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ASSOCIATION OF MINE BLAST INJURY WITH RADIOOPAQUE FOREIGN BODY ON RADIOLOGY AND ASSESSMENT OF THE SEVERITY AND AREA INVOLVED

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ABSTRACT

Objective: To determine the association of mine blast injury with radio-opaque foreign body on radiology and assessment of the severity and area of body involved.

Design: Observational study.

Place and Duration: The study was conducted at CMH Quetta and included cases over a span of one year from Aug 2005 to august 2006.

Patients and Methods: 28 cases which had antipersonnel land mine injuries were taken at random from record and their x-rays were analyzed for radio-opaque material in the filed up imaging films and area of the body involved and severity was grouped.

Conclusion: Landmine blast injury is associated with metallic radio-opaque foreign body on radiology. In this small study about 82 percentage have radioopaque material and majority were less than 10 mm. 60.7% percentage had severe injuries with fractures and amputation and major exploration was required. More than 50% involved combined injuries to limb and torso.

Keywords: Mine blast, antipersonnel land mines, radiology

INTRODUCTION

Explosions have the capability to cause multisystem, life-threatening injuries in single or multiple victims simultaneously. These types of events present triage, diagnostic, and management challenges for the health care provider. Explosions can produce classic injury patterns from blunt and penetrating mechanisms to several organ systems. The extent and pattern of injuries produced by an explosion are a direct result of several factors including the amount and composition of the explosive material (e.g. the presence of shrapnel or loose material that can be propelled, radiological or biological contamination), the surrounding environment (e.g. the presence of intervening protective barriers), the distance between the victim and the blast, the delivery method (if a bomb is involved), and any other environmental hazards. No two events are identical, and the spectrum and extent of injuries produced varies widely [1]. Antipersonnel mines have disabled individuals, handicapped families, and mutilated entire societies. Their effects are widespread and continue long after a conflict has ended [2]. The treatment of amputees from antipersonnel blast mines makes greater demands on hospital resources, blood supplies, and long term rehabilitation (including the fitting of artificial limbs, vocational training, and social reintegration) than does that of other war wounded, including those injured by fragmentation mines.

The purpose of this study was to determine the association of mine blest injury with radio-opaque foreign body on radiology and assessment of the severity and area of body involved.

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Table-1: Detail of severity in groups and shows the area involved

Area	Radio-opaque	Multiple or single	Nature of injury and region Grossly and splinter size in mm	Severity Group
2	Present	Multiple	Face,neck and Lt Eye. 2 to 1mm	1
3	Not present	-	Chest, both arms and left thigh. 2 to 3mm	1
3	Present	Single	Extrapeirtoneal bladder injury. 2/6mm	2
3	Present	Multiple	Foot bone fracture right.4/12mm Perineum .3/5 mm Both legs .8/6 mm	2
3	Not present		Face injury. Lt hand amputation	2
3	Present	Multiple	Rt leg amputation. 4/7mm	2
1	Present	Single	Left Leg .2/5mm	1
1	Not present	-	Bil leg fracture.	2
1	Not present		Rt leg injury	1
3	Present	Multiple	Face and shoulder injury, fracture hand bones. 2 to 4mm	2
3	Present	Multiple	Left shoulder. 2/4mm 3/5mm	1
3	Present	Multiple	Foot amputation. 4/5mm.Pelvis. 4 /6 mm. Hip. 5 /7 mm. Rt hand. 4 /5mm	2
1	Present	Multiple	Both knee joint. 3/ 5mm	1
3	Present	Single	Foot and calcaneal injury with fracture. Forearm fracture.2/3mm	2
3	Present	Multiple	Neck and spine .3/5mm 6/mm Left elbow .3/6mm.Tibia rt. 3/3	1
3	Present	Multiple	Rt foot amputation. 3/3mm	2
1	Present	Multiple	Bil limb fracture amputation rt foot. 3/7mm	2
1	Present	Single	Scalp. 2/3mm	1
3	Present	Multiple	Chest .2/3mm and 4/6mm.Leg .4 /4mm Fracture femur below knee amputation Rt	2
2	Present	Single	8/15mm. face involvement.	1
2	Not present	-	Injury face	1
3	Present	Multiple	Chest back and rt knee.3/4mm	1
3	Present	Multiple	Amputation left leg face and eye injury .3/4mm	2
2	Present	Multiple	Traumatic amputation both feet .3/7mm	2
2	Present	Multiple	Traumatic amputation left leg with fracture left hand. 4/7mm	2
2	Present	Multiple	Fracture both legs 2/3mm	2
1	Present	Multiple	Fracture both legs 3/9mm	2
3	Present	Multiple	Chest wall loss with multiple injuries abdomen and rt arm3/6mm,7/4mm	2

