

# Craniofacial injury – a case report

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## Abstract

Work accidents are a subject of particularly tight control, and craniofacial injuries belong to the most difficult types of trauma in terms of their pre-hospital management. The aim of this paper is to present the case of a patient who experienced craniofacial injury during a work accident. Analysis of the case history showed that due to specific type of injuries, this patient required complex surgical treatment and multi disciplinary consultations. Due to long-term incapacity for work, craniofacial injuries constitute an organizational and economic challenge.

## Key words

trauma, craniofacial, treatment

## INTRODUCTION

Facial skeleton injuries constitute a complex clinical issue and their effective treatment requires the co-operation of specialists in a number of medical disciplines. Depending on their degree, the injuries may be limited to damage to soft tissues, but they frequently also involve fractures of bone structures and other associated injuries to the adjoining organs in the area, such as the organs of hearing and sight, the olfactory organ, the organs of speech and taste, the masticatory organ and the organ of swallowing. Facial skeleton injuries are among the most difficult injuries in the pre-hospital patient management [1, 2].

The increased incidence of facial skeleton injuries reflects the changing living and working conditions in the developing world. The most frequent causes of injuries to the facial skeleton are accidents occurring in traffic, during sports activities and at work; a separate group are assaults and falls [3–6].

Accidents at work belong to a category of injuries which are subject to particularly rigorous supervision. Occupational safety and health in Poland is governed by the provisions of the Constitution of the Republic of Poland and Part X of the Labor Code. Additionally, detailed rules for occupational safety and health are included in the internal regulations of each employment establishment. Adherence to the above regulations is enforced by the authorized bodies and any infringements by either employers and employees will be prosecuted [7]. Due to the well-developed labour protection system, accidents at work are a rare phenomenon. An analysis of reports from the Central Statistical Office shows that since the 1<sup>st</sup> – 3<sup>rd</sup> quarter of 2014 a total of 59,270 people have suffered accidents at work, including 177 fatal accidents and 352 serious accidents. For several years a downward trend in occupational accidents has been observed, but such sectors of the economy as industrial processing, construction, mining and extraction, as well as agriculture, transport and the engineering industry, record the highest number of accidents at work, including those that are serious or fatal [8].

Facial skeleton injuries sustained at work concern 1/5 of the injured. The most frequent causes are: being crushed by a forklift, a fall from a height, handling objects, and operating machinery [9]. The nature of the injury sustained by the patient often leads to directly life-threatening conditions and requires the quick transportation of the patient to a hospital emergency department. These injuries result in very serious and diverse morphological and functional as well as esthetic complications. As a consequence, they damage or disrupt the physiological activity of vital systems – respiratory, nervous, gastrointestinal and masticatory. Injuries to the craniofacial skeleton, if undiagnosed or improperly treated, may lead to permanent disability. Prolonged hospitalization followed by a period of exclusion from professional and social life are associated with psychological problems [10]. Serious injuries to the bones and soft tissues of the facial skull lead to long-term incapacity to work and require conservative orthopedic or surgical treatment [3]. The treatment of uncomplicated fractures of teeth and alveolar processes is the domain of dental surgery, whereas extensive injuries to the facial skeleton with accompanying multiorgan injuries are diagnosed and treated at maxillofacial surgery centres [11]. Facial skeleton injuries are common in emergency medicine practice. The complex character of the injury demands emergency medicine physicians and specialists in maxillofacial surgery, otorhinolaryngology, plastic surgery, ophthalmology and trauma surgery to take coordinated action [1, 2, 12].

**Treatment.** The current treatments for fractures of facial skeleton bones rely on biocompatible materials, namely titanium plates, and the surgery is performed by means of the intraoral approach, frequently using endoscopy [11, 13]. The advantages of surgical treatment include: short duration of treatment, ability to maintain proper oral hygiene and lack of feeding problems, while the disadvantages include: the necessity of general anesthesia, post-operative wounds, possible damage to the facial nerve, possible necessity of removal of the fixing material and high treatment costs [14, 15]. The rule in the surgical treatment of facial skeleton injuries and the concomitant functional and esthetic complications is early, comprehensive and anatomical reconstruction of the craniofacial skeleton, intended to restore the masticatory function and to minimize the functional and cosmetic

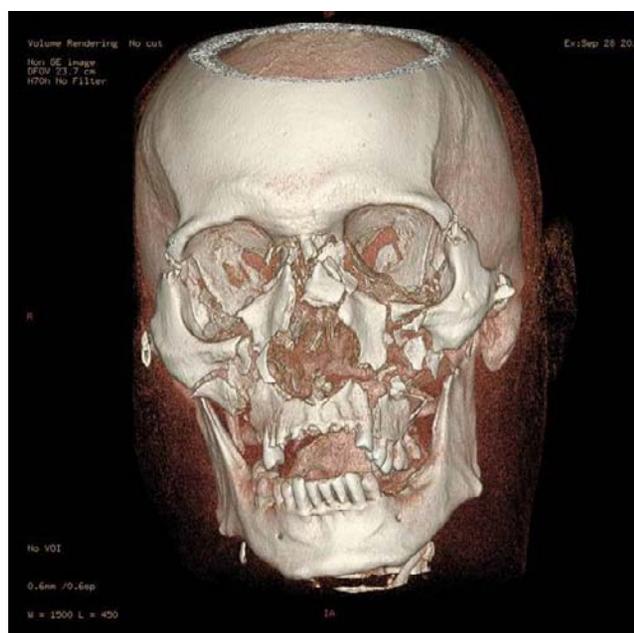
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disorders [1, 10, 12]. Perioperative treatment requires the entire team to co-operate with the patient, especially with respect to the educational activities undertaken [16].

