Keywords: Maxillofacial trauma; War injuries; Missile; Soft tissue injuries; Skeletal injuries

Introduction

War continues to be the best school for surgeons. Historically, military conflicts had provided significant opportunities for the advancement of trauma surgery [1]. Banks stated that missile injuries by their special nature have lessons applicable to the general understanding of facial trauma.

Maxillofacial region comprises a complex anatomical arrangement of bone and soft tissues. Contained within the face are systems that control specialized functions including seeing, hearing, smelling, breathing, eating, and talking. Also, the vital structures in the head and neck region are intimately associated. This complex anatomy makes missile injuries affecting this region one of the most complex and challenging problems facing surgeons. The importance of an oral and maxillofacial surgeon on the casualty team was proved in the Vietnam War when the medical care given to American soldiers in this war was outstanding [2-5]. The primary phase deals with survival of the patient by maintenance of hemodynamic and airway functions. In the intermediate phase, supportive care such as antibiotic prophylaxis and treatment of infection, control of bleeding, and tissue debridement are done. The third phase is the reconstructive phase [6-8]. Modern advances in military weapons have undoubtedly resulted in an ever increasing incidence of injuries in armed conflicts. However, the world’s major wars have produced many advances in the management and treatment of wounds. The introduction of a wide range of potent antibiotics, improved anesthetic techniques and better postoperative care has all added to greatly increasing the survival rate of casualties. Anbar is the largest province in Iraq in surface area (more than 1.5 million, forms western borders). Iraq in general and Anbar in particular became the world’s battlefield for terrorist attack to many civilians by different types of weapons including explosive cars, explosive belts, rifle bullets and handgun bullets. Every conceivable type of weapon has been used, which has resulted in the full spectrum of violent injuries. The severity of injuries ranged from simple facial laceration and dentoalveolar fractures of the jaws to injuries that are incompatible with life.

Patients and Methods

During the period from May 2003 to December 2010, a total of 518 cases were treated at Maxillofacial Unit, Ramadi Teaching Hospital and Department of Oral & Maxillofacial Surgery, College of Dentistry, Anbar University, Iraq. Total of (518) cases were chosen on the basis of them being only oral and maxillofacial injuries including 325 males and 193 females with age range from 8 to 75 years old.

Results & conclusions: Most cases were in the age group (20-29) years, 312 (60.2%) patients were injured with missile fragments, isolated soft tissue injuries were found in 56 (10.8%) while, skeletal injuries were found in 462 (89.2%), facial nerve injuries which found in 57 (11%) patients, 119 (40%) patients had mandibular fractures were treated conservatively and 179 (60%) patients were treated by direct skeletal fixation.

According to Stump et al. [9] Wounds were classified into penetrating, perforating, and avulsive wounds. Missiles were divided into high velocity rifle bullets, low-velocity missiles (includes handgun bullets, airgun, and shotgun), and fragments. Injuries were divided into isolated soft tissue wounds and skeletal injuries, the latter were further divided into mandibular fractures, mid-face fractures, and both mandibular and midface fractures. In emergency room, for all patients included in the study, a standardized case sheet form was made that includes: history, primary survey, life saving procedures, secondary survey, definitive treatment, intermediate phase, and rehabilitation. Patients in this study received immediate care According to ATLS approach to maintain or establish adequate airway, to monitor vital signs and to initiate an intravenous line. The facial structures of each patient were appropriately examined by radiograph and/or CT scan. Surgical priorities were then decided. All of the wounded received surgical treatment ranging from debridement and suturing to immediate reconstruction of facial structures. All surgeries were performed under general anesthesia through either intranasal or intraoral endotracheal tubes. Tracheostomies, whether emergency or elective, were made as indicated. Timing of primary surgery was decided according to many factors.
factors including: the need of a lifesaving procedure, patient’s general condition, past-medical history of the patient as well as the presence of associated injuries. Theater availability was a crucial factor in times of mass casualties. After considering all the previously mentioned factors, primary surgery was executed as early as possible to avoid infection. When patient conditions and circumstances allowed, definitive care of maxillofacial injury was attempted at the initial surgery. All patients were placed on systemic antibiotic cover that consisted of Metronidazole 500mg × 3 IV. And Cefotaxime 1g × 4 IV were used; tetanus prophylaxis was not available always in our hospital (Figure 1,2,3,4,5 and 6).

