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Case Report

Emergency Treatment of Multiple Maxillofacial Fractures Due to Motorcycle Accident: Case Report

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Abstract

Introduction: Physical trauma to the facial area can cause soft tissue injuries and fractures of the facial bones. Multiple injuries to the face can be difficult to treat and can lead to complications and defects if left untreated. The purpose of this case report is to discuss the emergency management of multiple fractures of the maxillofacial bones due to a motorcycle accident. Case Report: A 23-year-old male patient came to the emergency room at Hasan Sadikin General Hospital with complaints of facial and jaw injuries due to a motorcycle accident the day before. Extraoral examination, found edema and hematoma in the right orbital rim region, situational suturing in the right lid, and lacerated wound in the right labii superior region. Intraoral clinical picture found lacerated wound in the left inferior labii region and gingiva. The occlusion is anterior crossbite and open bite, and there are steps in the mandibular corpus bilaterally. Radiographs show fracture lines of the right zygomatic bone region, right orbital rim, maxillary and mandibular bones bilaterally. The diagnosis of this case was multiple fractures of the maxillofacial bones. The emergency treatment performed included wound debridement, wound resuturing, and temporary fixation of the wiring arch bar on the maxilla and mandible. **Conclusion:** Emergency treatment of multiple maxillofacial fractures due to trauma with wound care and temporary installation of arch bar fixation devices on the maxilla and mandible gives good results and makes it easier for definitive treatment

Keywords: emergency, multiple fractures, maxillofacial, accident, motorcycle

Introduction

Facial trauma is any type of trauma affecting the soft tissues and bones that make up the face, from simple to complex. Because of local and global demographic factors, as well as environmental, economic, age, gender, and mechanism of injury factors, the epidemiology of maxillofacial trauma varies. The incidence of facial trauma in the United States is approximately 500,000 per year. In Indonesia, the incidence of facial trauma in 2017 is estimated to have occurred in around

78,421 cases.[1] Maxillofacial trauma is more common in men than women and is caused by fights, assaults, falls, work accidents, and motor vehicle collisions.[2,3] Soft tissue trauma and other injuries account for about 30% of facial fractures. Skull and upper extremity fractures are estimated to account for approximately 25% of facial fractures, and cervical spine injuries associated with facial trauma account for up to 9.7%. Spinal, extremity, and hip injuries account for about 10% of facial traumas and are often overlooked.[2]

Soft tissue, facial skeletal, and dentoalveolar trauma are the three types of facial trauma. Fracture patterns of facial bones can also be made based on location in the first third of the face: the upper third (which includes the frontal bone, frontal sinus, and roof of the orbit), the middle third (which includes the orbit, nose, malar region, and maxilla), and the lower third (which includes the mandible and teeth). The upper third of the skull is associated with frontal sinus fractures, which necessitate determining whether the trauma affects the outer surface, the inner surface, or both, as well as the presence of nasofrontal tract outflow obstruction. The middle third fracture pattern includes the typical Le Fort pattern but is more often asymmetrical and more extensive at certain sites such as the orbito-zygomaxillary complex (OZMC), orbital, nasal, and naso-orbito-ethmoid (NOE) alone or in combination. The lower third of the face is fractured, namely in the mandible.[4] The mandible is the second most frequently fractured bone after the nasal bones. The most common sites of mandibular fractures reported in the literature vary, although the mandibular angle and condyle are the most common.[2,4]

The diagnosis of a fracture should be based on the patient's clinical manifestations, history, physical examination, and radiological findings. Signs and symptoms of a fracture are a deformity in the form of swelling from local bleeding, which can cause deformity at the fracture site, swelling in the form of oedema, which can appear as an accumulation of serous fluid and extravasation of blood into the tissues, muscle spasm, which is an involuntary spasm as a result of the natural fixation of fragments, pain as a result of the fracture. Fracture fragments overlap and cause injuries around the fracture as a result of muscle spasms. Crepitus occurs as a result of friction between fracture fragments, a shock from a bone fragment can cause the tearing of blood vessels, which can result in shock. Fracture signs or symptoms can be divided into definite (definitive) fracture signs and uncertain signs. Signs of a definite fracture indicate that there is definitely a fracture, while signs of a possible fracture indicate that there is a possibility of a fracture but that further examination should be carried out.[5,6]

