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Missile Injury In Maxillofacial Region

Amera Kh. Al-Kaisi[1] , Mahir Musfafa Abdul Hameed[2], Nather A. Rashied[3]

Abstract

Back ground: Various types of missile injuries were treated in AL-Kark General Hospital which include injuries in Maxillo_facial region.

Method :The patients Age, Sex,& residence were reviewed .Injuries oro_facial soft and hard tissues , injuries in other parts of the body and their incidence was also recorded.

Results : A total of 85 patients with various type of missile injuries were treated with in the period ranging from 26 March 2003 to 4 July 2004 successfully in AL-Kark General Hospital subspeciality ward, 34 patients 40%of all injuries were in maxillofacial region-Males predominated , 30 males ,91.76% against 4 females 8, 23%. Age group of 21-30 year was the commonest and the mean age was 33.3 years-Patients residence distribution was 20, 58.82% in ALKark side and 14, 41% in AL-Rusafa . Soft tissues of the mid face was mostly involved 15 patients 44.11%, while hard tissues were 19.55 ,88% distributed as follow :

The mandible was the most commonly fractured 8 patients ,32.52% .followed by zygoma 7 patients 20,58%.Maxilla was 2 patients , 5.88%, nasal bone was 1 patient and combined fractures (mandible +zygoma) was 1 patient ,2.94% While limb injuries was the most commonly observed fractures in other part of the body 39 patients ,45.88%.

Conclusions : In conclusion there is a high incidence of missile injuries which necessate an additional oral and maxillofacial centers at different locations in Baghdad to insure proper primary reconstruction of facial region to reduce subsequent disfigurment and morbidity.

[1] BPS, DQSJVlSc_OraL& Maxillofacial department

[2] Msc Operative Dentistry

[3] Msc Operative Dentistry.

Introduction

Missile injuries are alone in producing massive facial destruction. Gunshot wounds causes contaminated compound fractures of the jaw (1) . A higher proportion of overall injuries in the second world war caused by fragmentation missile than by bullet (2), though the facial region more prone to injured by the latter (3). In Vietnam much higher proportion of overall injuries were from rifle bullets . (4) All these injuries to the facial region have certain characteristics that set them apart from other wounds. Several studies were done to determine the incidence of maxillofacial injuries in war time and they found that it occupy 10-20% of all causalities. In Vietnam found to be 10,I%(5) .During the Six day Arab -Israeli conflict in 1967 Ben Hur (6) recorded the incidence of head and face which were 15% . Mandible was the most commonly seen fractures (7) -Age range found to be from 21 to 30 years and males were predominant (8) .This study is based on the data concerning those patients admitted in AL-Kark General Hospital Subspecialty ward in Baghdad from 26 March 2003-4 July 2004 who sustained missile injuries. Factors considered were Age, Sex .Residence, Injuries in maxillofacial region hard and soft tissues , injuries in other part of the body and their incidence to be evaluated & if there is a need for further maxillofacial centers in Baghdad.

Review of Literatures

Type of missiles: Porritt 1953 (2) analyzed the overall frequency of second world war wounds by various missiles as follow:

1-Fragmentation missile (mortar, aerial bomb, grenade shells)
2-solid missiles (bullets, antitank shells)
3-Land mines booby traps
4-Blast crush
5-Chemicai (phosphorous)
6-Other wounds

Maxillofacial injuries are more frequently the result of solid missile. Ctarkson etal 1946 (3) analysed 700 missile wounds of the face and jaw and he found 40% caused by mortar,30%shell,30% bultet and less than 5% from grenades, mines or aerial bomb. Anderews 1968(4) also found high incidence of bullets wounds among maxillofacial casualties in Vietnam.

Wounding characteristics of various missiles: The capacity to injure depends on the kinetic energy (KE) at impact . According to formula

$KE = 1/2 \text{ mass } X \text{ velocity}^2$

Terminal velocity is relatively more important than mass in determining the energy dispersed at the point, of impact.

Bullet velocity classified as

1-Low under l000feet/s
2-Meduium between 1000 and 2000 feet/s.
3-High above 3000 feet/s.

The effect of bullet on tissue:

When a bullet strikes bone, the kinetic energy is expended and transferred to the fragments which act as secondary missiles of much lower velocity , however not reproduced with in soft tissue .the impact of a bullet in living tissue transforms that tissue into secondary missiles which are thrown away from the passage of the bullet largely in radial direction. This produces a very short- lived temporary cavity in which pressure of up to 10.000 Kpa may occur for 5-10 ms(9)

Splashing effects: When high velocity missile hits the surface of the body which analogous to the upward splash produced when a pebble is dropped in to water.

