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MEDICAL LESSON FROM THE OPERATION IRAQI FREEDOM

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Summary

A critical prospective analysis was conducted for the missile injuries of the extremities in Basrah University Department of Orthopaedic Surgery at the time of operation Iraqi Freedom (20th of March – 20th of April 2003). The wounds were classified into four grades according to the severity of the injuries. Wound closure was performed primarily in 20 (16%), secondarily in 44 (35.2%) while skin graft was necessary for 36 (28.8%) patients. Although the transportation time was less than two hours, the injuries were severe because of the close proximity of shortening. Collapses of the old houses in Basrah were responsible for the associated closed or open injuries. Primary wound excision was insufficient in 37(27%) patient, this was related to the lack of experience by the junior staff, and was the reason behind the high incidence of wound infection which was recorded in 78 (56.93%) patients. Compound fractures were recorded in 66 (48.17%) patients, soft tissue injuries were noticed in 43 (31.38%), while amputation was the final outcome in 24 (17.5%) patients. The injurious agents were fragments of shell in 74 (54.01%), bullets in 34 (24.81%) while closed injuries were noticed in 12 (8.65%) patients. The fractures were immbolished by external fixation in 24 (9.48%), temporary internal splint in 13 (9.48%), gypsona in 29 (21.16%). The mortality rate was 4.83%. The infection rate and other complications could have been lower if war surgical principles were accepted and performed precisely in the management.

Introduction

Extremity wounds represent 65-70% of all wartime injuries of the survivors. The nature and mechanism of missile injuries have been extensively studies in many articles (Barach Eric et al, 1986, Boyer et al, 1997, Georgi Basil, 1991, Leibovin et al, 1996, Ragsdle Bruce D,1984).

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Basrah University Teaching Hospital (south of Iraq) was used as a front line hospital at the time of operation Iraqi Freedom receiving both military and civilian directly form the scene.

Missile incidents prove to be highly variable concerning scene settings, victims population and types of bullets and explosive charge properties.

Wound classification was suggested by some authors for easy identification and communication.

Primary closure of wounds was rejected by many authors (Quirinia Anne et al.1996, Ragsdle Bruce, 1984) but advocated by only few writers (Mericevic et al. 1997).

We have previous experience in handling missile injuries of the extremities for eight years at the time of Iraqi-Iranian conflict (Hamdan, 1995, 1987, 1988, 1998, 1993, 1999, Hamad et al, 1989, Hamdan 1987, Hull et al. 1996, Klein Richards, et al. 1975, Leiboviu Dan, et al 1996). So the previous lessons were relearned and a new fact arises which gave us additional experience.

The purpose of this study was to describe the pattern of injuries, to identify the problems associated with treating this type of injuries, and to suggest new wound grading.

Patients and Methods

This is a record of the Orthopaedic Department in one general hospital in Basrah over one month period (from 20th March –20th April 2003) at the time of operation Iraqi Freedom. The information was analysed for demographic details. Those who arrived dead were not included in the study.

Data retrieved also include age and sex distribution of the victims, location of wounds, casualty sorting out, early treatment and post operation complication.

The battlefield was less than 100 kilometer away from the hospital, then the distance became shorter and shorter every day, and finally we found ourselves in the centre of the battlefield. This short distance though makes the resuscitation procedure more effective, it does indicates that the injuries were very severe because of the short shooting distance.

All victims arrived to the accident and emergency department by ambulance within 2 hours after the injury. They were classified into three groups:

A- Wandering casualty:
Those with minor injure capable of serving themselves, kept aside for delayed treatment.

B- Fatally injured casualty:
Those with fatal injuries, no expectation of survival even after extensive rescucitation.

C- Seriously injured casualty:
Special considerations were given to this group, though they had serious injury, there was great hope in helping them. So they were given priorities in the treatment. They stayed for short period in the accident and emergency department for extensive resucitation and investigation, anti tetanus toxoid was not given as a routine, but all were given broad spectreum anti biotic (intravenously (ceftrioxane), narcotic analgesia and minor tranquilizer. Their wounds were classified into four groups according to the severity.

A- Minor:
Only soft tissue involvement, no bone, vascular or nerve injuries with or without metallic fragment retention.

B-Moderate:
Soft tissue involvement with undisplaced or drill fracture, but no vascular or nerve injury with or without metallic fragment retention.