Maxillofacial fractures cannot be separated from head injuries because of their close proximity and structure. Patients with maxillofacial fractures are often accompanied by head injuries, such as intracranial hemorrhage and skull base fractures, and decreased consciousness, which can result in damage to the central nervous system.[7] Head injuries due to trauma are the main cause of death and disability. When an injury occurs, the brain can lose function even in the absence of a clinical injury to the head. The pressure that occurs on the head can be in the form of injury or a direct shock to the brain due to reflection against the inner wall of the skull cavity. Trauma can cause bleeding in the cavity around the brain, bruising of the brain tissue, or damage to the nerve connections in the brain.[8]

Emergency treatment for patients with multiple facial fractures is to perform irrigation and debridement of the wound under local anesthesia. Irrigation can use saline solution and debridement with the antiseptics povidone-iodine and/or chlorhexidine. Furthermore, suturing of the wound was carried out to stop bleeding, followed by reduction and fixation as an emergency measure for fractures.[9] Fixation procedures can be carried out with intermaxillary fixation (IMF) or maxillomandibular fixation (MMF) with arch bars, 4-point fixation, and mini plates. There are advantages and disadvantages to both fixation

methods. Closed reduction is safe for the vessels and saves money. IMF or MMF is a technique of immobilizing the mandibular segment by locking the occlusion externally, using the teeth as a point of stability.[10] The purpose of writing this case report is to report and discuss the emergency management of multiple maxillofacial fractures due to motorcycle accidents.

Case Reports

A 23 years old male patient came to the emergency room at Hasan Sadikin Hospital with complaints of facial and jaw injuries. One day before, the patient had an accident with a motorcycle, with his face hitting the asphalt first. Wearing a half-face helmet (+), being unconscious (+) for 30 minutes, nausea, vomiting (-), bleeding from the mouth (+), bleeding from the nose and ears (-). The patient was transported to a private hospital in the Soekarno Hatta area for wound cleaning, situational suturing, and electrolyte infusion. The patient was then referred to the Hasan Sadikin Emergency Room for further treatment. Alcohol consumption history (-)

Extra-oral examination revealed oedema and hematoma in the right orbital rim region, situational suturing in the right palpebral region, and lacerated wound in the right labia superior region, measuring 2x10x0.5 cm with irregular edges at the muscle's base (Figure 1)