## CASE DESCRIPTION

A 52-year-old patient was transported in the afternoon by the Ambulance Service to the Clinical Emergency Department at the Invasive Medicine Centre in Gdańsk, Poland, due to an isolated facial skeleton injury as a result of being crushed by a pneumatic press (hit on the head by a part of the machine weighing 500 kg during work). According to the information provided by the ambulance team, at the site of the accident the patient was conscious but confused, and then lost consciousness. He was intubated. There was a history of alcoholic dependence syndrome, a negative result of the serum ethanol test, no concurrent conditions reported. Body weight – 63 kg, height – 165 cm. At the Emergency Department, computed tomography scanning in 3D projection was performed and revealed fragmentation of all the walls of the maxillary sinuses and ethmoid bone, fragmentation of the nasal bone skeleton, a fracture of the maxillo-ethmoidal region, and numerous fractures of the facial skeleton, and both orbits. No fragments of the fractured bones pressed on the second cranial nerve.



**Figure 1.** 3D (spatial projection) computed tomography image of the patient.  
Source: Archival materials of the Maxillofacial Surgery Clinic, University Clinical Centre, Gdansk

Due to the complexity of the image, a laryngologist, an ophthalmologist and a maxillofacial surgeon were consulted. The laryngological examination revealed a massive oedema of the soft tissues of the facial skeleton, a flattened nose with invisible contours, fresh blood in both nasal cavities, a missing lower (osseous) part of the nasal septum, loosely hanging nasal concha and fragments of ethmoid bones in both nasal cavities. Mobile plane of the hard palate. Anterior nasal packing was placed bilaterally and the oral cavity was seton drained. The surgeon's examination showed no indications

for immediate surgical intervention. The ophthalmologist's examination showed 'spectacle haematomas' and a massive oedema of the eyelids which, on being opened, revealed a major oedema of the conjunctiva and the central part of the cornea, undamaged eyeballs, transparent front section, and even, round and narrow pupils. Reaction to light was difficult to evaluate. Pink reflex from the fundus of the eye and the fundus of the eye was very difficult to examine. It was stated that the patient did not need surgical intervention on ophthalmological grounds.

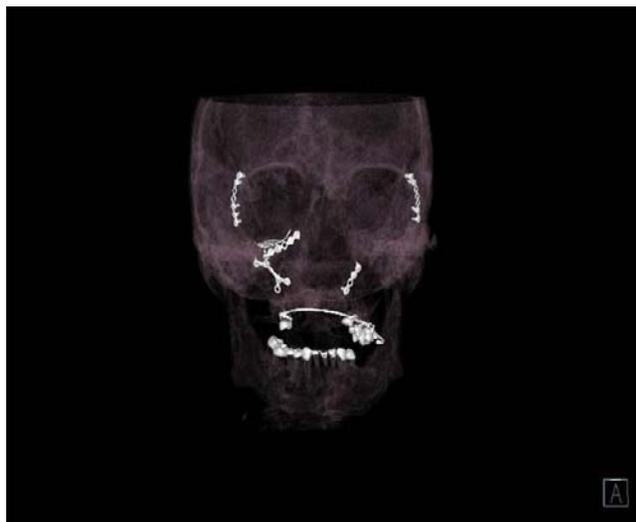
At the Clinical Emergency Department, due to the massive injury of the facial skeleton, tracheotomy was performed under general anesthesia and the respiratory tract was secured with a tracheotomy tube. In the evening, the patient was transferred to the Intensive Care Clinic, with an indication for further treatment at the Maxillofacial Surgery Clinic after general improvement in the patient's general condition.

**Course of hospitalization.** The patient stayed for 5 days in the Anesthesiology and Intensive Care Clinic, followed by 15 days in the Maxillofacial Surgery Clinic.

Upon admission to the Intensive Care Clinic, the patient was sedated with a continuous infusion of Midazolam (Dormicum) 10mg/h, and mechanically ventilated. An orogastric drain was inserted and 1,200 ml of dark bloody content was drained. After 2 days, the patient was weaned-off sedation and logical contact was established with him. Due to periodic agitation, the patient was placed on tranquilizers. On the third day, the patient started breathing through the tracheotomy tube on his own; condition stable on clinical and gasometric assessment. A laryngologist removed the drainage from the nose, but because bleeding continued the drain was reinserted. On the third day after the injury, enteral nutrition was started. After 5 days in the Intensive Care Clinic, the patient was transferred to the Maxillofacial Surgery Clinic. At the clinic the patient was prepared for surgery for repositioning and osteosynthesis of the bones of the maxilla, nose and orbit. On the sixth day, the gastric tube was removed and oral fluid ingestion was recommended to monitor swallowing reflexes, after which a liquid diet was started.