C-Severe
Severe soft tissue involvement, severely displaced comminuted fracture, usually with a retained single or multiple metallic fragment, vascular, nerve injury or both of them.

Avulsive:
Extensive soft tissue damage, bone less, associated vascular or nerve injury or both single or multiple metallic fragment retention, sometimes the limb is attached by a skin tag only.

Operative procedure:

Consist of generous wound excision (better to avoid tornique and cautery), removal of all foreign bodies, in the wound pockets, copius irrigation by normal saline, fracture fixation by external skeletal, intra medullary metallic internal splint, or gypsoan depending on the type and site of fracture, repair of the associated vascular injuries. No primary repair for the tendon and the nerve, the skin was either closed primarily or left for secondary closure depending on the indication.

Results

The sex distribution was 96 (70.74%) male, 28 (20.43%) were female and 13 (9.98%) were children. One hundred and two (74.45%) were civilian living in the vicinity of the hospital, and 35 (25.54%) were military personnel.

The age of victims varied between 4-79 years.

The wounding agents were fragments of shell in 74 (54.0%), bullets in 37 (42.81%), grenades in 12 (8.75%), mines in 5 (3.64%). The bullets produced much more injuries than metallic fragments. Closed injuries following collapse of houses or fall were noticed in 12 (8.75%). Associated flame burn injuries because of the explosion were noticed in 12 (8.75%).

Because the hospital was very near to the battlefield most of the patients were seen in the hospital within 2 hours of their injuries. Some even were admitted within 15 minutes after injuries.

The shooting and explosion distance were not measured precisely but certainly it was very short, sometimes only few meters, and this may explain the high incidence of severe wounds and extensive damage.

Multiple injuries were noticed in 78 (56.93%) compound fractures were the dominant injuries, it was recorded in 78 (56.93%) while closed fractures were noticed in 5 (3.64%). Forty three (31.38%) had multiple soft tissue injuries. Hand injuries were recorded in 14 (10.21%) while 9 (6.56%) had foot injuries. Eight (5.82%) patients had bilateral limb injuries, 24 (17.51%) end up with amputation, either because the damage was beyond repair as noticed in 15 (10.94%) or the limbs were already amputated (attached only by skin tag), this was seen in 9 (6.56%) patients.

The associated injuries were vascular in 14 (10.21%), peripheral nerve in 9 (6.56%), abdominal injuries in 6 (4.37%) and facio maxillary in 5 (3.64%) patients.

Generous wound excision under general anaesthesia was performed to all patients with open injuries, but it was insufficient in 37 (27.00%) patients, so it was repeated by a more senior staff. This was the main reason behind the very high incidence of infection in this article which was up to 78 (56.93%).

In 22 (16.05%) the retained metallic fragments were removed at the time of initial wound excision which is the ideal time.

The wounds were minor in 12 (9.6%), moderate in 32 (25.6%), severe in 52 (41.6%) and avulsive in 29 (23.2%).

Fracture fixation was achieved by external skeletal fixation in 24 (17.51%) Which is the ideal method for fixation for war casualties.

Temporary internal metallic splint was used for fixing fractures in the upper limbs in 13 (9.48%), while gypsona was used for fracture fixation in 24 (21.16%).

Bone defects were noticed in 13 (9.48%) patients and it was left for secondary reconstruction. Delayed primary closure the ideal and standard method was performed for 44 (32.2%) patients, primary closure was performed for 20 (16.0%) patients, partial thickness skin graft using the open methods was necessary to close 36 (28.8%) wounds. 25 (20%) patients left having open

wounds because of a deep seated infection which does interfere with closure.

No complications were noticed with primary wound closure.

Table 1 demonstrates the site of amputation

Site	No.	%
Above the knee	9	6.5
Below the knee	7	5.10
Above the elbow	5	3.64
Below elbow	3	2.18
Finger	7	5.10

Discussion

Because of the short term follow up, the late complications can not be discussed in this article

Classifying the war wounded into wandering, fatally injuries and seriously injured patients helps to a great extent in identifying those who need urgent help and in making the ideal use of time when there is mass casualty. Bullet wounds (gunshot wounds) were much more severe than fragment wounds, this fact was also confirmed by Fackler 1984, and Georgi 1991, particularly when fragmentation or expansion occurs inside the limb (Padrta Jerry).

