ORIGINAL ARTICLE

PRE-HOSPITAL MANAGEMENT OF SPINAL INJURIES IN A NATURAL DISASTER

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Background: Spinal injuries are one of the most devastating and crippling conditions known to mankind. Natural calamities follow no rules, and all have the potential of devastating medical and public health resources, earthquakes being the deadliest. The incidence of spinal injuries increases by leaps and bounds in such calamities. Improper pre-hospital management and inadvertent manipulation of the spine during rescue and transfer can aggravate the damage. This study was conducted in order to access the level of pre-hospital care that had been provided to the patients with spinal injuries reaching Ayub Teaching Hospital, Abbottabad after the October 2005 earthquake. **Methods:** This study was conducted in the department of Neurosurgery, Ayub Medical College after the earthquake of October 2005. All patients sustaining spinal injuries were included in the study. Demographic data like age, gender and time of arrival at hospital were recorded. The important aspects of pre-hospital care like spinal immobilisation, intravenous access, fluid resuscitation, catheterisation, pain killers and intravenous steroids administration were also recorded. **Results:** Out of the 83 patients with spinal injuries, 55 (66.26%) were females and 28 (33.7%) were males. Age ranged from 12–68 years (mean 26.6±13.2 years). At the time of presentation 70 (84.3%) patients had complete spinal injury whereas 13 (15.6%) had incomplete spinal injury. Sixty-one (73.5%) patients were paraplegic and 22 (26.5%) cases were quadriplegic. Only 8 (9.6%) patients were brought to the hospital after proper spinal immobilisation on the spinal boards. Intravenous line was maintained in 24 (28.9%) patients and only 18 (21.7%) received some sort of fluid resuscitation. Thirty-eight (45.7%) were catheterised, 18 (21.6%) received some sort of parenteral analgesics and 4 (4.8%) received steroids at the time of patients. Only 10 (12%) were brought in properly equipped ambulances. **Conclusion:** Poor pre-hospital management of spinal injured patients depicts the lack of emergency preparedness as well as the lack of basic knowledge rescue teams and health care providers about the common trauma management measures. There is a dire need of educating rescue workers and volunteers about spinal injury in order to save lives minimise the secondary damage to already affected spine.

Keywords: Spinal injury, pre-hospital management, earthquake 2005, spine immobilisation

INTRODUCTION

The incidence of spinal injuries is on rise and appears to be region specific because of unique geographic and demographic characteristics of the area.[1,2] In United States around 11,000 spinal injuries occur annually with an annual incidence of 43.5–51 per million population.[1,3] The incidence of spinal injuries is around 2% of all the blunt trauma patients, with higher rates in the setting of severe head injuries.[4] The leading cause of spinal injuries are road traffic accidents followed by fall, sport injuries, assaults and neoplasia.[5] But, natural calamities hitting the populated areas follow no rules and all have the potential of devastating medical and public health resources, earthquakes being the deadliest. The incidence of spinal injuries increases by leaps and bounds in such calamities.[6] Earthquakes in developing regions often result in large number of casualties with higher number of spinal injuries. Around 240 cases were reported in earthquake that hit Iran.[7]

In October 2005, about 87,000 people died in the devastating earthquake that hit the northern areas of Pakistan and another 100,000 were severely injured.[8] Patients with spinal injuries are at risk of secondary injury with neurologic deterioration and an important cause of this secondary injury is improper pre-hospital management and inadvertent manipulation of the spinal cord in the cases of unstable spinal injuries.[9,10] The pre-hospital management becomes even more important during natural disasters in which the medical resources are over-stretched by the number of casualties, with the added disadvantage that untrained volunteers and workers in community work in haste with limited or no resources. With limited or no knowledge about the spinal injuries patients are moved, even dragged and pulled without considering spinal immobilisation.[11]

This study was conducted in order to access the level of pre-hospital care that had been provided to the patients with spinal injuries reaching Ayub Teaching Hospital, Abbottabad after the October 2005 earthquake.

MATERIAL AND METHODS

This study was conducted in the Department of Neurosurgery, Ayub Medical College after the earthquake of October 2005. All patients sustaining

spinal injuries were included in the study. Demographic data like age, gender and time of arrival at hospital were recorded. The important aspects of pre-hospital care like spinal immobilisation, intravenous access, fluid resuscitation, catheterisation, pain killers and intravenous steroids administration were also recorded. Patients were clinically examined for the level and grade of injury. Radiological assessment of the spine was done by X-ray, CT scan and MRI to identify the level of injury.