PATIENTS AND METHODS

This observational study was conducted in CMH Quetta. In this study 28 cases were taken over a span of one year at random form record and their x-rays were analyzed for radio-opaque material in the filed up imaging films. All land mine injuries were included who had reported to the hospital as referral alive. Patients with bomb blast and other gunshot and splinter injuries and those brought in dead were excluded from the study. All those cases of landmine blast injuries were included in which radiological films were available in record. All patients were male because this is a predominantly serving personal referring hospital. Area of the body involved was divided into three groups

Group-1 involved isolated injury to any of the limbs including arms or legs.

Group-2 involved isolated injury to torso and face area.

Group-3 involved above two groups in combination.

Description of injury was divided into two categories according to severity

Group-1 included mild to moderate injuries to soft tissue, including lacerations,

contusions and musculcutaneous penetrating injuries.

Group-2 involved fractures (severe injuries) with loss of limb, or who had abdominal and chest injuries requiring major surgery.

RESULTS

Total no. of 28 cases was included. All were male and average age was 26, with a range from 21-36 years. (table-1) gives the detail of severity in groups and shows the area involved. Radio-opaque images were present in 23 cases (82.14%) and absent in 5 cases (17.86%) as in (fig. 1).

Single radio-opaque image was seen in 5 cases out of 23 comprising 21.74%. Multiple radio-opaque images were in 18 cases (78.26%).There was no association with number and size with nature of injury and majority were less than 10 mm in size.

As far area of the body was concerned, Group 1 (involved isolated injury to any of the limbs including arms or legs) injuries were 8, Group 2 (involved isolated injury to torso and face area grossly) had 5 and Group 3 (involved above two groups in combination) had fifteen injuries (fig. 2).

Description of injury was divided into two categories according to severity Group one (mild to moderate injury to soft tissue, included lacerations contusions and musculcutaneous penetrating injuries) included 11 patients. Group two (fracture, severe injuries with loss of limbs or who had abdominal and chest injuries requiring major surgery) had 17 patients (fig. 3). About 64.28% percentage had severe injury. Single splinter image was seen in five cases out of 23 (21.7%). (fig. 4-7) shows some of severe group 2 injuries. The p value for presence of radio opaque images in our study was <0.05.

DISCUSSION

An antipersonnel landmine is placed under, on or near the ground or other surface

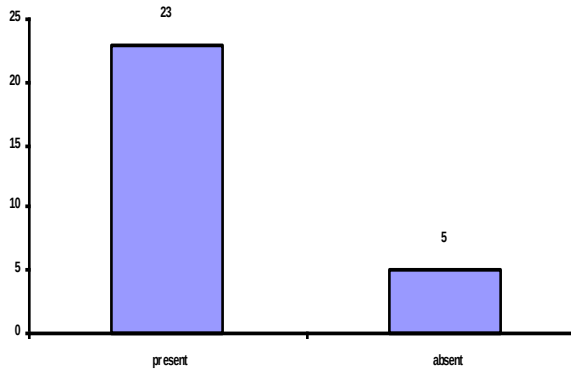

Fig. 1: Distribution of presence of radio-opaque material.

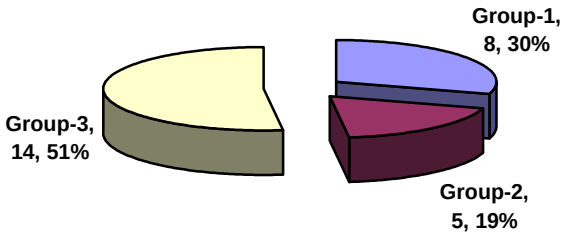

Fig. 2: Distribution of area involved

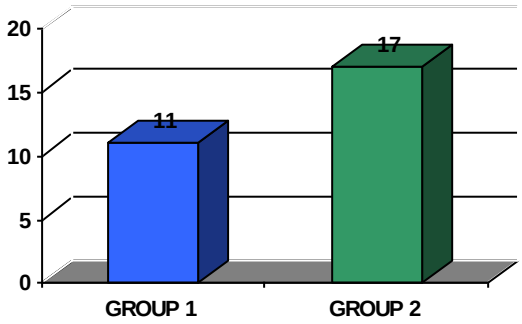

Fig. 3: Distribution of severity

Fig. 4: Mine blast group 2 severe injury

area and designed to be detonated by the presence, proximity or contact of a person. In many parts of the world, undetonated military incendiary devices such as land mines and hand grenades contaminate the sites of abandoned battlefields. During wartime, injuries arising from explosions frequently outnumber those from gunshots with many innocent civilians becoming victims. Events are identical, but the spectrum and extent of injuries produced varies widely [3].