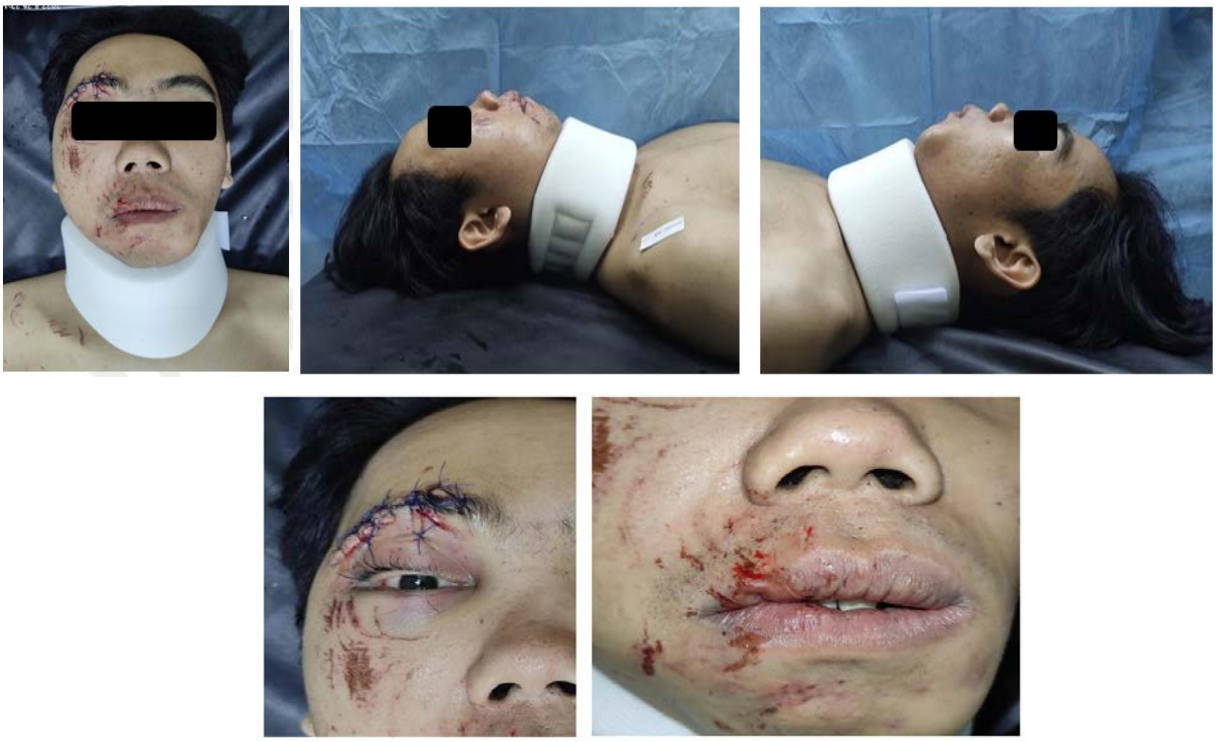

Figure 1: Extraoral oedema and hematoma in the right orbital rim region, situational suturing, and lacerated wound in the right labia superior region

On intra-oral examination, a lacerated wound was found in the left inferior labia region with a size of 1x0.5x0.5 cm and irregular edges of the muscle base, and lacerated wound in the gingival region of teeth 33-34 and teeth 46-47, size of 1x1x0.5; 1 x 1 x 0.5 cm and an irregular edge and bony base. There is a 1.5 cm mouth opening due to anterior crossbite occlusion (figure 2).

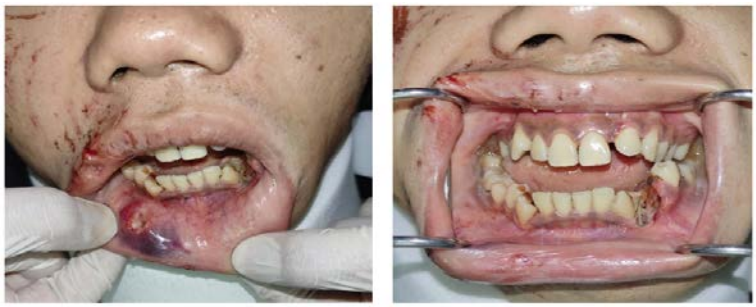

Figure 2: Intraoral examination, a lacerated wound is seen in the inferior labii region and left gingiva, and crossbite occlusion and anterior open bite

On CT Scan radiological examination, a soft tissue hematoma was seen in the frontotemporal area and right zygoma. Fracture of the right zygomatic bone involving the right orbital rim, fracture of the right maxillary bone with signs of right maxillary sinus bleeding and minimal pneumocephalus at the base of the skull, and bilateral mandibular fractures. There were no signs of intracranial hemorrhage or cerebral edema. No midline shift or signs of brainstem compression were seen (figure 3).