Results

Patient sample in this study composed of (518) patients, with age range from 8 to 75 years old; mean was 41.2 years old who were treated at Oral & Maxillofacial Surgery Department, College of Dentistry, Anbar university and Maxillofacial unit at Ramadi Teaching Hospital, Anbar, Iraq, including 325 males and 193 females. Most cases were in the age group (20-29) years (Table 1). Regarding type of missile; 312 (60.2%) patients were injured with missile fragments of explosive cars, explosive belts, mines, mortars, IED and grenades while patients were injured with bullets included 128 (24.7%) rifle bullets, 61 (11.6%) handgun bullets, and 16 (3.1%) airgun pellets. According to site of injuries, isolated soft tissue injuries were found in 56 (10.8%) while, skeletal injuries were found in 462 (89.2%) of patients including that mandibular fractures were found in 298 (57.5%) patients, while middle third fractures were found in 164 (31.7%) patients. Regarding the need for airway management 56 (10.8%) patients needed emergency tracheostomy under local anesthesia at emergency room and 17 (3.3%) patients needed tracheostomy because of critical postoperative period due to edema of the series had tracheostomy eventually. Only 23 (4.4%) patients were presented with active bleeding which would not stop without intervention including 6 (1%) patients had injury to great vessels. Overall Mortality was 2%. One of the mortalities was due to direct brain damage caused by the missile or due to complication involving CNS (brain abscess, meningitis).
Regarding treatment; In this study 56 patients had extensive soft tissue loss and was packed with Iodoform pack.

Regarding treatment of 298 patients of mandibular fractures; 119 (40%) patients had injuries to the neck (vascular, laryngotracheal, and neurogenic) and 19 (3.7%) patients had injury to the CNs and 5 (0.9%) patients had injuries to the lachrymal system.

Regarding treatment; In this study 56 patients had extensive lacerations and injuries of soft tissues as part of perforating and avulsive wounds that treated by primary closure where suturing was done in the treatment of comminuted fractures.

of multiple teeth that required suturing only and 8 (4.9%) patients were treated by packing maxillary sinuses with antrostomy for supporting comminuted orbital floor fractures, 59 (36%) patients were treated by suspension wires with IMF, 19 (11.6%) patients were treated using multiple transosseous wires approached through lacerations caused by the missile.

Discussion

Peter Banks [2] stated that bullet wounds are a feature of terrorist and guerrilla war while fragment injury from bomb explosions is the hallmark of conventional war and terrorist attacks. The distribution of types of missiles in the current study reflects the bizarre nature of the conflict taking place. Iraq has become the field of the third world war of terrorists for the last two years and the war is a combination of conventional war, civil unrest, crimes, and terrorism. The severity of these injuries depends on the type of missile site of injuries and the amount of soft tissue loss and bone destroyed. Classification of injuries is a useful procedure for the clinicians to communicate with each other by using a brief terminology rather than lengthy descriptions of injuries sustained. Classification should adequately describe the site, extent and nature of the hard and soft tissue injuries.

In high-velocity missile injury, large amounts of energy are transferred to the tissues of the body and result in massive injury to soft tissue and ablation of cortical bone. Airway disruption is significantly more likely after a high-velocity injury this demonstrated in the current study where high percent of patients who needed airway management were injured by high velocity missile.

Blunt injury survivors usually experience multiple injuries that are characterized by gross contamination. Our results confirm the importance of the secondary blast injury that sends objects flying through the air as well as imparting high velocity to the resulting fragments as the main wounding agent in survivors and the importance of looking for these injuries and cast a light on the changing trend in injuries caused by missiles characterized by the emerging incidence of multiple hits to multiple body regions in survivors. The first 24 hours from the time of injury is the most suitable time for primary closure and after that all wounds should be packed open. However, favorable blood supply to the face coupled with the fact that in the face the whole of the wound tract in most of the cases is available for surgical excision allowed primary closure of extensive lacerations in this study. Early operative repair of mandibular fractures and the reconstitution of the soft tissue position are critical in obtaining optimal aesthetic and functional results and it is important that the remaining segments of the mandible be held in an anatomic position throughout the period of soft tissue and bone reconstruction to limit the magnitude of the deformity therefore active treatment was undertaken for mandibular fractures cases including a closed reduction and indirect fixation was done in the treatment of comminuted fractures.

References


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