OPERATING CLASSIFICATION OF TRAUMATIC LESIONS OF THE HUMP OF UPPER JAW

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Abstract

The aim of the research was to develop an operating classification of lesions of the hump of the upper jaw, which will increase the effectiveness of the surgical treatment of injured patients by assessing the nature and extent of lesions. Some clinical cases of traumatic lesions of the posterior-lateral wall of the maxillary sinus, which is represented by the hump of the upper jaw, are described. Classification of fractures of the hump of the upper jaw presented herein allows to fully assess the nature and extent of the existing lesions, to predict and anticipate the course of the wound process and to plan the most appropriate stages of the method of surgical treatment of the victims.

Keywords: *zygomatic complex, lesions, fractures of the posterior-lateral wall, maxillary sinus.*

1. INTRODUCTION

In practice, the maxillofacial surgeon often has to deal with fractures of the zygomatic complex with defects in the bone walls and the mucous membrane of the maxillary sinus. When such fractures occur, the soft tissues of the orbit, cheek and spastic area fall into the maxillary sinus and can cause chronic post-traumatic inflammatory processes of the adjacent soft tissues or obliteration of the maxillary sinus. It is precisely in the area of the defect of the posterior-lateral sinus is the largest array of soft tissues and the fatty ball of Bichatbulges into the lumen of the maxillary sinus. This is contributed by the negative pressure that occurs in the paranasal sinus during respiration [1-3].

To date, according to the literature, poor attention is paid in the surgical treatment of fractures of the zygomatic complex to the lesions of the posterior-lateral wall of the maxillary sinus, which is partially represented by the maxillary hump and separates the sinus from the infratemporal and pterygomaxillary fossa. At the same time, surgeons apply osteoplastic operations in order to restore mainly the upper, anterior and lateral damaged bone walls of the maxillary sinus, and the abutments of the midface. Since, until now, the literature available to us offered no classification of fractures of the hump of the upper jaw, which would meet the clinical requirements, this issue needs to be thoroughly studied [4,5]. The aim of the research was to develop an operating classification of lesions of the hump of the upper jaw, which will increase the effectiveness of the surgical treatment of injured patients by assessing the nature and extent of lesions.

2. MATERIALS AND METHODS

For practical analysis, 63 patients with fractures of the zygomatic complex with ages between 18-65 years were examined. The standard clinical research methods, CT and CT-3D damage zones, and volumometry of the maxillary sinus were applied to all patients. Then the computer tomograms were analyzed, the results of the clinical examination were studied, intraoperative data were taken into account for all patients with traumatic fractures of the zygomatic complex.

It was revealed that most often the fractures of the walls of the maxillary sinus with the

lesion of its posterior-lateral wall were combined with fractures of the malar complex, which occurred in 54 of 63 patients, constituting 85% of the total number of subjects with fractures in the malar complex under examination.

An inverted fracture of the posterior-lateral bone wall of the maxillary sinus, where the bone chips remained to be linked with the periosteum and its adjacent intact areas were located at an angle to these areas in 12 of 54 patients, namely 22% (Fig. 1).

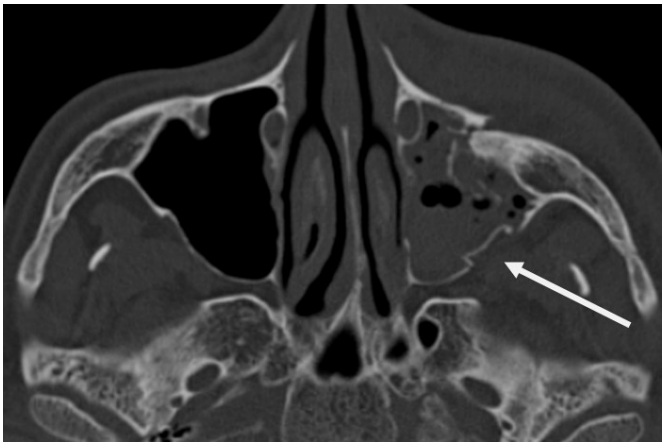

Fig. 1. Depressed fracture of the posterior-lateral bonewall of the maxillary sinus
(marked with an arrow)

The partially suppressed fractures were revealed in 7 of 54 patients, namely 17%. The bone fragments of the posterior-lateral wall of the maxillary sinus partially lost the link with the periosteum and its intact adjacent areas (Fig. 2).