RESULTS

A total of 83 earthquake victims with spinal injury presenting in Ayub teaching Hospital were included in this study. The number of spinal injuries might have been high, but even in the worst circumstances with shattered infrastructure and crippled resources the data of these 83 patients was recorded. Out of the 83 patients with spinal injuries 55 (66.26%) were female and 28 (33.7%) were male. Their age ranged was 12–68 years (mean 26.6±13.2 years). First patient arrived within 6 hours after earthquake, and patients kept on pouring in during next 8 days. At the time of presentation 70 (84.3%) patients had complete spinal injury whereas 13 (15.6%) had incomplete spinal injury, out of these 2 patients had clinical features of central cord syndrome. Sixty-one (73.5%) patients were paraplegic and 22 (26.5%) cases were quadriplegic, (Table-1). In 53 (63.8%) patients injuries occurred while standing and being hit by falling debri. Eight (9.6%) patients were brought to the hospital after proper spinal immobilisation on the spinal boards. Intravenous line was maintained in 24 (28.9%) patients and only 18 (21.7%) received some fluid resuscitation. Thirty-eight (45.7%) were catheterised, 18 (21.6%) received parenteral analgesics and 4 (4.8%) received steroids at the time of patients. Only 10 (12%) were brought in properly equipped ambulances, all the rest were brought in private cars, buses, trucks, or tractor trolleys. Two among them were air lifted in helicopter. These results are compiled in Table-2.

Table-1: Classification of injuries

	Number	Percentage
Spinal Injuries		
complete spinal injury	70	84.3
Incomplete spinal injury	13	15.6
Type of paralysis		
paraplegia	61	73.5
quadriplegia	22	26.5

Table-2: Pre-hospital management measures

Pre-hospital Management measures	Number	Percentage
Spinal immobilisation	8	9.6
Intravenous access	24	28.9
Fluid resuscitation	18	21.7
Catheterisation	38	45.7
Analgesia	18	21.6
Steroids	4	4.8
Proper transport	10	12.0

DISCUSSION

Spinal injuries are one of the most devastating and crippling conditions known to mankind, and unfortunately the number of spinal injuries in natural disasters is very high. Although no exact data of the patients who sustained the earthquake of October 2005 is available, but it is estimated to be between 600–750 cases.[11–13] In our patients 55 (66.26%) were female, this is very high compared to spinal injuries in non-disaster sittings. Similar high percentage of affected female population is also documented in other studies during 2005 earthquake.[8] This may be because the earthquake struck at a time when most of the ladies in rural areas of Pakaistan are at homes with limited space and gents are out at workplaces. The other possible reason might be the poor nutritional status of women in the affected population. In our study 70 (84.3%) patients had complete spinal injury and 13 (15.6%) patients had complete spinal injuries, out of which 2 had features of central cord syndrome. Comparing these results with the results of 1995 Hanshin earthquake in Japan, in which out of the 140 persons with spinal fractures only 6 had neurologic deficits, the level of emergency preparedness situation can be easily thought of.[13]

Only 8 (9.6%) patients in our study were properly immobilised on spinal boards during their transport to out hospital, and 10 (12%) were shifted by properly equipped ambulances. Most of them were shifted by international rescue workers or agencies. Studies have shown that immobilisation of patients with a board and collar and head immobilisation between foam wedges provides the most stable biomechanical immobilisation.[14] The addition of spinal board to cervical collar provides statistically significant immobilisation than collar alone.[15] Such a low use of spinal boards and spinal immobilisation shows the low or even non-existence of proper spinal immobilisation and transport facilities and protocols in our setup. It has been reported that patients transported within 24 hours to a proper health facility have better outcome that those who are transported after 24 hours.[16] Although we cannot expect such an ideal transport in a calamity of that extent, yet the transport facilities could have been better. Patients were transported by road in all type of vehicles from ill equipped ambulances to private cars, buses, trucks, and even tractor trolleys. In natural disasters helicopter transport service is the most suitable method of transportation of spinal injured patients.[17] However, of the many international and national helicopters working in the aftermath of earthquake, only a few were air ambulances.[3]

In our patients there was fairly high number of patients with paraplegia. Although this is consistent with other studies yet in our study the number of patients with quadriplegia is high when compared to other

studies for the same duration.[12,13] This may be because our hospital is situated in the affected area itself, so received more patients with cervical injuries than the other health facilities during the earthquake which were far away from the areas of maximum destruction, so the patients with high spinal injuries might not have survived long to reach there. Similarly there was a very low percentage of patients having intravenous line and fluid resuscitation. Only 45.7% patients were catheterised and even fewer received pain killers or steroids before presenting to hospital.

Though the calamity was beyond imagination, even the hurricane Katrina (which was by far a disaster of lower magnitude) had floundered the emergency response in the US, yet the level of emergency preparedness should be increased. The level of alertness should be high and the available resources should be properly mobilised and utilised. Masses should be educated about proper evacuation, immobilisation and transport protocols. Emergency response teams should be trained to minimise or avoid spinal injuries.

CONCLUSION

Poor pre-hospital management of spinal injured patients depicts the lack of emergency preparedness as well as the lack of basic knowledge rescue teams and health care providers about the common trauma management measures. There is a dire need of educating rescue workers and volunteers about spinal injury in order to save lives minimise the secondary damage to already affected spine.

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