Missing injuries is expected at the time of mass casualties (Hamdan 1987), and in particular the closed injuries and nerve injuries, because open injuries draw the attention of the patient and the physician as well. So special search is mandatory for the closed injuries.

Severe wounds were the dominant type, this was related to the closed range of shooting or explosion which certainly induce more kinetic injury transfer to the limbs (Bowyer 1997). War wounds classification was suggested by Compland (1993), which is not easy to applied at the time of heavy casualties though it looks comprehensive, other wounds classification was suggested by Ordog (1993), which is complicated and not comprehensive. So the author suggest classifying war wounds according to the degree of severity into minor, moderate, severe and avulsive, this was easy and practical classification.

We found it very useful at this time in giving priority for operative interference and for the estimation of the degree of disabilities which is probably unavoidable following some war wounds (Hamdan 1993).

Aggressive exploration, liberal debridment and prompt removal of foreign bodies are the corner stones for the management and for avoiding complication.

No place for packing the wounds and for putting marker for identifying nerve ends, using tornique and cautery. Unfortunately wound excision was insufficient for 37 (27.5%) patient because it was done by inexperienced surgeon. Tika (1975), reported 25% incidence of incomplete excision. So war wound should be handled by those surgeons with good background and trauma surgeon are not always good war surgeon.

All metallic fragment should be removed at the time of initial wound excision if possible (Hamdan 1995), its removal induce pleasure to the patient and his family, and it is always easy to be removed initially because of patent tract.

The gold standard for wound closure is delayed primary closure, which is also applicable for ischemic wounds (Quirinia Anne et al 1996). But the author found that there is a definite though limited place for primary closure, particularly for closing amputation wound, this rule was applied for 20 (16.0%) patients with gratifying results. This is in agreement with Mericeric (1997). Proper selection is mandatory for primary closure, it should be done before 6 hours of injury by the hand of experienced war surgeon who can perform aggressive and generous wound excision. Open skin graft was found very

useful in closing skin defect, even in potentially dirty wounds. This incidence of amputation in this article was 17.5% while in Iraqi-Iranian conflict was 12.3% (Hamdan 1987), this obviously indicates a higher incidence but still it is lower than the incidence in the post gulf war explosive injuries in liberated Kuwait which was 29.9% (Bajec et al, 1993).

Associated vascular injuries is the major contributing factor for the high incidence of amputation particularly the missed or when repair was performed late (Hamad et al, 1999).

No traumatic amputation was noticed through joints, this is in agreement with Hull results (Hull et al 1996).

Guilotine amputation was not performed in our study and in the international red cross committee hospital because of closure difficulties (Coupland, 1992). Closure was either performed primarily or the stump was prepared for closure at the initial setting.

Seventy eight (56.93%) end up with infected wounds, this is obviously very high if compared with other studies which report a 22% incidence (Simchen et al, 1975). There is obvious direct relation between the infection rate and the length of time between injury and receipt of medical care and probably much more important is how generous and aggressive was the wound excision.

In our study, all the infected wounds were handled by unexperience junior staff who made incomplete wound excision. Infection was considered by Ordog (1993) as the second leading cause of morbidity in war injuries. Infection is always expected in war wounded patient because bullets or fragments of shell contaminated with bacterial inoculum prior to discharge remain contaminated with the same organism at the point of impact in addition to tisasue devitalization and disruption of the local circulation produced by the high velocity missiles.

The author agree with Klein (1975) suggestion which indicates that wound excision reduce the concentration of bacteria, remove dead tissue and increase blood supply. Strick adherence to war surgery principle will certainly reduce infection rate.

A crucial factor affecting the incidence of infection is that of time elapsed before hospitalization (Klein 1975).

Conclusion

1- A simple, practical and easy classification of the war casualties and the degree of severity for their wounds is mandatory and very useful.
2- There appear to be no substitute for proper surgical debridement, frequent dressing and drainage to combact infection, antibiotic may supplement but never supplant wound excision.
3- External skeletal fixation is the ideal method for fixing limb fractures in both upper and lowere limbs, but temporary intramedullary splint is also useful for fixing upper limb fractures.
4- There is some place for primary wound closure in the hand of the experienced war surgeon, particularly for closing the amputation site.

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