

Principles of Surgical Treatment in the Midface Trauma - Theory and Practice

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ABSTRACT

Introduction: Facial trauma is a common injury in the urban setting. Many studies have been published on the epidemiology and treatment of facial fractures, but few of them conducted in emergencies hospital as ours. The purpose of this study was to present theory and practice in surgical treatment of midface trauma.

Materials and method: We will present a retrospective study and a cases series report with our personal experience in diagnosis and treatment of middle floor facial trauma. Craniofacial trauma in context of polytrauma involves a screening condition assessment of the patient to prioritize lesions and frequently require a multidisciplinary approach: neurosurgeon, ENT surgeon, maxillo-facial surgeon, ophthalmologist, plastic surgeon and so on. Axial and coronal CT are mandatory and three-dimensional CT reconstruction can be extremely useful. Surgical indication in middle floor facial trauma is given by functional and aesthetic deficits.

Results: We will present the surgical principles we use in treatment of fractured nose, in fractures of maxilla, in fractures of the zygomatic arch with or without zygoma body fractures and fractures of the floor of orbit.

Discussions: The surgical technique was imposed by coexisting lesions of neuro and viscerocranium, by the complexity of the fracture, by functional or aesthetic deficits and by our surgical experience.

Conclusions: The main principles in middle face trauma are an accurate and complete lesions evaluation; mixed surgery team with maxillofacial surgeon and neurosurgeon.

Keywords: lesions evaluation, mixed surgery team

INTRODUCTION

With high-speed auto travel, the increasing participation in sports by people of all ages and both genders, and especially the high incidence of violent crime, facial fractures continue to be important injuries in our society. Manage-

ment of facial fractures, contrary to the pattern of care in other countries of the world, is in the United States, spread across the disciplines of oromaxillofacial surgery, plastic surgery, and otolaryngology. Because of the comprehensive training in head and neck anatomy and physiology, the ear, nose and throat (ENT) surgeon is well prepared to best deal with these injuries

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together with oromaxillofacial (OMF) surgeon (1).

The paper has a general-synthetic character and that is the reason it is entitled „Principles of surgical treatment in the midface trauma“. Our target is ENT surgeons, OMF surgeons and other types of surgeons who fight with craniofacial trauma in emergency hospitals. These emergency hospitals, as our hospital, have a very special profile of number, but especially in complexity of cases. We have a small number of specialists in trauma teams in such of hospitals, usually 1-2 ENT surgeons and 1-2 OMF surgeons, so it was necessary for each of us to redefine our knowledge and to integrate it in a common protocol and strategy.

The simplification, but not simplicity of content, comes from a very rich experience in craniofacial trauma over 10 years during we were obligated to perfect and to develop ourselves. Therefore, despite the huge number and the complexity of cases, all medical legal cases, we have had no malpractice process in all this time.

The first encounter with the patient with a facial fracture is usually in the emergency department. The patient is often the victim of an accident that involves many body systems, and, almost always, attention to these injuries takes precedence. The exception to this is the initial attention to the airway. Extensive soft tissue contusion, bilateral mandibular body fractures, and Le Fort fractures of the maxilla can all result in airway obstruction. In mandibular fractures, a nasotracheal intubation is appropriate; however, in maxillary fractures, there is always a risk of fracture to the cribriform plate or the fovea ethmoidalis. Intubation by the nasal route presents the danger of intracranial passage of the tube so that oral intubation, cricothyroidotomy, or tracheostomy should be used to secure the airway (2). Rarely will fractures of the facial skeleton present with life-threatening hemorrhage, but we have to stop this hemorrhage before complete investigation. At this point, a careful evaluation of the other important systems is performed.

Craniofacial trauma in context of polytrauma involves a screening condition assessment to prioritize injuries (3). Very often, it requires a multidisciplinary approach: neurosurgeon, ENT surgeon, maxillofacial surgeon, ophthalmologist, plastic surgeon and so on. Axial and coronal CT is mandatory and three-dimensional CT reconstruction can be extremely useful.

Treatment of the patient with facial trauma should include a thorough history and physical examination to determine the location and extent of all injuries. The goal of treatment of patients with craniomaxillofacial injuries should be reconstitution of all injured regions. Both soft tissue and bony injuries should be assessed, and a treatment plan should be established. The goals of treatment should be the restoration of function and appearance. The pre-morbid form and function of dental, skeletal, and soft tissues should be re-established as much as possible. Recent photographs and dental records, if available, are most helpful to establish the pretraumatic appearance (2). Surgical indication in middle face trauma is given by functional and aesthetic deficits and the result has to be as well as we get (coexisting trauma, comorbidities, age, social status etc). □

PERSONAL EXPERIENCE MATERIAL AND METHODS

We performed a retrospective study during January, 2008 – January, 2012 (48 months) on 670 adult patients with 929 middle face trauma lesions. The patients were from Intensive Care Unit, ENT Department, Neurosurgery Department and Ophthalmology Department from University Emergency Hospital Bucharest, Romania.