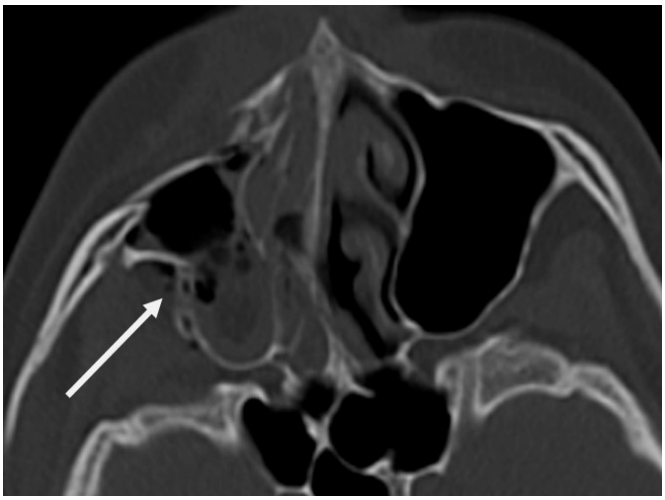

Fig.2. Partially depressed fracture of the posterior-lateral wall of the maxillary sinus (marked with an arrow)

Obvious multiscale (3 and more) fractures with displaced bone fragments inside the sinus, a rupture of the mucous membrane, and the prolapse of the fatty tissue of the cheek and soft tissues of the subcutaneous area into the lumen of the maxillary sinus were found in 35 patients – *i.e.*, 61% (Fig. 3).

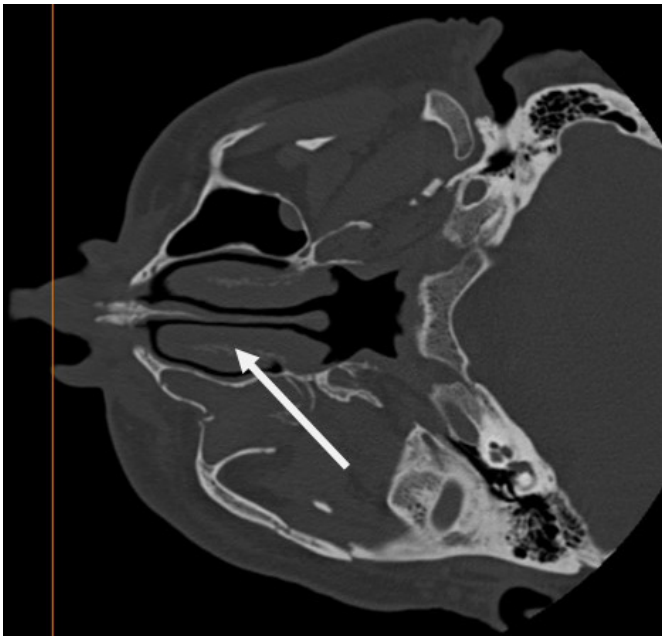

Fig. 3. Multiscale fracture of the posterior lateral wall of the maxillary sinus. There is a lesion with displacement of bone fragments inside the sinus (marked with an arrow), the rupture of its mucous membrane and the prolapse of the fatty tissue of the cheek and soft tissues of the subcutaneous area into the lumen of the maxillary sinus

Clinical Case: Male patient B., 51 year-old. I. min. No. 13683 dated October 06, 15. was hospitalized in the Maxillofacial Department No. 2 of the Kyiv Municipal Clinical Hospital No. 12 in Kyiv for emergency care with the diagnosis of closed craniocerebral injury, cerebral commotion. Traumatic fracture of the left zygomatic complex with displaced debris. Left-side haemosinus. Objectively: depression of the left malar area, violation of nasal breathing on the side of injury, paresthesia in the infraorbitalis sinister area, limited opening of the oral cavity - up to 1.5 cm (Fig. 4).

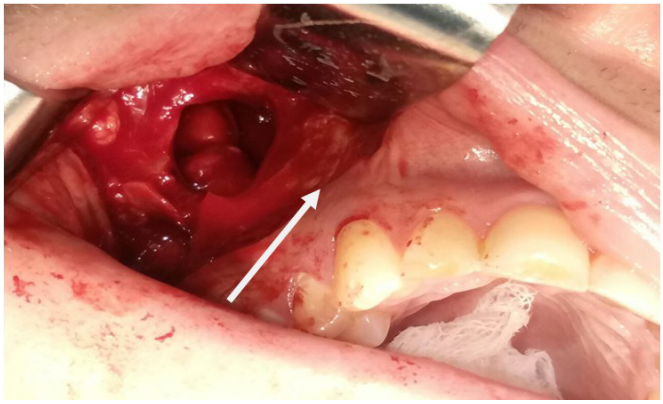

Fig. 4. Traumatic fracture of the left zygomatic complex with displacement of hump fragments of the upper jaw. Prolapse of the fatty ball of Bichatinto the lumen of the maxillary sinus (marked with an arrow). The picture was made during surgery.

