INJURIES AND FATALITIES RESULTING FROM THE 2005 SOUTH ASIA EARTHQUAKE. A HOSPITAL EXPERIENCE

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ABSTRACT

Background: The South Asia quake struck South Asia with its epicentre in Pakistan on 8th October 2005, originating from a previously recognized fault line but of unsuspecting magnitude of death and destruction. The Earthquake measured 7.6 on the Richter scale and caused massive loss of life and extensive damage to property never seen before in the history of Pakistan.

Methods: Earthquake related admissions and deaths to one of the two major tertiary care hospitals receiving casualties from the quake zone from 8th October 2005 through 1st November 2005 were analysed. All medical data from the hospital records was reviewed for quake related injuries and information about pattern of injuries received and treatment administered.

Results: A total of 3128 earthquake related admissions were recorded in the hospital with 39 in-hospital deaths. Admission rates were approximately 2:1 by gender, males affected more.

Conclusion: Earthquake related injuries are varied and multifactorial. Comprehensive surveillance and a well developed plan for all Medicare setups need to be in place and when actively rehearsed, can help lead to better management preparedness.

Keywords: Earthquake injuries, mass casualties, management

INTRODUCTION

Earthquakes are the most impulsive and one of the most severe forms of natural disasters. An average of 16 earthquakes leading to many fatalities occur throughout the world each year, with many more leading to injury and property damage [1]. These disasters strike quickly and without warning leaving little time for action as regards immediate management. During the past 20 years, natural disasters have claimed more than 3 million lives worldwide [2] .On Eighth October 2005 at 8:52:38 a.m. Pakistan Standard Time, an earthquake measuring 7.6 on the Richter scale struck South Asia. The impact being on Pakistan's northern Himalayan region. Its activity was felt across the upper country and into India and westwards into Afghanistan as well. Its effects were immediate with devastation of a magnitude, never seen before in the history of Pakistan. The total damage is estimated to be more than 6 billion dollars with extensive loss of life and disability of a whole generation living in the region. Epidemiologists have suggested that enumerating the incidence and pattern of injury is important in the development of preventive measures [3]. Association between injuries and seismic intensity, building characteristics and the activities of individuals are hypothesised but even then, estimates are rare [4]. The reason for this descriptive study was to identify and describe all injuries and fatalities brought to one of the two principle draining hospitals during the immediate aftermath of the tragedy.

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Table-1: Age and gender distribution.

Age group	0-9	10-19	20-39	40-59	60-79	80+	Male	Female
n=3128	253 (8.1%)	277 (8.9%)	1934 (61.8%)	603 (12.3%)	57 (1.8%)	04 (0.1%)	2087 (66.7%)	1041 (33.3%)

METHODS

Hospitalized injuries were defined as all those cases actually brought to this hospital and given treatment for injuries resulting from the earthquake and its immediate physical consequence i.e. falling buildings from eight October 2005 through 1st November 2005.

Fatal injuries were those which resulted in the death due to trauma sustained during the quake and were either brought dead on arrival or died during admission.

Hospital records were reviewed and data retrieved regarding the spectrum of injuries, fatalities and treatment given to such victims. The frequency distribution was then listed and analysed.

Data had been entered in SPSS ver-10.0. Descriptive statistics i.e percentages and rates were used to describe the data.

RESULTS

A total of 3128 patients were hospitalized during the period of study. Two thirds (67 %) of all admissions were male reflecting the general trend in injury figures. The highest causality figures were in the 20-39 year age group making nearly 62% of all admissions (table-1). 17% of the admissions were in the 0-19 year age group, this figure being actually much higher as most of the younger people were at the time at educational institutions and were unfortunately buried alive mostly to their deaths. The male: female ratio being nearly 2:1. The first week was the most hectic in terms of endurance and resources at the hospital level receiving 2127 (68%) patients, the figures dropping to 24% during the second week (fig. 2). There were 39 (1.2%) deaths in the hospital and 182 (5.8%) were brought in dead. The main General Surgery workload is as shown in (table-2). A total of 56 amputations were performed. This relatively high number was mostly as a result of Ischemic gangrene, Gas gangrene and Mangled extremity all beyond salvage (table-3) (fig. 3,4) as the affected were mostly in the mountains and evacuation took a lot of time. The main roads had been wiped out and air evacuation was limited initially due to unavailability of helicopters and help from the international community was paramount

Table-2: Surgical procedures undertaken (n=2153).

