

Demographic study of patients with vertebral column trauma in North-West of Iran trauma center

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Abstract

Background: Spinal Traumatic injuries is the major damage which is associated with morbidity and mortality rates. In this study the epidemiological characteristics of trauma, spine and their relationship to outcome were investigated. **Methods:** In this cross sectional study, patients' information such as age, sex, type of injury, severity of injury, site of injury trauma who admitted to Imam Reza hospital from 29 march 2012 to 20 march 2014 were included. We used Chi-square tests to compare the types of injuries associated with the injury and regression methods. **Results:** The spinal trauma was identified in 105 cases, of which 9/61% were male. 1.18% of patients with incomplete injury, 5/10% 4/71% damage and no injuries were full. 6/48% of vehicle accidents, 22 cases (21%) of motorcycle accidents, 14 cases 3/13% due to the fall, the equivalent of 10 5/9% of pedestrian accidents, the equivalent of 5 7/4% injury 3 people with a knife and the rest of 9/2% were due to other causes. 6 people, equivalent to 2/9% were experiencing mortality. Type of injury, site of injury and injury severity was significantly associated with outcome. **Conclusion:** accidents caused by motor vehicles (cars and motorcycles) are the most common cause of trauma in spines in our country. Three factors as well as stable or unstable trauma, the severity of the initial injury and the injury as factors influencing outcome were obtained. According to the achievement of the emergency department in the early diagnosis, appropriate management such as surgery in preventing complications and improving outcome becomes more clear.

Key words: Trauma; Spine;

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Introduction

Although Acute injuries of vertebral column are one of the uncommon complain which present to emergency department, but they are important due to their destructive and long-time morbidities. This kind of trauma is cost consuming with disabilities (1).

These injuries mostly occur in young people, with male to female ratios of 4:1. Car crush are the most common reason of vertebral column injuries and sport trauma is in second step. vertebral column trauma are one of the major reasons of mortality and morbidity in many countries. Vertebral column trauma and spinal cord injuries are two types of spinal injuries which cause disability, mortality and impose cost for the health care system (2).

One of the most important predicting indexes for decreasing this health problem is epidemiologic data to find the reasons and risk factors of vertebral column trauma; then it will possible to make rules, guidelines and design educational systems for at risk groups. To decrease this type of injury (3).

Spinal cord injuries based on their etiology divided to two groups, traumatic and non-traumatic. In general population traumatic injuries of spinal cord and vertebral column are more than non-traumatic ones. Traumatic injuries are in young adults of 16 to 30 and is 85% in males (4).

There are several factors which predict functional outcome of patients with spinal cord and vertebral column traumas. Also different studies explain the recovery process and revival of a neurologic findings (5).

Most spinal cord injuries are traumatic and most fractures of this column which resulted from crushes may lead to spinal cord injury. Sometimes spinal trauma resulted from spinal tension with fractured bone or ligaments (6). Vascular damage and ligament damages usually

occurs in car collision injuries, motorcycle accidents, sever sport exercises, gunshot trauma, felling down from the height and stabs wounds (7).

In waters et al studies which was done to observe blunt & traumatic fractures of cervical spine, Prevalence of blunt traumatic cervical spine fractures (TCSF) was near to 1/5 of fractures. In their study C₂ was the most prevalent vertebra for fracture and 1/3 of fractures were in low cervical vertebrae from C₃ to C₇. Average age of patients was 36.1 ± 17.2, 29.1% of patients were low educated. Prevalent mechanism of trauma in fractures of C₁-C₇ vertebrae was motorcycle accidents and felling down from the height was the second one; in this patients had spine cord and spinal roots injury 13.3% , 39.9% respectively. Hospital mortality based on lower, upper and multiple fractures was 12.5%, 10.5% and 16.7% respectively and there wasn't any meaningful difference between groups mortality (8-10).

According to high prevalence of mortality and morbidity due to trauma in our country (11) and also vertebral trauma and lake of studies in demography of it in our area, we decided to gather patients data with vertebra trauma and get demography study on incidence of it and its outcome and if there is any relation between data.