Fractures of the hump of the upper jaw may have iatrogenic aetiology: Clinical Case: Female patient K, 41 year-old I. min. No. 14283 dated November 12, 2015, was hospitalized in the Maxillofacial Department No. 2 of the Kyiv Municipal Clinical Hospital No. 12. Upon additional examination, the R-graph of paranasal sinuses and CT (Fig. 5) showed chronic odontogenic antritis, caused by the 28thretinal and dystopian tooth. Surgery was carried out on the left-sided radical maxillary sinus: atypical removal of the 28th tooth. After removal, a defect of the posterior-lateral wall occurred in the adjacent area of the 28th atypically placed tooth.

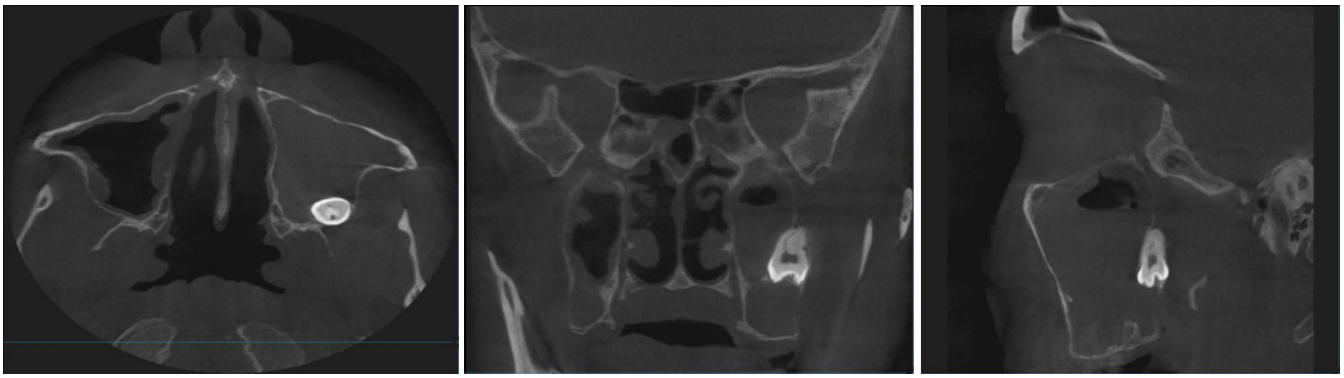

Fig. 5. CT of a female patient with the 28thretinal and dystopian tooth in the lumen of the maxillary sinus, adjacent to the posterior lateral wall of the maxillary sinus

Quite often, hump fractures arise when 8 upper teeth are removed (Fig. 6)

Fig.6. 8th tooth with fragment of hump of the upper jaw

In some cases, the posterior-lateral wall was damaged in the fractures of the articular or coronary processes of the mandible.

Clinical Case: Male patient Yu., born in 1983, was delivered to the Maxillofacial Department in ambulance. The diagnosis, established on the basis of clinical data and confirmed by X-ray examination, showed a traumatic bilateral fracture of the mandible in the area of the left articular process and the body of the mandible between the 45th and 46th teeth. After computer tomography of the bones of the skull and the cerebrum (according to the recommendation of the neuropathologist), fractures of a left hump of the upper jaw and left-sided haemosinus were also revealed; being not manifested clinically, they could not be diagnosed when the patient was accepted for hospitalization (Figs. 7,8).

Fig.7. CT traumatic fracture of the articular process of the mandible (marked with an arrow)

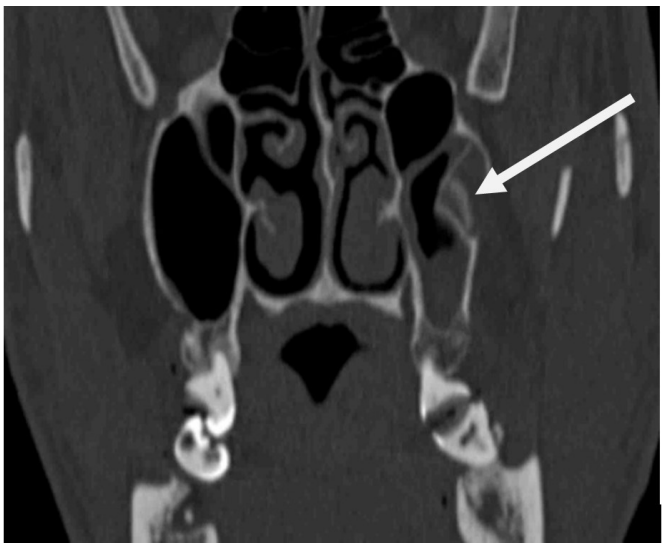

Fig. 8. CT traumatic fracture of the posterior wall of the maxillary sinus (marked with an arrow)

The mechanism of such fractures is insufficiently described in the literature. In recent years, 2 publications devoted to the mechanism of this trauma have been found, showing that, during the lower-lateral impact on the lower jaw, fracture of the hump of the upper jaw is caused by a crown fracture of the mandible (Fig. 9).