General surgery operative workload (n=1364) (63.4%)	
Laparotomy	59 (4.3%)
Debridement	645 (47.3%)
Amputation	56 (4.1%)
Fasciotomy	28 (2.1%)
Wound Excision	526 (38.6%)
Chest Intubation	7 (0.5%)
Suprapubic Cystostomy	14 (1.0%)
Tracheostomy	7 (0.5%)
Incision/Drainage	5 (0.4%)
Misc	17 (1.2%)
Orthopaedic workload (n=576) (26.8%)	
Dynamic Hip Screw	31 (5.4%)
Austin Moore Hip Prosthesis	1 (0.2%)
Hip Spica	6 (1.0%)
Interlocking I/M Nailing	44 (7.6%)
K wiring	30 (5.2%)
K nail	7 (1.2%)
Spine Fixation	55 (9.5%)
ORIF	117 (20.3%)
Plaster of Paris stabilizations	49 (8.5%)
Closed Reductions	80 (13.9%)
Skeletal Traction	16 (2.8%)
U slabs	5 (0.9%)
Malleolar Screws	37 (6.4%)
External fixators	98 (17.0%)
Vascular 3 (0.1%)	
Arterial repairs	3 (10.0%)
Neurosurgery (n=27) (1.2%)	
Burr hole	3 (11.1%)
Craniotomy	20 (74.1%)
VP Shunt	4 (14.8%)
Plastic surgery (n=181) (8.4%)	
Free Flaps	21 (11.6%)
Local flaps	92 (50.8%)
Skin Grafting	68 (37.6%)
Thoracic surgery (n=2) (0.1%)	
Lobectomy	1 (50%)
Sternotomy	1 (50%)

in getting the injured to treatment centers (fig. 5).

DISCUSSION

Disaster casualty reports show a first wave of survivors with relatively minor injuries, a following wave of more severely injured survivors and a subsequent sustained wave of rescued survivors [5]. This report coincides with the above pattern.

The earthquake struck at 0850 hrs and the first casuality was received at this hospital at 1125 hrs. The main brunt of casualties arrived during the first week (i.e. from 8-14th of October with 2127 patients). Two thirds of the victims were male during this period, nearly the same ratio recorded in the World Trade Centre terrorist attack [6]. Initial triage was carried out in the trauma centre and the available space in front by a Senior Surgeon. Limb and life saving surgery were prioritised .All eight operation theatres along with those in a sister institution nearby were utilised. Primary risk factors for serious injuries were falls and being hit by falling debris of construction materials. A one team approach with 12 hourly rotations consisting each of three senior surgeons and residents utilising all eight theatres was employed. Despite the untiring dedicated effort of so many involved

Table-3: Amputations.

Indication for amputations	
Gangrene	20 (37.0%)
Crush Injury/Mangled extremity	28 (50%)
Traumatic Amputation	8 (14.8%)
Total	56
Summary of amputations	
Above Knee	11 (9.6%)
Below Knee	18 (32.1%)
Above Elbow	8 (14.3%)
Below Elbow	6 (10.7%)
Toes	2 (3.6%)
Fingers	4 (7.1%)
Hand	3 (5.4%)
Feet	6 (10.7%)
Total	56

