

Limbs Injuries caused by Terrorist Explosion in Kerballa

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Abstract:

Scourge of terrorist explosive attacks among Iraqi civilian population became one of the major health problems during the last three years. Terrorist use whatever available-illegally manufactured explosive devices.

On Jan-5th-2006 in the most crowded place in Kerballa- near holy Imam Hussein shrine (pace be upon him)- terrorist explosive attack happened leading to (184)victims, classified into three major group:

1. First group include 46(25%) fatalities
2. Second group include 72(39%) of moderate to sever injuries which needed admission. Injuries were distributed randomly over the body surface & were mostly located in the extremities (65%)
3. Third group include 66(36%) of very mild injuries treated as out-patients & discharged from emergency department.

The aim of this paper is to shed light upon 86 injured extremities for 50 patients of the second group. Depending on clinical signs of the wounds regarding its site, size & any association of active bleeding, nerve damage & fractured bones. Radiological examination used to determine the patterns of the fractures & to detect the site & type of projectiles used .

The characteristic multiple small penetrating wounds & radiological signs of small metallic balls proved that the explosive charge was designed to release thousands of pellets immediately on detonation. This pattern of wounds greatly differ from that caused by previous attacks in Kerballa, using screws, nuts, nail & other irregular shape projectiles.

The results showed that the pattern & severity of extremities injuries inflicted by explosion is directly related to the composition & shape of wounding agents used in addition to its velocity & range.

Key words: Kerballa, Limb injuries, Terrorist explosion.

Introduction:

Scourge of terrorist explosive attacks among Iraqi civilian population became one of the major health problems during the last three years. Terrorist use different illegally manufactured explosive devices.

The patterns of extremities injuries following such explosive are a product of the composition & amount of materials involved, the distance between the victims & the blast & any intervening protective barriers.

On Jan -5th -2006, in the most crowded place in Kerballa near holy Imam Hussein (peace be upon him) , terrorist explosive attack occurred using explosive charge which released thousands of small metallic balls (pellets) which is used as ammunition for shotgun.

The attack leading to 184 victims, including fatalities & different degree of injured survivors.

Limbs injuries of the admitted injured patients were studied regarding the patterns of entrance & exit wounds & radiological examination for the detect the fractures patterns & the missiles type.

The results compared with limbs injuries caused by previous explosion occurred on Dec- 15th – 2004 in similar place in Kerballa but the wounding

agents were screws, nuts, nails & irregular shape missiles.

Patients & method:

The research was limited to a total identified injured extremities for admitted multi-system injured patients due to explosion occurred on Jan-5th 2006.

The extremities examined clinically for site, size of entry & exit wounds & any association of active bleeding, signs of vascular or nerve injuries, & fractured bones.

X-rays used to identify the patterns of the fracture & to detect the type of missiles used.

The results compared with results of extremity injuries caused by explosive on Dec-15th-2004 in similar place in Kerballa.

Results

Mortality and Morbidity

(184) victims reached to Al-Hussein general hospital & classified into three major groups: (Table No.1)

(1) first group (46) (25%) cases of death occurred within first hour due to deadly wounds in the chest, abdomen & head.

(2) Second group (72) (39%) patients of moderate to sever injuries admitted to the hospital.

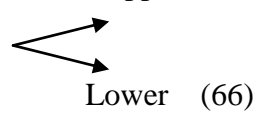
more of small superficial wounds & they discharged from casualty department.

(3) Third group (66) (36%) patients with single or little

Table No-1- showed the mortality & morbidity

	Jan.5 th 2006	Dec-15 th 2004
(1) Fatal injuries (Dead cases)	64 (25%)	10 (18%)
(2) Moderate – sever injuries (Admitted cases)	72 (39%)	29 (53%)
(3) Mild injuries (Discharged cases)	66 (36%)	16 (29%)
Total victims	184	55

Anatomical distribution of injuries (Jan.5th 2006) (Table No. 2)

A. Head (12)
 B. Chest (9)
 C. Abdomen (25) upper (20)
 D. Extremities (86) 
 Total (132)

Dec-15th-2004

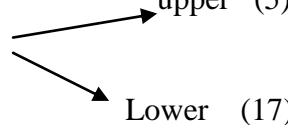
A. Head (6)
 B. Chest (5)
 C. Abdomen (7) upper (5)
 D. Extremities (22) 
 Total (40)

Table No-2- showed the age, sex, and anatomical distribution of the wounds.