Cavitation ; The size of temporary cavity is related to the elasticity of the tissues, Sometime the tissues are unable to contain the temporary cavity when the energy release is large and this accounts for the explosive nature of some ultra -high velocity wounds.

Effect of cavitation: There is a rush of air and contaminants into the cavity behind the missile. This is why gunshot wounds are dirty -They originally thought that the cavity remained full of air, it is now thought that there is rapid sealing- off of the tissue at the points of entry and exit as a result of tissue recoil .The dissipation of kinetic energy of the missile produces steam which is contained under pressure in the cavity. The pressure effects within the tissues mean that tissue damage extends well beyond the visible track of the missile .This combination of tissue death and contamination is highly favorable to bacterial infection specially by anaerobes such as CL- Weichii . The crucial factor in cavity production is the specific gravity of the tissue and dense cortical bone is the most severely damaged of any of the body tissue (10) . Actual ablation of part of the bone may occur after high velocity impact. The fragments fly out in to the temporary cavity but are sucked back close to parent bone. Lower velocity bullet produce marked comminution , with fragments spread at right angle along the wound track . The heat generated by high velocity missile is insufficient to sterilize it (11) , but may cause damage to susceptible tissue particularly blood vessels (12) . This may be the cause of primary and secondary hemorrhage , particularly as the elasticity of the blood vessels tends to protect them from damage by direct impact . High velocity bullet produce a small entrance and large exit wound .Ultra- high velocity bullet may produce a large entrance wound due to the splashing effect and may also produce massive damage as a result of explosion of the temporary cavity. Low velocity wounds tend to be associated with relatively minimal damage related to entirely to laceration and crushing effects (13).

Patterns of injury in the head and neck

1-Pentrating wounds ; Caused by missiles of low impact velocity in which small and ragged point of entry is found with the missile retained in tissue , caused by hand gun , most missile fragments slightly has tendency to fracture mandible.

2- Perforating wounds; Missile of high velocity passes right through the tissues with entrance wound comparable to size of missile exit wound is often considerable larger which may be healed before the casualty reaches effective hospital treatment [14]

3-Avulsive wounds; Massive wounds with avulsion and loss of tissue cause by high velocity missile or rapidly moving artillery or mortar fragments . Small entrance comparable to missile size .-Exit wound is usually gaping with large amount of tissue loss.

Site of wounds

2-Upper Face. The most serious which may involve the eye or the cranial cavity, if this happen there is risk of meningitis or permanent nerve damage to cranial nerves (olfactory nerve mostly).

2-Middlc Face. Traverse injuries may cause complete separation of maxillae from the base of the skull .Sever hemorrhage may occur from branch of the maxillary artery Bleeding in to the airway and repeated epistaxis can occur from damage to anterior ethmoidal artery .Tangential injuries in the midface frequently involve the parotid gland and may lead to parotid fistulae.

3-Lower Face. Injuries range from gross destruction of the lower face to simple mandibular fracture. Frequently the shock wave causes fracture of teeth.

Separation or avulsion of the mandibular symphysis disturbs the attachment of the tongue to the genial tubercles , when the level of consciousness is depressed in any way ,Ioss of tongue control and airway obstruction can occur. Transverse injuries at the mandibular angle in which missile passes through the base of the tongue cause much greater mechanical threat to airway. Gross swelling and bleeding from the tongue force the latter out of the mouth where mucosal drying exacerbate the situation. Tangential injuries to the lower jaw may accompanied by gross comminution or even loss of bone and soft tissue .Any loss of lip tissue sufficient to prevent effective sealing of the oral cavity gives rise to great discomfort and difficulty with feeding , as also do salivary fistulae from perforating wounds -Abullet passed through open mouth, transversed the oropharynx and exited via the neck behind the left shoulder, when the patient complained that fluids taken by mouth ran down his back.

Patients & Methods

A total of 85 records of patients who were treated in AL-Kark General Hospital subspecialily wards for their missile injuries in period between 26 March 2003 to 4 July 2004 were taken. Each patient's record was reviewed in respect to age, sex, residence, injuries of orofacial soft tissues and hard tissues, injuries in other parts of the body and their incidence was recorded.

