

CASE REPORT

Management of Frontal Sinus Fracture: Obliteration Sinus with Cancellous Bone Graft

Sahib Muminagic¹, Tarik Masic², Emina Babajic¹, Mithat Asotic³
 Cantonal hospital Zenica, Bosnia and Herzegovina¹
 Clinical center of University of Sarajevo, Bosnia and Herzegovina²
 Cantonal hospital Travnik, Bosnia and Herzegovina³

Frontal sinus fractures make up about 2-15% of all facial fractures. This is relatively low frequency of occurrence, but it has a large potential of complication and may involve not only the frontal sinus but more importantly the brain and the eyes. The management depends of the complexity. If anterior wall is fractured with grossly involved nasofrontal duct (NFD) in the injury it is paramount to occlude NFD. Very often, sinus obliteration is done at the same time. In our experience autogenous cancellous bone graft is considered to be the best grafting material. It has the less short - or long-term complications and the donor site morbidity is insignificant. **KEY WORDS:** FRONTAL SINUS, FRACTURE, CANCELLOUS BONE GRAFT.

Corresponding author: ass prof Tarik Masic, MD, PhD. Clinic of Maxillofacial surgery, Clinical center of University of Sarajevo, Bosnia and Herzegovina

1. INTRODUCTION

Frontal sinus fractures make up about 2-15% of all facial fractures (1, 2, 3). This is relatively low frequency of occurrence, but it has a large potential of short - and long-term complication that may involve not only the frontal sinus but more importantly the brain and the eyes (4). It can affect anterior and/or posterior table with or without hitting the nasofrontal duct (NFD) (3). The management depends of the complexity (5, 6).

The surgical techniques used access to the fractures via coronal incision or through existing lacerations. Other incisions are not aesthetically pleasing (1, 3). Isolated anterior table fracture not displaced or minimally displaced do not require surgical repair. If the fracture is isolated to the anterior wall but displacement is greater than the width of this table, depressed segment is carefully reduced and the fracture is fixed with titanium miniplates. If ante-

rior wall is fractured with NFDs injury the decision about treatment depends of the condition of the NFD. When the NFD is grossly involved in the fracture, it is paramount to occlude the NFD and completely separate the nasal cavity from the sinus. For obliteration of NFD can be used fibrin sealants. Very often, sinus obliteration is done at the same time.

Common material for sinus obliteration are: autologous avascular grafts (abdominal fat, muscle, bone), vascular regional flaps (pedicled pericranial flap) or synthetic materials (hydroxyapatite cement). Management of the posterior wall fracture first has to determine does injury of the dura exist. To seal small fractures fibrin sealants are an excellent option (5, 7, 8). If there are displaced fragments of the posterior wall, they can cause dural tears and cerebrospinal liqor (CSF) leak. This condition usually requires a cranialization procedure (8).

2. CASE REPORT

A 27-th years old male was transferred from Department of emergency medicine to Maxillofacial department because of upper face trauma caused by traffic accident. There was no history of lost of consciousness, vomiting, or any other signs of intracranial injury. Examination in Department of emergency room was not revealed any other associated injuries. When the patient was admitted he has periorbital ecchymosis, forehead swelling (without any wound) and pain, with visible depression in region of frontal sinus.

Radiologic evaluation confirmed diagnosis of multifragmental fracture of anterior wall of frontal sinus with nasofrontal duct involvement. This was indication for surgical treatment. Approach to the fractures performed through coronal incision. The coronal flap is elevated in a subgaleal plane until 2 cm above frontal sinus, than commenced subperiosteal plane. Visualisation of the fractures was made (Figure 1).

Fractured anterior wall bone frag-



FIGURE 1. Visualisation of fractures


FIGURE 2. Frontal sinus antrum

ments were removed and saved (Figure 2). Than sinus and NFD were prepared for obliteration. The sinus mucosa was meticulous removed with sinus curettes. The material choosed for obliteration is free bone graft. Proximal tibial epiphysis is an excellent source of cancellous bone for grafting (Figure 3).

Technique was followed strict aseptic condition. After incision of the skin, subcutaneous and fascial layers, the periosteum is visualised. Opening through the cortical bone was made. The cancellous bone is harvested using orthopedic bone curettes. After hemostasis the wound is closed in layers. Open surgical drainage system was applied subcutaneously. NFD was obliterated with fibrospun (to prevent the reepithelization of the frontal sinus, isolating it from the nasal cavity) and


FIGURE 3. Tibial epiphysis

FIGURE 4. Obliterated frontal sinus

FIGURE 5. Overfilled frontal sinus.

FIGURE 6. Results after a few weeks.

frontal sinus antrum where carefully overfilled with cancellous bone graft, the saved fragments of anterior plate returned back (without osteosynthesis), and protected with periost and pericranium (Figure 4). The wound is closed with a single stitches (Figure 5).

A few weeks after surgery the result was aesthetically pleased (Figure 6).

3. DISCUSSION AND CONCLUSION

Many complications can follow frontal sinus fracture repair (9, 10, 11). Acute complications include wound infection associated with incision, infection associated with the sinus (osteomyelitis) or with its new contents (abdominal fat), complications associated with donor site (abdomen, bone), intracranial events (meningitis, brain absces), CSF leaks (15). Chronic complication include: mucocele or mucopyocele, cosmetic deformity, chronic headache, neurologic deficits (11). In some frontal sinus fracture cases, sinus obliteration

is necessary. It is difficult to find an adequate, safe, material for obliteration without long or short-term complications (12, 13). With synthetic hydroxyapatite should not to be obliterate the entire sinus because of high risk of infection resulting from lack of adequate vascularization. The most frequently used material, with the longest history of use is abdominal fat, but more than 60 % of the transferred fat may be re-sorbed with time (1, 2). Cancellous autograft has the disadvantage of poor structural support. The potential disadvantages of pericranial flap frontal sinus obliteration are the devascularization of the anterior table and the flap vascular compromise (14). In our experience autogenous cancellous bone graft is considered to be the best grafting material. It has the less short - or long-term complications and the donor site morbidity is insignificant.

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