A primary blast injury is caused solely by the direct effect of blast overpressure on tissue. Air is easily compressible, unlike water. As a result, a primary blast injury almost always affects air-filled structures such as the lung, ear, and gastrointestinal (GI) tract. A secondary blast injury is caused by flying objects that strike people. A tertiary blast injury is a feature of high-energy explosions. This type of injury occurs when people fly through the air and strike other objects. Miscellaneous blast-related injuries encompass all other injuries caused by explosionsb [3]. A patient may be injured by more than one of these mechanisms. Some mines can tear off a person's foot or leg as in (fig. 6,7). The explosion is so strong that it forces bits of bone, metal, stones, even parts of the person's shoe to stick in their flesh. Sometimes the explosion is strong enough to kill a person immediately: if not, it is always necessary to amputate. Another kind of mine is filled with small pieces of metal. These mines usually have a wire attached to them. If someone walks into the wire, the mine explodes. The damage can be terrible. For example, the mine can shoot hundreds of steel balls in one direction: if you are close to it, the balls can tear your body to pieces and there will be nothing left [1].

The surgery that is necessary to amputate the limb of a landmine victim is very difficult and it takes a long time because there is so much dirt in the wounds. Landmine injuries often need several operations because of infections. An estimated 110 million land mines scattered in 64 countries continue to terrorize people and destroy human lives long after wars and fighting have ceased [5]. A Committee of the Red Cross has arrived at an estimate that 24,000 people are killed and wounded per year on average world wide

Fig. 5: Mine blast group 2 severe injury

Fig. 6: Mine blast group 2 severe injury

Fig. 7: Mine blast group 2 severe injury of Rt foot

due to landmines [6]. In Afghanistan, approximately 5-7 million landmines are scattered throughout the country [4]. During 2000-2001, Afghanistan had the highest number of reported landmine and UXO casualties in the world [7]. The International Committee of the Red Cross (ICRC) has surgically treated 49,946 war wounded from all sides of the Afghan conflict. Two hospitals were established in Peshawar (1981) and Quetta (1983) on the Afghan border of Pakistan and inside Afghanistan in Kabul (1988). One quarter of all war wounded were injured as a result of antipersonnel mines. In the ICRC hospital Peshawar, 48% of all war wounded in the last year were injured as a result of mines [8]. Injuries of the musculoskeletal system are the most common type of wounds seen in modern warfare, accounting for 60% to 70% of all wounds [9]. In our study more than 60% had severe injury. Hull analyzed the nature of forty-one traumatic amputations in twenty-nine servicemen who had survived to reach medical care after sustaining blast injuries. He found that, in the lower limb, the prevalence of traumatic amputation was significantly higher at the level of the tibial tuberosity than at other sites. In the upper limb, there was a tendency for the traumatic amputation to occur through its distal portion, but this tendency was not significant [10]. In our study more than 50 % involved limb with torso. Majority of the amputations were of lower limb. Metallic foreign material indicates the type of weapon and the depth of penetration, while the absence of metallic fragments usually indicates a through-and-through wound and the need to search for an inconspicuous entry point. Alternatively, foreign material such as shoe leather, dirt, and plastic casing fragments may not be radiopaque but still may be associated with severe injury [11]. In our study 82% had radio-opaque image. One of the X-ray chest is shown in (fig. 8).

Fig. 8: Radio-opaque material seen in chest radiology

CONCLUSION

Explosions have the capability to cause multisystem, life-threatening injuries in single or multiple victims simultaneously. These types of events present complex triage, diagnostic, and management challenges for the health care provider. Landmine blast injury is associated with metallic radio-opaque foreign body on radiology. In this small study about 82 percentage have radio-opaque material and majority were less than 10 mm. Sixty two percent of the patients had severe injuries with fractures and amputation and needed major exploration, and more than 50 percent involved combined injuries to limb and torso. For a country the presence of mines causes a serious environmental, social, and economic burden, and for the victims, continued tragedy not only for their families but also the whole country for many years to come.

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