	Jan.5 th 2006	Dec-15 th 2004
(1) Age:		
(a) less than 15-years	12	3
(b) 15-50 years	51	25
(c) above 50 years	9	1
(2) Sex:		
(a) Male	(75%)54	(82%)24
(b) Female	(25%) 18	(18%) 5
(3) Anatomical distribution of the wounds		
(a) Head	12	6
(b) Chest	9	5
(c) Abdomen	25	7
(d) Extremities	86	22
(Upper)	20	5
(Lower)	66	17

Pattern of wounds in the extremities (Jan.5th 2006)

- 1. Small penetrating wounds (less than 5mm) 72(84%)
- 2. Moderate crush or cut (between 2-5 cm) 12(14%)
- 3. Sever crushing wounds & soft-tissue loss 0 (0%)
- 4. Blunt trauma 2 (2%)

On Dec-15th-2004

- 1. Small penetrating wounds (less than 5mm) 5(23%)
- 2. Moderate crush or cut (between 2-5 cm) 7(32%)
- 3. Sever crushing wounds & soft-tissue loss 8 (36%)
- 4. Blunt trauma 2(9%)

Anatomical distribution of fractured bones (Jan.5th 2006) (Table No. 3) Radiological

examination revealed (22) fractured bone (25%) distributed as follow:

- A. femurs (5)
- B. leg (tibia &\or fibula) (13)
- c. Metatarsal (1)
- D. hummers (1)
- E. forearm (2)

On Dec -15th – 2004

- A. femurs (2)
- B. leg (tibia &\or fibula) (6)
- c. Metatarsal (1)
- D. humerus (1)
- E. forearm

Table No-3- showed pattern of wounds, anatomical and pattern of fractures.

	Jan.5 th 2006	Dec-15 th 2004
(1) Pattern of wounds		
(a) small wounds	72	5
(b) moderate	12	7
(c) sever wounds	0	8
(d) blunt trauma	2	2
Total	86	22
(2) Anatomical distribution of fractured bones		
(a) lower limbs	19	9
(b) upper limbs	3	3
Total	22	12
(3) pattern of fractures (Gastilo classification)		
Type -1-	18	3
Type-2-	4	3
Type-3-	0	6

Pattern of fractures (Gastilo classification)

On Jan.5th 2006

Type 1:	18	82%
Type 2:	4	18%
Type 3:	0	0 %

On Dec -15th – 2004

Type 1:	3	25%
Type 2:	3	25%
Type 3:	6	50 %

Injuries of other structures in the extremities (4)

A. vascular injuries (3)

B. nerve injuries (1)

Discussion

In Iraq the risk of terrorist explosive attacks increased during the last three years, using a different illegally manufactured antipersonnel weapons. The pattern of extremity wounds depend on composition & a mount of materials involved, the distance between the blast & victims & any intervening protective barrier.⁽¹⁻²⁾

So for proper management, it is important to get information a bout the type of explosion & agents involved. When information is not available, clues from clinical & radiological examination may be very helpful.

On Jan-5-2006, a terrorist explosive attack happened in the most crowded place, near the holy Imam Hussein shrine

(peace be upon him) leading to 184 victims. Clinical & radiological signs of the survivor injured patients, indicate that the explosive charge was designed to release thousands of small metallic balls (pellets) – that is used in the shotgun - traveling in all directions. This conclusion confirmed by surgical extraction of a number of these pellets. Each one is made of steel & about 5 mm in diameter with one gram weight.