Following the necessary diagnostics and ophthalmological and laryngological consultations, the decision was taken to perform the surgery with the participation of a maxillofacial surgeon, a laryngologist and an ophthalmologist. The surgery was performed on the 12<sup>th</sup> day after the injury. Before commencement of the surgery, an upper dental splint was fastened to limit the mobility of the fragments of the maxilla and teeth. This procedure limited the mobility of the maxillary region, which made swallowing and speaking less painful for the patient. The surgery of repositioning and miniplateosteosynthesis of the injured facial skeleton bones was performed under general anesthesia. The maxillofacial surgeon made an incision in the oral cavity, exposing the front wall of the right and left maxillae with numerous fracture gaps. Repositioning and miniplateosteosynthesis were performed on the right zygomatico-alveolar crest, followed by repositioning and miniplateosteosynthesis on the zygomatico-frontal suture on the left and right. The laryngologist repositioned the fractured bones of the nose and restored the patency of the nasal cavities. He removed isolated bone fragments, repositioned the conchae and positioned the nasal septum

in the medial line. The ophthalmologist exposed the injured inferior margin of the orbit and removed the falling-out tissues of the orbit, including the inferior straight muscle, as well as several loose bone fragments. He introduced a titanium plate into the inferior wall of the orbit, covering the fracture gap. Surgical wounds were sutured.



**Figure 2.** Radiographic image of the miniplate osteosynthesis in the patient.  
Source: Archival materials of the Maxillofacial Surgery Clinic, University Clinical Centre, Gdansk

After the surgery, the patient was transferred from the recovery room to his initial clinic. The patient was cardiovascularly and respiratorily stable, with vital signs within normal limits. A pain monitoring chart and an intensive observation and fluid management chart were kept for the patient. He was found to suffer from a significant level of discomfort due to the inability to chew and ingest food by the oral route, and because of being fed by the orogastric tube. The presence of the tube was the reason why the patient reported discomfort in the throat, nasal mucous dryness and dry sensation in the mouth. This posed the risk of erosions and pressure ulcers, hence care was taken to moisturize and wash the oral and nasal cavities using antiseptics. The patient required tracheobronchial tree toileting by the aspiration of the deposited secretion. It should be noted that the presence of the tracheostomy tube caused difficulties in the communication between the patient and the staff. A significant and bothersome problem was pain in the facial skeleton, which caused deterioration in the patient's functioning. Pain complaints were assessed on the visual analog scale (VAS) and analgesic medications were administered regularly, as ordered in the pain monitoring chart. The patient's condition gradually improved during the days after the surgery, and no dangerous complications appeared in the post-operative period. The patient was discharged from hospital on the 9<sup>th</sup> day following the surgery with indications for regular follow-ups at the Maxillofacial Surgery Outpatient Clinic, the Laryngology Outpatient Clinic and the Ophthalmological Outpatient Clinic. Antibiotic therapy with clindamycin 2x600 mg/day was maintained. Prosthetic rehabilitation to reconstruct the missing teeth and maintain the satisfactory results of treatment was planned.

It should be noted that problems in the social sphere related to fears about becoming disabled and the

opportunities of returning to work were identified. Indications for management in the home environment were prepared and the importance of observing the rules was explained.

## DISCUSSION

The face is not only every person's trademark but it also plays many other important functions. Facial injury may disrupt the patient's ability to ingest food, speak, interact with others and perform other important functions. Disfiguring facial injuries can have serious psychological and social consequences [2]. The fundamental principle in the treatment of facial injuries is the elimination of life-threatening factors in the first place; however, the preservation of the facial functions and the cosmetic effect are equally significant [17]. The presented description of the surgery in a patient with extensive injury to the facial skeleton which required a reconstructive surgery, demonstrates that the post-operative period is sometimes of the utmost importance. The characteristic complaints, such as pain, facial oedema and the inability to ingest food orally present a major physical and mental strain.

The specificity of injuries and surgical procedures in maxillofacial surgery requires the education of patients about the hygiene and care of the operated site [18]. The information given to patients and the procedures followed on wards should take into account the current recommendations on oral hygiene management in the perioperative period. This significantly accelerates the healing of the postoperative wound and prevents infections of the oral mucous membrane [16, 18]. Diet modifications concern mostly the consistency of food, which must be liquid or half-liquid. This is due to the fact that patients have injuries within the masticatory organ. In the presented case, psychological support played an equally important role as the preventive measures against complications. Face mutilation is always a traumatic experience. The patient left the hospital with symptoms of poor vision, but his rehabilitation will be only complementary to the measures taken in hospital.

## CONCLUSIONS

Facial skeleton injuries are noteworthy because of the complexity of the related therapeutic procedure. The presented case demonstrates the importance of integrated co-operation between specialists in different fields. The interventions, frequently arising from the therapeutic procedure should comprise all the aspects of the patient's quality of life.

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