Materials and Methods:

Population:

In this cross sectional descriptive study, patients with multiple trauma with spinal fracture and dislocation who came to emergency department of Imam Reza hospital as a north west trauma center of Iran, from 20 Mrach 2012 to 20 March 2014 were enrolled.

Protocol:

patient data such as age, Gender, Trauma Cause, portion of the spinal, the stability or



instability of injury by imaging (radiography or CT), the type of injury and its outcome including mortality, morbidity or improvement were collected by a structured questionnaire.

Exclusion criteria were: a) spinal cord impairment with a non traumatic cause, and b) initiation of treatments at another center.

The patients were divided into two groups as those with complete injuries and those with incomplete injuries according to the clinical findings during admission based on ASIA-International Medical Society of Paraplegia (IMSOP) Impairment Scale (6). According to this index ASIA-IMSOP impairment score divided to 5 grades include Grade A contains complete spinal injury without any motor & sensory function in sacral segments S₄-S₅.

Grade B: incomplete injury, Sensory but not motor function below the involved zone.

Grade C: motor function is preserved below the neurological level and more than 3 key muscles below the neurological level of injury have a muscle grade less than 3.

Grade D: incomplete injury and motor function is preserved below the neurological level and at least 3 key muscles below the neurological level of injury have a muscle grade ≥ 3 .

Grade E: without spinal involvement and normal motor and sensory function.

The patients were divided into four subgroups as <20 years of age, 20-40 and 40-60 years of age and >60 years of age. Data on the complete injury group and the incomplete injury group were compared.

Analysis:

All data of the patients were documented in the questionnaire and analyzed using the Statistical Package for the Social Sciences (SPSS) (version 15, SPSS Inc., Chicago, IL, USA. The relationship between the types of injury (complete and incomplete) and demographic characteristics was analyzed using chi-square test. Lesion sites, accompanying traumas, developing complications, and mortality rates were analyzed. For relation between data, Pierson regression was run. The level of statistical significance was accepted as $p < 0.05$.

Results

In a study of 105 trauma patients admitted to the hospital, 65 cases of 61.9% male and 40 cases of 38.1% were women. Most of the patients were in 20-40 years old (figure 1).

Age	Number	percent
0-20	31	29.5%
20-40	36	34.3%
40-60	23	21.9%
60<	15	14.3%

Table1: frequency of patients in age ranges

36.9% were male in the range of 20 to 40 years and the majority of female (35%) patients in the age range from zero to 20 years.

48.6% (n=51) cases were car collision 21% (n=22) of motorcycle accidents, 13.3% (n=14)

cases of fall from height, 5.9% (n=5) pedestrian accidents, 4.7% (n=5) of the injury with stabs and 2.9% (n=3) were due to other causes.

71.4% (n=75) patients did not have spinal cord injury (ASIA-E), in the other hand 10.5% (n=11) had complete spinal injury (ASIA-A) and

18.1% (n=19) had incomplete cord injury (ASIA-B to D). 21% (n=22) patients had multiple comorbidities such as diabetes or other chronic disease. 52.4% (n=55) patients had stable fracture and 47.6% (n=50) had unstable fracture. 59% (n=62) patients had permanent neurologic dysfunction, 33.4% (n=35) were discharged and 7.6% (n=8) were died.

59% (n=62) had cervical spinal finding (such as fracture, dislocation, disc herniation/malposition or ligament protrusion to cord), 26.7% (n=28) thoracic and 14.3 (n= 15) had lumbar vertebra trauma and finding.

In male, there is 72.4% (n=47) patients discharged without any neurologic deficit,

13.8% (n=9) patients had incomplete cord injury and 13.8% (n=9) had complete cord injury but in female 70% (n=28) patients were discharged and 22.5% (n=9) had incomplete cord injury and 7.5% (n=3) had complete cord injury; there is not any significant difference between two gender in kind of cord injury (pv=0.357).