Study inclusion criteria were:

- Nasal bones fractures;
- Zygoma fractures;
- Orbital floor fractures;
- Multiple middle face fractures.

Study exclusion criteria were:

- Other cranio-facial fractures except middle face.

The diagnosis protocol consisted in clinic examination, imaging examination – cranio-cerebral CT scanning in all cases, three-dimensional CT reconstruction in selected cases. Clinic examination presumed ENT and OMF examination, neurosurgical and ophthalmologic examination.

From these patients we selected a case series report and we will present the surgical principles we use in middle face trauma. □

RESULTS

From January, 2008 until January, 2012 we treated 670 patients with 929 middle face trauma lesions. We had nasal bones fractures

(36%), zygoma fractures (27%), orbital floor fractures (10%), multiple fractures (14%), others types of fractures (13%).

The demographic data showed men/women ratio of 76% males and 24% females. The age repartition showed a domination for young people versus old people: the most involved age was 21-50 years (66%), followed by 51-70 years (18%), 71-90 years (11%). We have had a few patients between 1-20 years (5%) because we are not a paediatric hospital.

In the population studied the most frequent aetiology was all traffic accidents representing 51.8% of the cases, followed by interpersonal violence/human aggression (18.6%), falls (12.1%), vehicle-pedestrian collisions (6.4%), sports accidents (5.7%), work injuries (2.3%), and other causes (3.1%).

The number of surgical cases from all cases of midface trauma was considerable less: 1/4 cases in nasal bones fractures, 1/3 cases in zygomatic fractures, 1/8 cases in orbital floor fractures, 1/2 in multiple facial fractures. □

CASES SERIES

We present some cases which exemplify middle face trauma and the surgical principles we use.

A. Nasal and septal fractures

We present a case of a female patient, 38 years old, a traffic accident with multiple facial fractures: comminuted nasal bones fracture and infraorbital rim fracture (maxillo-zygomatic suture) (Figure 1).

As surgical treatment we performed a closed reduction for cominutive nasal bones fracture with displacement and osteosynthesis with titanium plate for infraorbital rim fracture (maxillo-zygomatic suture) under general anaesthesia. The surgical treatment was performed at 7 days from trauma because the patient had a lip luxation operated firstly and after that she had fever for 6 days, without any apparent cause except resorbition fever after orthopaedic intervention (X-ray of lung was normal, hemocultures and urocultures negative). The patient was under antibiotic therapy and we establish to operate her without fever, because the fractured facial bones were still mobile. The postoperative evolution was simple with surgical healing and a good esthetical result (Figure 2).

B. Orbital floor fracture

At this subchapter we present a clinic case of male patient, 47 years old, victim of human aggression with isolated left orbital floor fracture with left enophthalmus and diplopia.

In this case we used a sub tarsal lower – eyelid approach for reduction and a titanium orbital floor plate for fixation (Figure 3).

The postoperative evolution was good. Left eye mobility, with preoperative upper gaze limitation, become normal in postoperative at 7 days.

C. Zygomatic arch fracture

We present in this section a case of male patient, 49 years old, a traffic accident, with zygomatic arch fracture and lateral outward displacement (Figure 4).

In this case we have a mixed team with neurosurgeon, OMF surgeon and ENT surgeon and we performed a hemocoronal approach with reduction. We have used plating for fixation – titanium plates 1.7/6 mm (Figure 5).

The post-operative evolution was simple, the active drainage was suppressed at 24 hours and the esthetical and functional aspects were very good at 7 days.