The tissue damage induced by the particular missile is largely attributable to its shape, mass & impact velocity. The kinetic energy of a missile is defined as the mass of the missile multiplied by the square of it velocity ($KE = 1/2 MV^2$)^(3, 4).

The distance between the point of burst & victims could not be established accurately, but information obtained from

patients or from bystanders, & accordingly we can categorize the victims into three major groups:

1. At close range (about 5-8 meters) the wounds were fatal & characterized by massive tissue destruction as seen in most of the 46 (25%) cases of death in the first group. We think the cause of death was the large mass of pellets imparts an extraordinary quantity of energy⁽⁵⁾ to the tissue which produce massive tissue destruction in an addition to primary effects of the blast over-pressurization wave⁽¹⁻²⁾.

2. At large range (more than 10-12 meters) and because of lighter fragments loss velocity more rapidly⁽⁴⁾, the individual pellets lack the kinetic energy needed to penetrate beyond subcutaneous tissues that make the injuries of 66 (36%) patients were simple superficial wounds mostly located in the lower limbs . These patients treated as outpatient & discharged from casualty department after applying dry sterile dressing & given oral antibiotics with analgesia.

3. At moderate range (around 8-12 meters) the injuries were mostly non-fatal multisystem required hospitalization. The flying pellets penetrated structures beneath the deep fascia & reached to different structures of the body as seen in the second group 72(39%) admitted patients(see table No.1). 86 injured extremities for

50 patients of this groups (see table No.2) were studied clinically & radiologically .

(A) The skin damage in form of relatively clean small size (4-5 mm in diameter) penetrating wounds found in 72 (84%) extremities. In 12(14%) wounds was relatively moderate crushed or cut & needed simple excision under G.A. There was no active bleeding except in three cases with vascular injuries (one femoral A, one femoral vein & the third was brachial A .).

There was no any case with traumatic amputation or severe crushing wounds as well as no case complicated with compartment syndrome. These types of wounds usually similar to that occurred by shotgun in moderate ranges (3-7 feet)⁽⁵⁾. A terrorist explosion occurred in similar place in Karballa on Dec-15-2004- in which the flying agents were screws, nuts, nails & other variable size irregular shaped shells – produced moderate & severe crushed wounds in (68%) of cases. Exploration & extensive wound excision was necessary. (B) X –ray revealed 21(24%) fractured bones (see table No. 3) & this similar to incidence of shotgun injuries (23%)^(3, 6).

Open fractures are usually classified (Gustilo classification)⁽⁶⁾ into:

Grade I : a small , clean wound with little soft-tissue damage.

Grade II: a wound longer than 1 cm, but with only moderate soft-tissue damage.

Grade III: a large wound with severe soft-tissue damage & contamination .

All cases of the fracture considered as type (I or II) and treated by conservative method (pop cast) except four cases of fractured femurs needed internal fixation.

External fixation – usually used for treatment of fracture with sever soft-tissue injuries^(6,7) - did not used in these patients. In contrast to cases of Dec-15-2004 six cases (50%) were highly indicated for external fixation.

Presence of pellets within the fracture site or in the soft-tissue in 38(44%) cases identified by radiograph, because of low kinetic energy of pellets which was not enough to pass out side of the body .

(C) It is impossible to remove all the pellets, to do so wound result in unacceptable damage to an injured soft-tissue⁽³⁾. Surgical removal of pellets were done in six (7%) cases, (3) during wound excision, (2) subcutaneous pellets, removed under L.A & the last one was within the fracture of femur, removed during operation for internal fixation .

Infection of this type of wound is rare ⁽⁷⁾ . The wounds of all our patients were healed without infection. The risk of infection in the grad (III) is over (10%)⁽²⁾ as seen in many cases of casualties of Dec-15 – 2004, that necessitated multiple wound excision & parentral antibiotic for longer period .

Conclusion

The severity of limbs injuries due to explosion is directly related to the mass and shape of wounding agents in addition to its impact velocity.

Explosion releasing pellets cause more benign limb injuries among the survivors because of its small mass & smooth rounded shape.

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