISM

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ABSTRACT

Cranio-maxillo-facial territory is interested in a significant percentage of polytraumatism cases. In the evaluation of these patients, the CT scan tends to replace the classic imaging methods represented by the radiographic examination at different incidences.

The aim of this article is to highlight the contribution of modern imaging in the cranio-maxillo-facial traumatology by highlighting the role of the computer tomography exam in the diagnosis and treatment of a complex facial trauma event in the Oro Maxillofacial Surgery Clinic of the "Sf. Spiridon "in Iasi.The computer tomographic examination in the cranio-maxillo-facial traumatology is decisive in highlighting the position of the anatomical elements and their reports with the traumatized structures in order to evaluate the lesions quickly and accurately, as well as in the choice of an optimal therapeutic plan and in the postoperative assessment of the patient. Computer tomography is currently the imaging method of choice used in cases of complex facial trauma.

Key words: *facial massif fracture, computer tomography, traumatology.*

INTRODUCTION

Cranio-maxillo-facial traumatology has begun to be the focus of the growing incidence, as well as the need for multidisciplinary management in the correct and safe resolution of cases that occur in trauma centers. However, despite the increased morbidity and mortality associated with trauma, this pathology is not yet classified as major affections. The initial assessment of the poly-traumatized patient should be done as accurately and systematically as possible in order to establish as quickly as possible the degree of lesion extension and the vital risk potential it may have [1].Cervical-facial trauma is a common pathology, with incidence ranging from 20% to 50% of all cases presenting in urgency [2].

The incidence, demographic distribution and gender distribution of patients with fractures of the bones of the face varies according to geographical area, socio-economic status, education, alcohol and drug use, and depending on the season. [2, 3].
The main cause of facial traumatic injuries is road accidents, followed by aggressions, accidents at work, accidental falls, domestic accidents, sports accidents, etc.

The clinical picture of the fractures in the cranio-maxillo-facial area varies according to the etiology and complexity of the trauma. From the point of view of the symptoms, the fractures in the territory of the maxillo-facial area may cause facial asymmetry, functional discomfort, swallowing, phonation and aesthetic disorders, which may be accompanied by nerve lesions, manifested

by hypoaesthesia, anesthesia or even paralysis [2].

The trauma of the cephalic extremity may be of interest to both the skull and the viscero cranium. The degree of interest of a particular segment of the facial skeleton tends to vary from one study to another and depends on the mechanism of trauma production, gender and age of the patient [2,5]. Viscero cranium lesions may be associated with skull injuries, cerebral lesions, cerebral vascular damage, cervical spine lesions, lesions of the soft parts of the face and neck [2,5,6].

Imaging investigations in maxillo-facial traumatology have the role of highlighting the presence, location and extension of fractures, recognizing cranial nerve lesions, and highlighting a possible interest in the base of the skull and meningo. Radiographic highlighting of the interest of the various key anatomical structures is essential in classification of lesions and subsequently in the application of different therapeutic strategies. The main objectives of the treatment are to reconstruct the anatomical structures of the face in order to provide the bone support needed to restore functionality and physiognomy. Immediate treatment is conducted to avoid early complications and prevent the potential for late complications [7,8,9,10].

Trauma that only affects the mandible is routinely evaluated using orthopanthomography or skull radiographs in anteroposterior incidence performed with maximum mouth opening. CT examination is increasingly used in assessing the patient with facial trauma to locate the fracture and the degree of bone fracture movement not only in the case of cranio-maxillo-facial, but also in isolated mandible fractures. Interpretation of CT images is facilitated when axial rays are aligned with the mandible body. The coronary imaging should be slightly angulated in the rear in accordance with the mandibular vertex and mandibular condyloma.

The sagittal images are placed in a oblique convergence, perpendicular to the mandibular mandible axis [3,4,6]. In the case of middle fractures of the face, conventional radiographs tend to be used less frequently. The classic imaging used in facial mass fracture assessment is represented by the Waters incidence, panoramic radiography or axial radiography (Fig.1).