D. Zygomatic-complex fracture

At this section we present a clinic case of a male patient, 26 years old, an explosion accident, with left orbital evisceration performed by ophthalmology surgeon and with complex zygomatic fracture (Figure 6). For surgical treat-

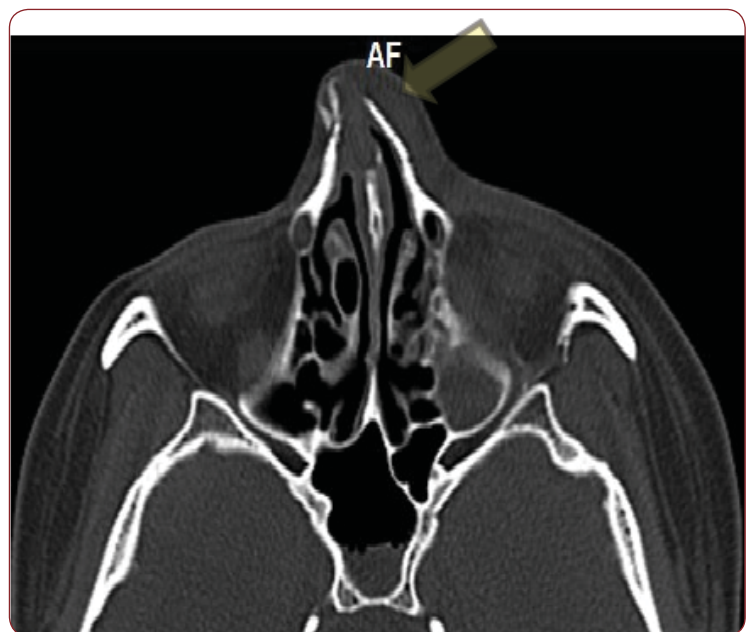


FIGURE 1. Comminuted nasal bones fracture.



FIGURE 2. Postoperative aspect – 7 days.

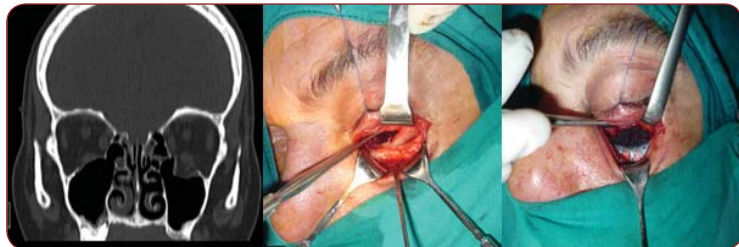


FIGURE 3. Titanium orbital floor plate for fixation.

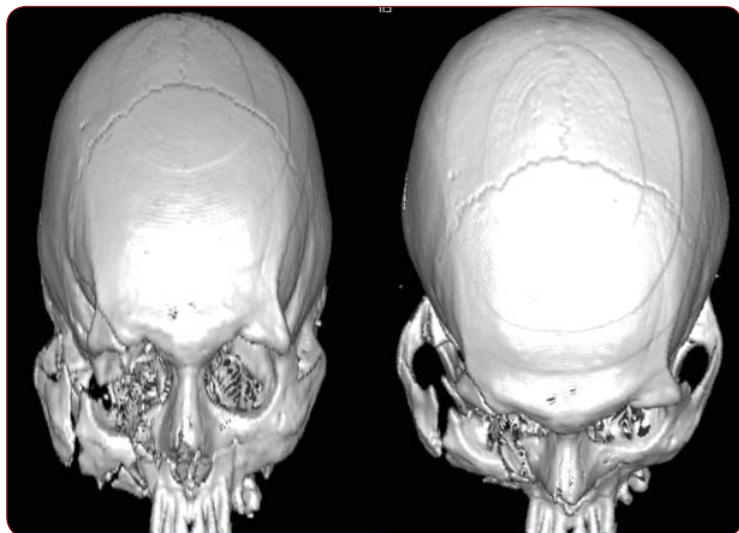


FIGURE 4. Zygomatic arch fracture with lateral outward displacement – preoperative aspect and CT – scan.

ment we used the existing lacerations and we performed open reduction with rigid fixation (Figure 7).

The surgical evolution was good, with wound healing in 10 days, but with a bad ophthalmologic functional resulting from lost of the left eye. □

DISCUSSIONS

Facial trauma is a common injury, especially in urban centres (4-6). Several studies have been published regarding the epidemiology of facial trauma in all continents (7-9). and we were interested especially those focusing on

maxillo-orbito-zygomatic complex fractures. Epidemiological data vary among the case series according to local socio-economic and cultural factors (6,10,11). However, it is noticeable that facial injuries affect predominantly young, economically active adults, mainly caused by interpersonal violence and traffic accidents (5,12). Studies on the epidemiology of facial fractures are valuable in providing useful data to be employed in the optimization of therapeutic and preventive actions (1).

In every case of midface trauma, we believe that the surgical technique is imposed by: co-existing lesions of neuro- and viscerocranium, the complexity of the fracture, functional or aesthetic deficits, our surgical experience.