Results

During the period under review 85 patients were treated, there were a total of 34 patients 40% of all injuries maxilloiacial cases (Tablel-4). The age range was from 9 years to 60 years with a mean age of 33.3 years and the most common affected age group was 21-30 years (Tabte 2-4). More than 3/4 of the patienls (30 patients 91.76%)
were male against (4 patients 8.23%) female, giving the ratio of 7.5 : 1 (Table 3-4). The patients residence was mostly in AL-Kark side ofBaghadad 20. 58.82% and 14, 41% in AL-Rusafa. The soft tissue of the midface was mostly involved(15 patients, 44.11%) ,wlule hard tissue injuries was (19, 55.88%) and distributed as follow : The mandible was the most commonly fractured bone(8 patients,32.52%) followed by zygomatic bone(7 padents,20.585%). Fracture maxilla was (2 patients,5.88%), nasal fracture was (1 palient,2.94%)and combined fractures mandible & zygoma was(lpatient,2.94%) as seen in (Table 4-4) while limb injuries was the most commonly observed fracture in other parts of the body(39 patients,45%) as shown in(Table 1-4).

Table 1-4 The Distribution of Patients by Site of Injury in all body(N=85)

Site of Ingury	Number of patients	Percentage %
Extermities	39	45.88
Maxillofacial	34	40
Abdomen	5	5.88
Neck	3	3.52
Combined +Maxillofacial	1	1.17
Chest +exteemity	1	1.17
Neck + extremity	1	1.17

Table 2-4 Age distribution of patients (N=34)

Age Range	Number of Patients	Percentage %
0-10	1	2.93
11-20	6	17.64
21-30	12	35.29
31-40	5	14.70
41-50	6	17.64
51-60	4	11.76

Table 3-4Gender Distribution of Patients (N=34)

Gender	Number of Patients	Percentage %
Male	30	91.76%
Femal	40	8.23%

Table 4-4 Distribution of Patients by Site of Injuries in Maxillofacial Region (N=34)

Site of Injury	*Number of patients*	*Percentage %*
Soft tissues	15	*44.11*
Fracture mandible	8	*23.52*
Soft tissues	7	*20.58*
Fracture Maxilla	2	*5.88*
Fracture nose	1	*2.94*
Zygoma + Mandible	1	*2.94*

Discussion

The distinct feature of injuries associated with explosives have been recognized since the invention of gun powder. Many of previous studies paid scant attention to ballistics. Ballistics is the science which is fundamental in understanding the characteristics of a particular injuries and subsequent treatment. In this study maxillofacial region compromised cleaner wounds with much less destruction, this finding in agreement with kassan 2000 who stated that head and face are most frequently injured in gunshot, but it is more than that found in Vietnam Tinder etal 1969 (10. 1%) . I attribute this to the destructive effect of modern day weapons used in this conflict . Age group of 21-30 years was the most commonly seen, the age of activities in agreement with owtotade etal 2004,or may be related to the military service personnel in Iraq range in age 18-30 years. Most patients were living in AL-Kark side of Baghdad, this is may be due to the location of the hospital understudy in this side of Baghdad. Almost all the individuals have varying degree of soft tissue injuries in form of clean laceration, contused lacerations ,abration .pentrating wounds perforating wounds, avulsive wounds—etc which were treated accordingly, the upper third of the face was most commonly observed ,this findings in agreement with previous studies by Maj sk etal 2004&0ginni 2002. The maxillofacial skeletal injuries ranged from isolated bone fractures to multiple hone fractures presenting contaminated compound fractures requiring extensive skeletal reconstruction.

Fractures was mostly seen in mandible which may be due to its prominancy , this finding in agreement with Awty cta) 1973. Zygoma was the second most commonly seen fracture. Associated injuries were seen in few patients. The importance of associated injuries in patients with facial injuries has been emphasized in previous reports from Nigerian Teaching Hospital where more than 20% had one form or the other Ugboko etal 1998 .

It is obvious from this study that missile injuries in maxilla_facial region occupy a bulk of injuries seen by AL-Kark General Hospital and since treating maxillofacial injuries require special training involving a hands on experience and restoring facial appearance with function, and due to the increase of lethality and injuring capability of modem day weapons, we suggest an additional oral & maxillo facial centers to be open at different locations in Baghdad in order to treat maxiliofacial injuries as soon as possible for best results. Attention should be paid for a good registry and to be done by rotators includes complete informations about patient & his injuries includes (patients age, sex , job , residence , place of accident. type of missile. site of injury, pattem of injury, investigations, treatment modalities& complications)for future studies and a proper treatment plane designing .

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