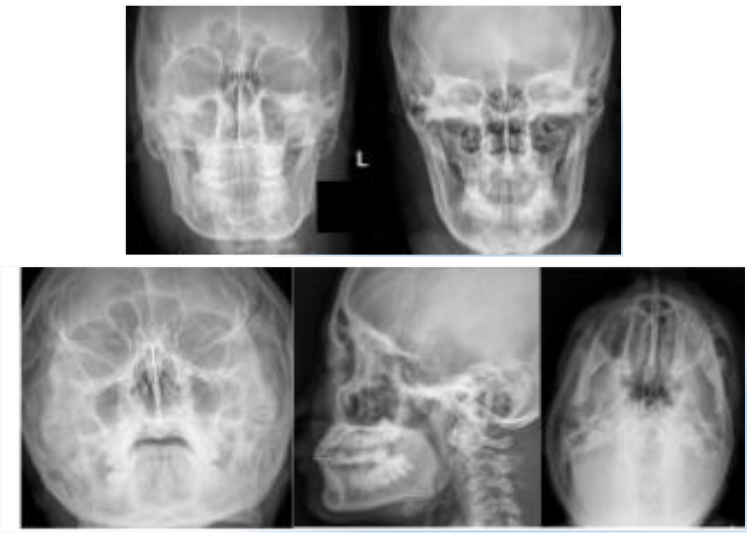

Fig.1 - Standard radiological incidence in facial fracture assessment

Because of the complex middle stage anatomy, CT imaging is the ideal way to highlight and evaluate traumatic lesions of the facial mass, avoiding the risk of overexposure to the image. CT imaging in the coronary incidence is most useful for assessing the inferior-superior orientation of the maxillofacial anatomy from the maxillary alveolar process to the orbital ceiling and the etmoid bone. Anteroposteriorly, the jaw and zygomatic bones can be seen, extending up to the level of the sphenoid and the posterior ethmoidal sinus[11,12,13,14]. The zigomatic bone and the sanguinary suture constitute the lateral limit, while the median limit is formed by the nasal bones, the pyriform aperture, the papyrus - like lamina of the ethmoid bone and the pterigoid processes. The axial and coronary incidences of CT images arranged in the orthogonal plane (parallel and vertical to the palate) are indispensable in the evaluation and classification of maxillofacial traumas [6,7,15,16].

Computer tomography facilitates the recognition of individual involvement of viscero cranium components. The vertical pillars of the medial naso-maxillary pilier, the lateral zigomato-maxillary pilier and posterior pterigo-maxillary pilier together with the horizontal reinforcement structures represented by the mandibulo-simphisar arch,the palatal-alveolar complex and the super- and infraorbital and sagittal structures represented the angle and the mandibular branch, the hard palate, the zygomatic arch and the orbit ceiling give the viscero cranium increased resistance and, at the same time, it is the key to planning reconstruction treatment and restoring the continuity and stability of the facial massif [17,18,19,20,21].

Case presentation

We continue to exhibit a complex case of facial trauma internalized in the Oro-Maxillo-Facial Surgery Clinic of "Sf.Spiridon" Clinical Hospital in Iasi and the important role of modern imagery in solving this case.

UR, patient, male 33-year-old from the countryside, was hospitalized in an emergency by interhospital transfer, presenting a severe facial trauma following an accident at work. The initial assessment of the patient identifies a Glasgow score of 14. The clinical examination on the apparatus and systems revealed the presence of traumatic marks at the abdominal level (ecchymosis) markings - in the epigastrum and the left hippocampus, the patient accusing a diffuse abdominal pain, which is the reason for the emergency examination abdominal ultrasound, which excluded the presence of intra-abdominal traumatic lesions. At the same time, the presence of an echocardiogram at the level of the right half pectus , 1/3 medium, the chest x-ray defying the costal fractures, the pneumothorax or the hemotorax, has not been evidenced.

From the point of view of the biological blood constants (hemoleucogram, ionogram, TGP, TGO, diabetes alcaline reserve, urea, creatinine, amylase, lipase, TP, TS, APTT, INR) have not been identified any changes.