In nasal and septal fractures we respect some highpoints combined from literature and from our experience: early reduction within 24 hours is done if feasible despite edema (unless massive); clinical evaluation is far more important than radiographs; the simpler the method of reduction, the better; preoperative and postoperative photographs are advises; general anesthesia if we have many facial fractures; open reduction only in exceptional cases (3).

Orbital injuries frequently require surgical treatment. Zygomaticomaxillary, naso-orbitalethmoid, orbital rim and blow-out fractures are among the injuries requiring intervention. Modern approaches are safe and aesthetically acceptable when performed properly (13). Selecting the most appropriate surgical approach will optimize exposure and increase the likelihood of successful treatment.

In orbital floor fractures we respect some highpoints combined from literature and from our experience: we have not injure the orbital septum or lacrimal sac; superiosteal elevation has to be done along the floor of the orbit; we have completely free any impaction of inferior rectus or inferior oblique muscles, especially posteriorly; we usually use a combined approach: antrum and infraorbital. The major indication is represented by disturbances of eye mobility that are the result of incarceration of ocular muscles - enophthalmos, exophthalmos secondary to blow-in fractures, hypophthalmos (14).

Converse (15) originally described the subciliary approach to the orbit in 1944. He and others have also advocated a subtarsal variation of this approach. Both are transcutaneous approaches that provide access to most of the or-

bital floor. The orbital rim incision is an alternative transcutaneous approach, which we do not use because of the potential for visible scarring. The transantral approach offers an improved visibility of the posterior orbit and especially the posterior shelf of a floor defect (13).

In zygomatic arch fractures we respect some highpoints combined from literature and from our experience: the earlier the reduction, the better - usually within 48 hours; we have to slightly overcorrect the depressed fragments; if the zygomatic arch deformity is severe enough that it cannot be adequately treated with a transoral or temporal approach, or is too unstable to be treated without fixation, an open treatment can be considered (16). The open reduction with fixation presents some advantages and some disadvantages. As advantage it allows direct visualization of the zygomatic arch with fixation and a stable fixation. As disadvantages: visible scar, time consuming, risk of temporal hollowing, risk of injury to temporal branch of the facial nerve (16).

For open treatment of zygomatic-complex fracture we have some indications and contraindications. The indications are displaced zygomatic-complex fractures and necessity for internal orbital reconstruction. As contraindications are nondisplaced zygomatic-complex fractures (17). $\square$

CONCLUSIONS

In summary, treatment of facial fractures requires a multisystem approach. All bony and soft tissue injuries should be diagnosed, and reconstitution of all tissue layers should be performed, if possible. The advancement of technology has enabled rigid fixation to become the standard of care for the fixation of most facial fractures. More precise stability and fixation of fractures have become possible, and intermaxillary fixation is used less frequently. Wellplanned incisions minimize scarring. Adequate exposure, precise reduction, and stable fixation remain the hallmarks of treatment of facial fractures (2).

But, it is very important when we have to do nothing, too, in connection with aesthetic and functional deficits. In our opinion, the main principles in middle face trauma are: an accurate and complete lesions evaluation; mixed surgery team with ENT surgeon, maxillofacial surgeon, neurosurgeon and ophthalmology surgeon; the result has to be "as well as we get."

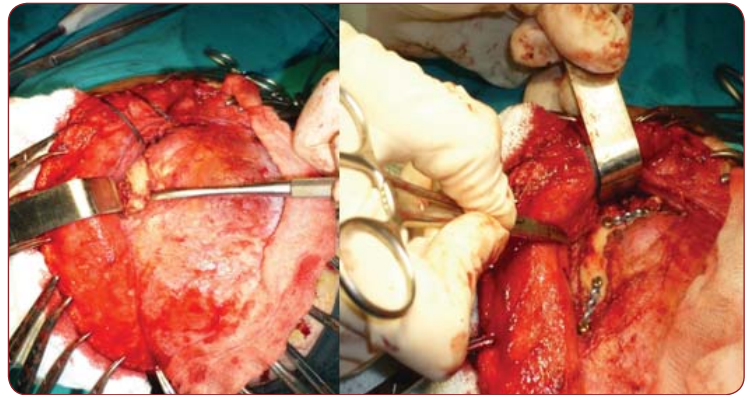


FIGURE 5. Intra-operative aspect - plating for fixation – titanium plates 1.7/6 mm.



FIGURE 6. Explosion accident. Left orbital eversion (ophthalmology surgeon). Complex zygomatic fracture.

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FIGURE 7. Intra-operative aspect – open reduction with rigid fixation, using the existing lacerations.

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