Figure 3: 3D CT scan showing multiple fractures of the zygoma, maxilla, and mandible

The diagnosis of this case is dextra zygomaticocomplex fracture (Tetrapod), maxilla fracture, dextra mandibular corpus fracture, and left parasymphysis fracture. Emergency management of the patient included wound debridement, extra oral resuturing, intra oral suturing, and temporary fixation of the fracture by placing a wiring arch bar on the maxilla and mandible (figure 4). Furthermore, the patient is planned for definitive open reduction internal fixation (ORIF) treatment.

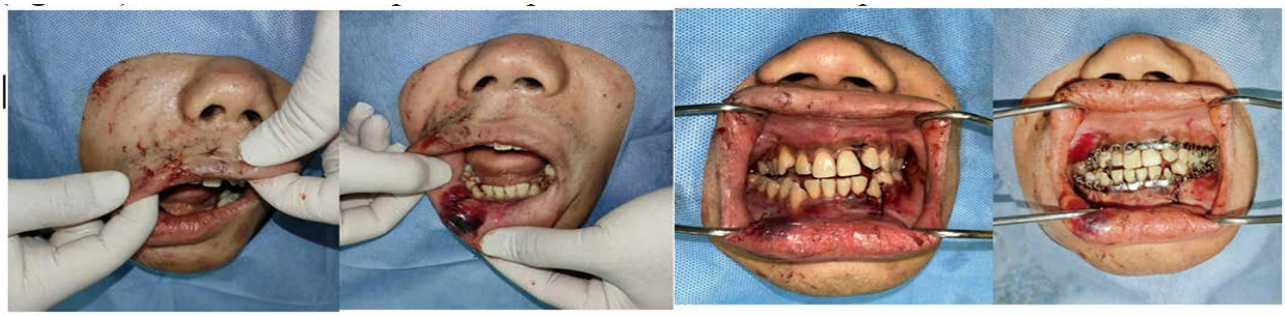

Figure 4: Soft tissue wound care and temporary fixation of arch bars in the maxilla and mandible

Discussion

The facial bones, including the mandible, form the maxillofacial area. The central area of the face is called the midface, which is surrounded by the frontal bone, paired zygomatic bones, and maxillary bones. About 30% of facial fractures involve the midface. This trauma is common in younger males, with zygoma fractures being the most common, second only to mandibular fractures. Many midface fractures are complex and more likely to be traumatized together. The Le Fort classification was developed to describe midface fractures involving the maxilla.[11,12]

A fast and careful clinical and supporting examination is needed to establish the diagnosis of fractures in the facial area and determine the general condition. The primary survey is a rapid and feasible physical examination designed to diagnose and treat the first life-threatening condition in any trauma patient. All patients were evaluated for anatomical and physiological disorders that could lead to premature death and morbidity. Addressing issues identified during the primary survey was started without delay before the survey was completed. The order of the primary survey is ABCDE: airway with cervical spine control, breathing with ventilation, circulation and hemorrhagic control, disability management (neurological), and exposure with environment control.[13,14]

The treatment of head injuries in the emergency room follows a set of procedures known as primary and secondary surveys. In this case, the patient's primary survey was clear, and the secondary survey revealed a deformity in the right femur. The initial presentation of soft tissue injuries can vary significantly in terms of severity, complexity, and accompanying injuries. Initial assessment should follow a systematic trauma protocol such as the Advanced Trauma Life Support (ATLS) program developed by the American College of Surgeons (ACS) Committee on Trauma (CoT) for accurate and rapid assessment of the patient's condition and injury, resuscitation, and transfer to a traumatic level. Higher maintenance if necessary. The primary survey focuses on evaluating the airway with control of the cervical spine, breathing with adequate oxygenation and ventilation, and circulation to ensure adequate tissue perfusion. Facial soft tissue injuries may be associated with obstructions to the airway requiring maneuvers or airway stabilization devices, intubation, or surgical airways. Injuries to the head and neck region can be associated with life-threatening blood loss, requiring proper homeostasis and resuscitation.[15,16]