The clinical presentation of the cervico-facial region revealed the presence of a 7 cm solution with irregular margins, with the presence of foreign bodies inside the wound (teluric matter), which starts from the right suborbitary level, having a descending oblique trajectory, interested in the right naso-genian shank, the upper right ½ lip, continuing in the oral cavity in the upper buccal vestibule 1/3 prior to the upper central incisors. It was also revealed a

second solution of approximately 3 cm of skin continuity located at the level of the right eyebrow region, whereupon it descends to the right upper right palpebral region (fig.2). At the right lower right palpebral level, a loss of substance at ½ left of the lower eyelid with the subjacent tarsus (fig. 3) was revealed.

Fig. 2 Multiple face wounds

Fig.3 Loss of substance at the level of the right inferiour eyelid

The extraoral palpation revealed the presence of a bone discontinuity at the lower orbital frontal-nasal suttures accompanied by crepitation and pain (the patient experienced anterior bilateral epistaxis stopped by anterior nasal swab) with the emphasis also on the internal cantus of the right eye of the subcutaneous emphysema. The intraoral clinical examination revealed solutions of continuity of the gingival fibroma in the buccal upper vestibule, from the edged space 1.2-1.3 to the tooth level 1.6. In the jaw and mandibular dentoalveolar arcades the postraumatic absence of teeth 2.1, 3.1, 3.2, 3.3, 3.4, 4.1, 4.2, 4.3, 4.4, 4.5, with postexpulsion alveoli with intralveolar blood clot was observed.

At the level of bilateral zigomato-alveolar ridges,the palpation highlights bone discontinuity at these levels and bone mobility of the entire facial mass in a vertical and horizontal sense.

Given the complexity of facial trauma, a computer tomographic exam was performed as an imaging method of choice. The CT examination has highlighted the presence of multiple bone fractures of visceral cranium: multiple solutions of bone continuity in the lower bilateral orbital rebord, both zigomato-alveolar growths, the etmoid bone, the nose's own bone, the pyrimiform aperture, the lateral walls of the orbit, the level of pterigoid apophyses in the middle 1/3.

It was also noted the presence of multiple bone fragments in the anterior wall of the right maxillary sinus with its dislocation and the presence of a bone continuity solution in the anterior left anterior sinus wall (Figure 4)

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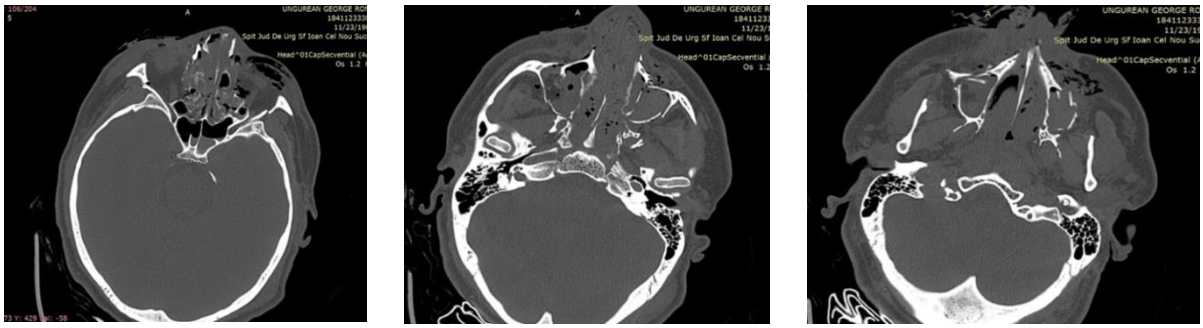

Fig. 4 CT Preoperative Aspect

In order to establish a correct therapeutic plan and to pinpoint as accurately as possible the anatomical structures involved, it was decided to perform the 3D reconstruction of the computer tomography sections (fig.5).

Fig. 5. 3D reconstruction

The surgical treatment was performed in two steps. The first step in the surgical exploration of the postoperative wounds, their toilet and the removal of the foreign bodies at this level, then the removal of the bone eschamals from the right maxillary sinus (Figure 6), followed by the outbreak of the fractures, followed by the surgical reduction their anatomical position and immobilization by osteosynthesis with titanium mini-plates (Fig. 8, 8, 9).