The most cause of trauma in teenage and under 40 years old is car collision but in elderly the most one is falling (Table 2). in under 40 years old specially in under 20 years old most of vertebra fracture were stable but over 40 years old most of them unstable (Table 3). in most of ages there is few complete cord injury (Table4).

		cause of trauma					Total	
		car accident	motor accident	pedstrain accident	falling	stab		others
age	0-20	14	8	5	1	3	0	31
	20-40	18	12	1	1	1	3	36
	40-60	13	2	2	4	1	1	23
	more than 60	5	0	2	8	0	0	15
Total		50	22	10	14	5	3	104

Table2: age and cause

		vertebral injury		Total
		stable	unstable	
age	0-20	25	6	31
	20-40	17	19	36
	40-60	9	14	23
	more than 60	3	12	15
Total		54	50	104

Table 3: age and satblity of vertebra fracture

Trauma injuries are one of the main reasons for mortality and permanent morbidity especially among young people (12). Vertebral column and spinal cord injuries are also is one of the main causes of morbidity in young ages.

So that in some studies they constitute 60% of injuries among people under 40 and men are at higher risk of spinal cord injuries. In this study 63.8% of patients are under 40 also 61.9% are male. In male group most of the trauma cases

		spinal cord injury			Total
		no injury	complete	uncomplete	
age	0-20	23	5	3	31
	20-40	27	3	4	34
	40-60	15	1	7	23
	more than 60	9	2	3	14
	Total	74	11	17	102

Table 4: age and cord injury

were at age range of 20-40 years old and in female group most of them were 0- 20 years old (13).

Also in Agrawel et al study shows that most cases were from 20-40 years old. Chacko et al founded that men in the age of 20-39 are the largest population in the vertebral trauma cases. Also no significant correlation was found between age, sex and outcome. In this study the most common causes of trauma were car collision and road traffic accidents (48.6%) and motorcycle accidents (21%).

In past studies it has been estimated that men are more likely to experience this trauma compared to women (13). In this study the main causes of trauma in men are car collision and motorcycle accidents and in female group the main causes are car collision, fall from height.

Also in past studies no significant gender dismantling was found in cause of trauma, but this study shows that the main cause in both gender is car collision. But in second step falling is more in female because of osteoporosis and other underline disease like osteoarthritis and etc (6,14). Also lack of routine use of motorcycles by female is considered as a reason for less motorcycle accidents in female group.

Different studies use the ASIA or (complete damage, incomplete damage, no harm) classification to assess the intensity of spinal injuries (6).

In this study 71.4% of patients classified as no harm. 18.1% as incomplete damage and 10.5% as complete damage. Also different studies shown that the prevalence of incomplete damage is more than complete one. In this study significant correlation was found between type of injury and outcome. Different studies have investigated the location of spinal column injury effect; for example In Hagen and colleagues study distribution of spinal column injuries obtained: Cervical spinal 63.2% Thoracic spine Lumbusacral spine total 30.4% (15).

Several studies reported that lumbar spine are the most common site of involvement in fall from height and in vehicle accidents cervical spine injuries are the most common injury (16). Clearly, the causes of injury vary between countries, as they do between regions within a country and urban versus rural locations (17). On a global level traffic accidents involving motor vehicles, bicycles, or pedestrians account for the greatest number of SCIs, typically 50% of all injuries (18).

In the review by sekhon, 45% of patients was in grade A of ASIA scoring and 15% in grade B,

10% in grade C and 30% in grade D (18); but in our study there was 10.5% of patients in grade A and 18.1% were in grade B-D and also 71.4% had no spinal injury and came in grade E.

Limitation

The most important spinal cord injury is the malpositioning and malpractice of pre hospital personnels in carrying and transporting the trauma patients that cause secondary trauma (19); which is impossible for us to evaluate it. This mismanagement can decrease by primary trauma care courses but it is important to have course as a continue education courses (20, 21).

Conclusion

This study showed that accidents caused by motor vehicles (cars and motorcycles) in our

country are the most important causes of spinal cord injury and vertebral trauma. As well as those under the age of 40 years are most influenced by this type of trauma.

Authors contribution

SSV designed the study. PP Data collection. AA performed the analysis and final evaluation. OT critically revised the article and study conduct. NP drafted the first copy of article.

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Conflict of Interest

Authors have no conflict of interest.

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