Once the patient is stable, a secondary survey is performed with a thorough physical examination from head to toe to identify any anatomic injuries. This examination is obtained from a thorough history, including detailed information about the mechanism of injury, symptoms, allergies, medications, and medical history. Radiographs or cross-sectional images are obtained based on the primary survey to describe the specific injury better. Other considerations include the tetanus vaccine and prophylactic antibiotics for contaminated bites or wounds.[17]

In this case, the diagnosis was a dextra zygomatic complex fracture (Tetrapod), maxilla fracture, dextra mandibular corpus fracture, and left para symphysis fracture. This is based on the clinical picture of injury in the presence of a hematoma around the fracture fragment. In addition, it was strengthened by clinical examination in the form of palpation around the fracture fragment, which found crepitus. A 3D Head CT Scan examination was carried out to establish the diagnosis of hard tissue fractures on the face.[9] The zygomaticomaxillary complex (ZMC) is the primary support in the lateral midfacial region. The ZMC has a distinct shape compared to other parts of the midfacial area, so even a minor injury can result in a fracture.[18]

The management of mandibular fractures in the early stages is an emergency following ATLS (Advance Trauma Live Support) rules. It consists of an initial or primary survey, including examining the airway, breathing, blood

circulation, shock treatment or circulation, handling soft tissue injuries, temporary immobilization, and evaluation of possible injuries. The second step is the definitive treatment of the fracture. The goals of fracture management are to restore the occlusion and mechanical strength of the fracture area and achieve the normal function of the masticatory muscles. Fracture integration is one of the main targets for successful treatment besides occlusion. In trauma patients with mandibular fractures, attention should be paid to possible airway obstruction, which can be caused by the mandibular fracture itself or by intraoral bleeding leading to the aspiration of blood.[19,20] In all these cases, bleeding from the oral cavity should be treated immediately to avoid airway obstruction and shock due to the profuse bleeding.

Maxillomandibular fixation (MMF) or IMF is an essential and fundamental principle in managing and caring for maxillofacial trauma patients.[21] Early fracture immobilization reduces the risk of infection due to the high risk of bacterial contamination in maxillofacial fractures. Antibiotics should be administered to all maxillofacial fractures. Temporary immobilization, in this case, was immediately carried out with an interdental wiring arch bar. So that the stable bone fragments were not pulled posteriorly, which could interfere with breathing.[10]

Erich's arch bar is one of the most commonly used arch bars. These curved rods are connected to the hooks on the outer surface by a flat strip of malleable stainless steel metal, making them more effective, faster, and easier to repair. Bars are available in roll form. The rod is cut to the length of the dental arch, and this reduces soft tissue injury from protruding edges.[19] The arch bar technique for intermaxillary fixation takes approximately 40 to 60 minutes. This technique causes considerable trauma to the periodontium and adjacent soft tissues and is time-consuming. The patient cannot maintain good oral hygiene, and soft tissue ulceration may occur. Erich's arch bar wiring is quite good and stable in the emergency treatment of maxillary or mandibular fractures.[21]

Proper oral hygiene, both before and after surgery, is an essential treatment in managing maxillofacial fractures. Loss of the tissue barrier due to bacterial invasion due to maxillofacial fractures, loose or missing teeth, gingival tears, hematomas, edema, and interference with natural cleaning mechanisms will increase the risk of infection. Proper oral hygiene uses saline, peroxide, or medications (chlorhexidine gluconate). Increasing the frequency of brushing teeth should be socialized to patients and their families, and the use of pulsatile irrigation devices is beneficial for patients.[10]

Conclusion

Emergency treatment of multiple maxillofacial fractures due to trauma with wound care and the temporary appliance of arch bar fixation devices on the maxilla and mandible gives good results and makes it easier for definitive treatment. Arch bar wiring is easy to apply and adequately supports multiple jaw fractures for temporary fixation or indirect fixation in the treatment of closed reduction maxillary and mandibular fractures.

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