

## FRACTURES OF ANTERIOR FRONTAL SINUS WALL AND SUPERIOR EYE-SOCKET WALL RELATED TO A CLINICAL CASE

MIHAI IULIAN FĂGETAN<sup>1</sup>, ELENA MIHAELA MĂRGĂRIT<sup>2</sup>, MIHAELA CERNUȘCĂ-MIȚARIU<sup>3</sup>

<sup>1,3</sup>“Lucian Blaga” University of Sibiu, <sup>2</sup>PhD candidate, “Lucian Blaga” University of Sibiu

**Keywords:** frontal sinus, eye-socket fracture, nasal bones fracture, osteosynthesis plate, mucocele

**Abstract:** The fractures of the frontal sinuses represent around 5-15% of the total combined cranio-facial trauma. Frontal bone fractures are usually produced through impaction, also leading to injuries of the paranasal, orbital and frontal sinuses. As a general rule, open reduction and fracture immobilization with wicks and osteosynthesis plates is bespoken. There are many clues regarding surgical procedure in case of frontal bone trauma. First of all, and probably the most obvious of them all, is the case of impacted fractures. The current paper points out the benefits of the huge progress made in the medical field during the last 20 years in relation to the surgical treatment and imagistic methods of diagnosis in case of major cranio-maxillofacial trauma. Immediately after the imagistic diagnosis of the comminuted frontal bone and the superior eye-socket wall fractures, the surgical treatment is being elected, more specifically the reduction and immobilization of the fractures. Material used: osteosynthesis plates, titanium screws and wick, the practitioner considering clinical, paraclinical and anamnestic data.

### INTRODUCTION

Most of the patients known with frontal sinus fractures have been subjected to major cranio-facial trauma. Road accidents used to be the most common causes of such trauma, but nowadays this sort of pathology involves pedestrians as main targets (1), many of these patients also having been suffering from intracranial injuries (2), thus requiring multidisciplinary approach. Furthermore, a major incidence of such fractures also relates to aggression, falls-on-the-same-level or falls from height.

The complexity of skull-base trauma entails suiting the therapeutic solutions to each case, with the purpose of achieving optimal functional results. For the nonce, the location and the number of fracture lines on the anterior frontal sinus wall and superior eye-socket wall are the main factors that influence the choice of therapeutic solution.

The need to resort to osteosynthesis for these particular traumata is absolute. Frontal bone fractures are usually produced through impaction, also leading to injuries of the paranasal, orbital and frontal sinuses. As a general rule, open reduction and fracture immobilization with wicks and osteosynthesis plates is bespoken.

### CASE REPORT

Patient S.R., aged 35 old, from Vilcea county, victim of a sports accident that took place 24 hours earlier, arrives in the Emergency Room on the 21<sup>st</sup> of April 2014 and is hospitalized in the Department of Oral and Maxillofacial Surgery, within the Clinical County Emergency Hospital of Sibiu, with cranio-facial trauma followed by headache, bruises on the nasal region and strong edema on the frontonasal region.

During the second day of hospitalization CT scan is being performed, as back up for the clinical diagnosis as well as to exclude any other lesions that would be undetectable through clinical examination, thus bringing forth the diagnosis of cranio-facial trauma caused by a sports accident that happened on the 20<sup>th</sup> of April 2014, with affirmative loss of consciousness;

comminuted fracture of the median and paramedian frontal bones, bilaterally, with impaction; fracture of the superior wall of the left eye-socket; frontal hem sinus; concussed wound of the frontal region. For the nonce, the elected surgical approach is done through bicoronal incision, from the front of the tragus, through the temporoparietal region (bilaterally), ending in the front of the opposing tragus. The aponeurosis of the glabella is peeled away until the bilateral temporal muscles and the frontal bone are put forth. From this point on the fascia of the temporal muscles is being dissected, in order to protect the facial nerve, whilst incising the periosteum of the frontal bone. The focal points of the frontal bone fracture are therefore revealed, as well as of the superior wall of the left eye-socket and the nasal bones fractures (figure no. 1).

The contents of the bilateral frontal sinuses are being drained away and the sinus mucosa is scraped, in order to fight off postsurgical complications, which tend to be observed with some delay. Most of these complications revolve around the development of a clinical and paraclinical picture due to the remnant sinus mucosa.

**Figure no. 1. Comminuted fractures of the frontal bone and superior wall of the left eye-socket**



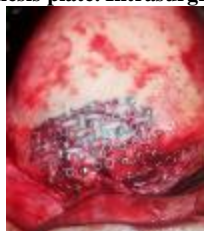
The next step consists of reducing the focal points of the fractures in anatomical position, followed by immobilization with active wick and 13 titanium screws, on the frontal bone, while the superior wall of the left eye-socket is being applied a small osteosynthesis plate mounted with 5 titanium screws

<sup>2</sup>Corresponding author: Elena Mihaela Mărgărit, Str. Nicovalei, Nr. 4-6, Sibiu, România, E-mail: mihaelamargarit86@gmail.com, Phone: +40747 578964  
Article received on 12.07.2015 and accepted for publication on 02.03.2016  
ACTA MEDICA TRANSILVANICA March 2016;21(1):125-126

## CLINICAL ASPECTS

(figure no. 2).