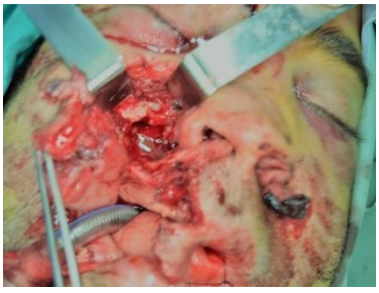

Fig. 6. Removing sinuses from the maxillary sinusal axis

Fig. 7. Exposure of the fracture furnace from the right infraorbital rebordial

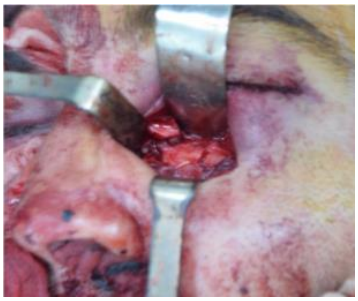

Fig. 8. Exposure of the fracture outbreak from the left infraorbital rebord

Fig. 9. Osteosynthesis with metallic miniplates

The intraoral time of surgical treatment consisted in the exploration of post-expulsion alveoli, alveolar ridge regularization and continuous suture. Subsequently, the two fracture outbreaks from the zigomato-alveolar crests and the pyrimiform apertures were exposed, the fractured fragments were reduced to the anatomical position and the metal plates were immobilized by osteosynthesis. In the second surgical procedure performed by the ophthalmologist, reconstruction of the right lower eyelid and of the tarsus subjacent to the graft free of skin and tars collected from the upper controlateral palpebral upper region (Figure 10, 11, 12) was performed.

Fig. 10. Upper palpebral incision and graft harvest

Fig. 11. Cutaneous graft

Fig. 12 Tarsal plate recessed from the upper left palpebral level.

Then, the transfer of the grafts and their overlapping over one another, this being possible due to the rich vascularisation of the territory, thus realizing the reconstruction of the post-traumatic defect (fig.13).

Fig. 13. Immediate postoperative appearance

Postoperatively performed computer tomography revealed how to reduce fractured fragments in the correct position (Figure 14).

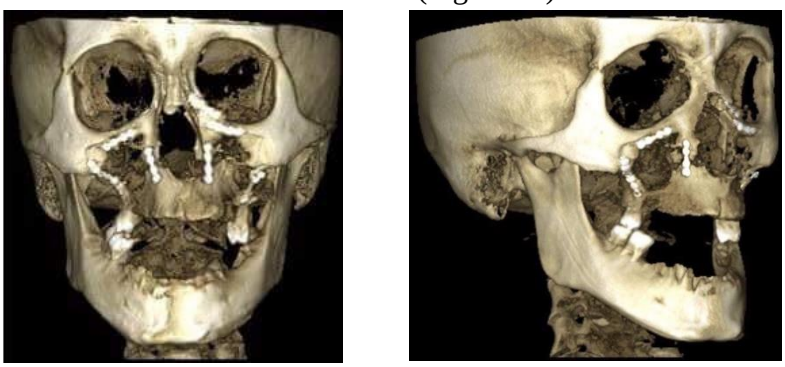

Fig.14. Postoperative CT appearance

The postoperative outcome was favorable, postoperative controls performed at one month, 3 months and 6 months postoperatively, revealing patient recovery physiologically and functionally (Figure 15).

Fig. 15. Postoperative appearance at 1 month, 3 months and 6 months, respectively

Conclusions

In conventional radiology, anatomical structures are presented two-dimensionally, so their depth and thickness can not be evaluated on the projected images. For the accurate assessment of morphology of anatomical structures, three-dimensional evaluation obtained using computer tomography is essential.

The use of CT imaging corroborated with three-dimensional CT reconstruction has a

particular role in the management of cervical and facial traumatic lesions, as face trauma is often accompanied by major edema that hampers clinical examination and masks bone lesion evidence on standard X-rays [8].

We emphasize the importance of the computer tomographic exam in preoperative assessment and surgical management of the traumatized patient, as well as in the postoperative assessment of the case.

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