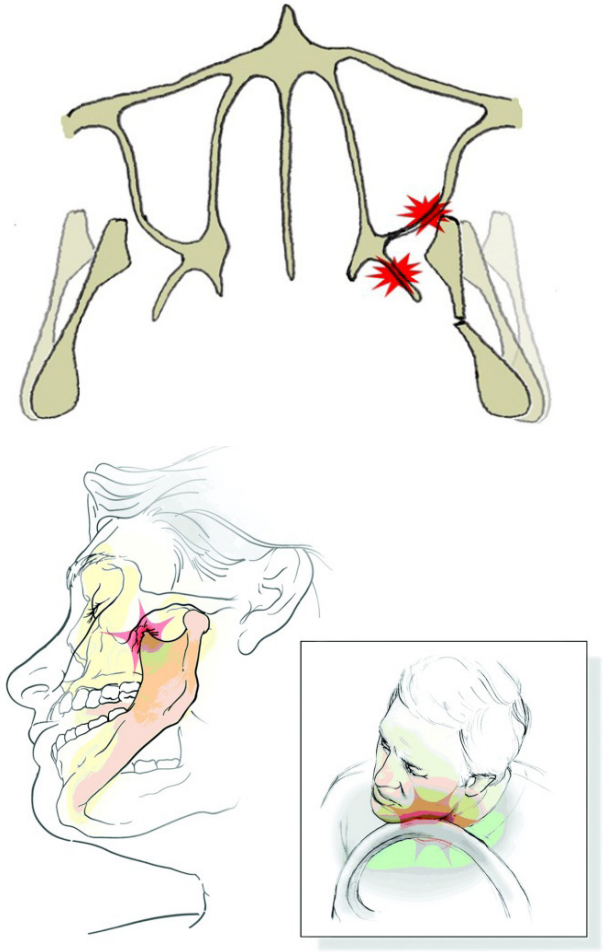

Fig.9. Mechanism of injury of the posterior wall of the maxillary sinus when the mandible is traumatically injured

3. RESEARCH OUTCOMES AND DISCUSSION

Based on the analysis of clinical cases and of computer tomograms demonstrating the traumatic fractures of the walls of the maxillary sinus, we proposed a working pattern of lesions to the hump of the upper jaw.

Classification of fractures of the hump of the upper jaw according to the following criteria:

1. Aetiology:
   a) traumatic;
   b) iatrogenic.

2. Isolated (when 8 teeth of the upper jaw are removed):
   a) partial (a fragment of the hump is broken and fixed on the periosteum and mucous membrane);
   b) full (the fragment of the hump of the upper jaw is fully separated and removed together with a8th tooth).
3. Combined:
   a) as a component of fractures of the bones of the midface;
   b) as a component of fractures of the bones of an anterior mandible (coronary and articular processes).
4. Type of lesion.
   a) linear (fractures);
   b) fragmental or comminuted (1-2 fragments)
   c) multifragmental (3 and more fragments)
5. Severity of the lesion:
   a) depressed fractures (the bone fragments of the posterior lateral wall of the maxillary sinus remain to be linked with the periosteum and its adjacent intact areas);
   b) partially depressed fractures (bone fragments of the posterior lateral wall of the maxillary sinus partly lose contact with the periosteum and its adjacent intact areas).
   c) complete fractures (bone fragments completely lose contact with the periosteum, being replaced into the lumen of the maxillary sinus).
6. Condition of adjacent soft tissues:
   a) without the prolapse of soft tissues into the maxillary sinus;
   b) with the prolapse of the fatty tissue of the cheeks and soft tissues of the infratemporal area into the lumen of the maxillary sinus.

The treatment of all patients was based on this classification. The stages of surgical interventions, which allowed to eliminate or minimize the existing violations, were scheduled taking into account the clinical data and CT results.

4. CONCLUSIONS

Classification of fractures of the hump of the upper jaw presented herein allows to fully assess the nature and extent of the existing lesions, to predict and anticipate the course of the wound process and to plan the most appropriate stages of the method of surgical treatment of the victims.

The main tasks of surgical treatment of patients with fractures are:

1) repositioning and fixing of the fragments of the malar complex;
2) sanitation of the maxillary sinus;
3) repositioning of bone fragments of all walls of the maxillary sinus, including the posterior-lateral wall;
4) salivation of sinuses (repositioning or resection) from the fatty tissue of the cheek, soft tissues of the infratemporal area that prolapse into the lumen of the maxillary sinus through bone defects of the posterior - lateral wall.
5) creation of a barrier between the soft tissues and the lumen of the maxillary sinus, to restore anatomical integrity and reconstruction of the physiological volume of the maxillary sinus for optimal conditions of regeneration of the tissues of the maxillary sinus, prevention of early and late complications.

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