**Figure no. 2. Reduction, in anatomical position, of the fractures, and proper application of the titanium wick and the small osteosynthesis plate. Intrasurgical view**



In the end, the surgical incision is sutured, followed by compressive, sterile dressing.

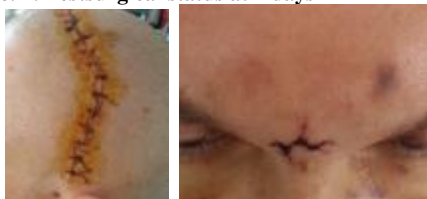
CT scan is being performed as postsurgical check-up, 4 days after the surgical intervention, revealing the titanium wick, the osteosynthesis plate and the correct anatomical positioning of the bone fragments (figure no. 3).

**Figure no. 3. Postsurgical CT scan**



Postsurgical nursing consists of daily dressing of the surgical incision and systemic administration of antibiotics and anti-inflammatory medication (figure no. 4).

**Figure no. 4. Postsurgical status at 7 days**



The stitches were removed 10 days after the surgical procedure, with uncomplicated evolution of the surgical incisions. After the complete remission of the postsurgical edema, the reconstruction of the facial relief was noticed, 14 days after the intervention.

### DISCUSSIONS

The fractures of the frontal sinuses represent around 5-15% of the total combined cranio-facial trauma. (1) All things considered, during the last 20 years the fractures of the frontal sinuses have undergone complete transformation regarding their management, which has become increasingly conservative due to the major development of endoscopic sinus surgery.

It is of paramount importance to evaluate such fractures accordingly as well as to make the surgical approach after certain understanding, in order to properly manage such lesions. In specialized publications, there have been described many other methods of treatment for these types of fractures.

If such surgical intervention is chosen for these injuries, the use of existing soft-tissue wounds to reveal the fractures is to be strongly avoided. These wounds are very rarely adequate to

allow viewing and access towards bone-injury treatment.(2)

From an imagistic point of view, in such cases the preferred options are:

- The simple X-Ray – “tall-face”, skull-latero-lateral and skull-basis (Hirtz) incidences are to be used, bearing the disadvantages of not being able to clearly highlight the full complexity of the bone structures of the skeleton and the inability to evaluate the soft-tissue elements of the face in detail.
- Three-dimensional tomographic exploration is the main imagistic element to elect in radio-anatomy of the frontal sinuses, allowing for precise localization of bone fragments and evaluation of the degree of displacement.
- MRI is probably the most important part of Imagistics, being able to truthfully expose the base of the skull and its contents, due to full-plan imagery acquisition.
- Computerised tomodensitometry.(3)

### CONCLUSIONS

The fractures of the frontal sinuses represent a low percent of the entire maxillofacial trauma but, due to the anatomical location of the frontal sinuses, insidiously evolved, devastating sequelae may occur. They may involve the brain, eye-balls, bones, Dura Mater, muscles or the skin.

There are many clues regarding surgical procedure in case of frontal bone trauma. First of all, and probably the most obvious of them all, is the case of impacted fractures. Surgical approach, in such cases, allows for reduction of the fracture fragments in their correct anatomical position. Furthermore, the cosmetic deficits need to be assessed in case of comminution or impaction of the external panel of the frontal sinus. The deficit is repaired surgically - damage correction – plasty with autologous bone fragments, acrylic or titanium plate.

In essence, in each case, zigzag coronal incision should be used, a lot better hidden by the hairline.

We must also realize that, related to frontal sinus fractures, regardless of age, sex or type of fracture, or treatment method, there is the possibility of complications. Knowing this, early detection and constant vigilance are our best defenses. This means that, during the entire lifetimes of the patients, they must return for routine imagistics, endoscopy, neurologic and ophthalmologic examinations.

Cranio-maxillofacial complications may be concurrent or associated with the surgical approach. These include chronic sinusitis, cutaneous fistulae of the frontal sinuses, subperiosteal abscess, bone-contour deformation, osteomyelitis, loss of sensibility in the affected region, paresthesia, vicious callus, pseudarthrosis, mucocele and reactions to foreign objects. The most common related injuries involve the eye-socket, naso-orbital-ethmoid lesions, nasal bone fractures and fractures of the middle section of the face - the greater the number of concurrent injuries, the more the risk of complications.(4)

### REFERENCES

1. Tedaldi M, Ramieri V, Foresta E, Cascone P, Iannetti G. Experience in the management of frontal sinus fractures. *J Craniofac Surg.* 2010;21:208-210.
2. Netter FH. *Atlas of Human Anatomy: Including Student Consult Interactive Ancillaries and Guides*, Ed. Elsevier-Health Sciences Division; 2014.
3. Fonseca RJ, Barber HD, Powers MP, Frost DE. *Oral and Maxillofacial Trauma*; 2012.
4. Hershman G, Katikaneni R, Hirsch DL. Use of 3D virtual Planning in Management of Frontal Sinus Fractures, *Journal of Oral and Maxillofacial Surgery.* 2012;70(9,e84).