Fig. 1: Area of subcontinent affected by the earthquake

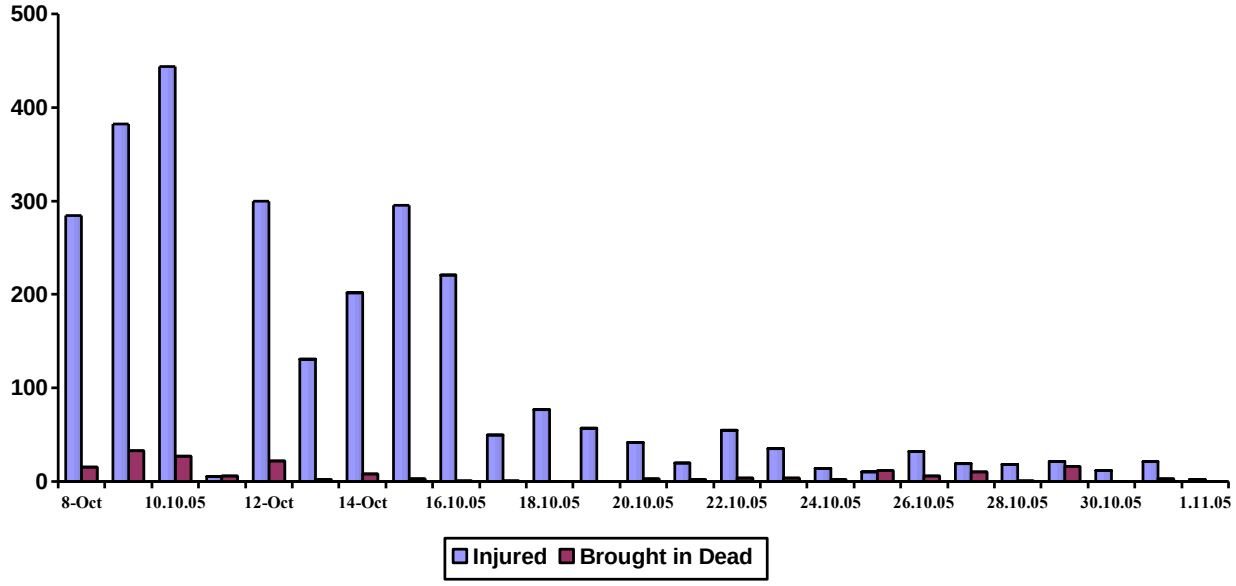

Fig. 2: Admissions - 8th October through 1st November.

in the management, a lot of problems were faced.

Delay in assessment of the magnitude of the problem and number of casualties greatly added to the problem of receiving further patients. The triage Surgeon in his shift was often consulted on other matters besides triage. The location of the main operation theatre being at a different location from that of the trauma centre saw two groups of patients arriving for triage which resulted in in-coordination with consequent inadequate record keeping in the early days of the saga. Triage labels were not placed on patients during the first couple of days resulting in extended surgeries for priority 3 patients instead of 1 or 2. Coordination amongst the departments need to be perfect and the same holds true between hospitals as failure results in added operation lists listed for the operating team by the respective wards and nearby hospitals. A critical deficiency of operating room technicians and the holding space for the injured, trolleys and beds was most felt, however reinforcements soon arrived being mobilized from other parts of the country and praiseworthy worldwide help.

Missed injuries albeit few as regards the huge number received nevertheless required subsequent operative interventions. The nature of polytrauma in mass casualties, limitation of attention confined to detected injuries and inadequate secondary survey contributed to this phenomenon.

Our analysis is also subject to limitations. Firstly the assessment and treatment offered to people received at this hospital was a sample which did not encompass all survivors, secondly data describing the circumstances, treatment offered and follow up of most patients was missing from many of the records reviewed and this observation is consistent with injuries among survivors of the world trade centre attack in September 2001 [6]. The total number of injured remain unknown but estimates have been in the region of a hundred thousand with an equal

Fig. 3: Necrotising fascitis.

Fig. 4: Child rescued by amputating limb.

Fig. 5: Main hospital, Muzaffarabad.

number of fatalities. Around 3.3 million were left homeless. This however is not based on medical record review; thus the number of injured and hospitalized injuries requiring admission may represent a small proportion of the overall injury pattern. This is similar to various retrospective mass casualty reviews

[7-9] and signify the epidemiological limitation in determining the incidence of injury following a major disaster.

CONCLUSION

Assessment of the injured in multicasualty disaster such as in earthquake reinforces the need to strengthen capacity for post disaster surveillance before disaster occurs. Better preparedness in peace time, improving record keeping and reporting will have to be an integral part of any effective disaster planning strategy; followed by mock drills at least once a year by hospitals to plan, train and equip so as to receive multiple casualties and provide the greatest good to the greatest number.

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