Pattern of Spine Trauma Presented to Spine Unit of Tertiary Care Hospital

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ABSTRACT

Objective: To present pattern of spine trauma in terms of etiology, age, gender, level of injury, neurological deficit type of treatment given and complications.

Methods: This study was performed at Spine Unit, department of Orthopaedic & Spine Surgery, Hayatabad Medical Complex/ Khyber Girls Medical College, Peshawar and Aman Hospital Peshawar from June 2013 to June 2016. All patients treated for spine trauma were included in the study excluding those who denied to participate. The data was acquired from the hospital record and analyzed with the help of SPSS.

Results: Total of 326 patients were included with age ranging from 5 years to 75 years having a mean age of 32.99 + 13.49 SD. Out of the total, 240(73.6%) were male and 86 (26.4%) were female. Etiology in majority of the cases was fall from height, RTA and FAI with frequencies of 199(61%), 120(36.8%) and 7 (2.1%) respectively. Most common level of injury was thoracolumbar spine involving 260 (79.8%) cases while in 66 (20.2 %) cases Cervical Spine was injured. Neurological injury was present in 167(51.2%), out of which 76(23.3%) had complete while 91(27.9%) had incomplete neurology. Fractures were classified according to AO classification into type A, type B and type C with frequencies of 121 (37.1%), 115 (35.3%) and 90(27.6%) respectively out of 326. Posterior spinal fixation (PSF) was done in 140 (42.9%) cases and decompression along with PSF was done in 78 (23.9%). Pedicle Subtraction Osteotomy was done in 7 (2.1%) cases while 7(2.1%) patients underwent vertebral column resection. In 35 (13.2%) cases ACDF was done while in 11 (3.1%) ACCF was done. Anterior screw fixation for odontoid fracture was done in 3 (0.9%) cases. In 14 patients having cervical spine injury, posterior fixation was done while in 2 cases combine procedure was done. 44 (13.5%) patients were treated conservatively. We had dorsal tear in 5(1.5%) patients, infection in10 (3.1%), new onset neurological deterioration in 2(0.6%) patients, proximal junction kyphosis in 2(0.6%) patients and 7 (2.1%) patients had implant failure.

Conclusion: We concluded that a fall from height is a major cause of spine injuries in our set up followed by Road Traffic Accidents. Preventive measures need to be instituted to lessen the devastating outcome.

INTRODUCTION

Spinal injuries are one of the most devastating injuries that can permanently affect the life of an individual. It put a lot of economical burden on health resources apart from severe psychosocial consequences on patient's life [1]. In developed world, the incidence of spinal injuries in polytrauma victims is reported between 13 to 30% [2,3]. In one study the authors reported 28% spinal injuries in173 polytrauma patients [4]. While another reported 13 % spinal injuries in 366 polytrauma patients [5].

Similarly, one of the largest trauma series of over 12 thousand Canadian patients reported 23.3% spinal injuries with 5.4% having spinal cord injury [6]. Of these one third of patients (over 4%) required surgical stabilization [7]. The two major causes of spinal injuries were road traffic accidents (RTA) and fall from height with RTA predominant [8]. Thoracolumbar spine injuries were frequent than cervical spine injuries. The reported incidence of cervical spine injuries is from 2 to 10% in various studies [9,10].

Majority of spinal injuries patients are polytrauma patients and the chances of spinal injuries are directly proportional to the magnitude of initial trauma. In these cases, the importance of initial stabilization according to

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ATLS protocol cannot be overemphasized [11]. After the initial stabilization of patients, the decision about surgical intervention depends on the presence of mechanical or neurological instability. Mechanical instability basically depends on the involvement of both columns mainly posterior Osseo ligamentous complex [12]. Spinal fractures are classified according to AO comprehensive classification into type A, B and C in which majority of type A fractures are stable while type B and C are unstable and require surgical stabilization [13]. Neurology is assessed and graded on ASIA scale. If any neurological involvement is present surgical intervention in the form of decompression is required, with partial neurological injuries are operated as soon as possible [14]. After this, rehabilitation is started which may continue for days to years depending on condition of the patient.

In this study, we present the pattern of spinal injuries in terms of their origin, spinal cord injury, types of fracture and intervention done in a tertiary care hospital. We would like to document the differences in this regard to the western world and also to see any difference to the rest of Pakistan as our province has unique geographical properties compared to the rest of the country.

METHODS

This descriptive cross-sectional study was performed from June 2013 to June 2016 with a total duration of 3 years. All patients treated for spine trauma were included in the study excluding those who denied to participate. The pre-operative details, operation notes and postoperative data was acquired from the hospital record and analyzed with the help of Statistical Package for Social Sciences (SPSS).

RESULTS

In this study, a total of 326 patients were included. Out of these 86(26.4%) were female while 240(73.6%)were male. Minimum age in our sample was 5 years while maximum was 75 years with mean age 32.99 (SD +13.49) years. Majority of the patients 169(51.8%) were in the age group between 20 to 40 years, while only 8(2.5%) were above 60 years of age.

The most common reason of spinal injury in our series was fall from height followed by road traffic accidents (RTA). Out of 326 patients, 199(61.0%) had a history of fall while 120(36.8%) patients had RTA and 7(2.1%) patients presented with firearm injuries (FAI). (Table 1)

Thoracolumbar spine injuries were the most common and in 260(79.8%) patients thoracolumbar spine was involved. While 66(20.2%) patients had cervical spine fractures.

The most common segment in cervical spine was C5/C6. Out of 66 patients with cervical spine injuries 46 had injuries around this level followed by C6/C7. In lumbar spine 115 patients had fractures around L1 and L2. In thoracic spine, the most common vertebra involved was D12 in 36 patients. Fractures were classified according to AO classification. Type A fractures were 121 (37.1%), type B 115 (35.3%) and type C were 90(27.6%) out of 326. (Table 2)

Table 1: Cause of Spine Injury

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fall	199	61.0	61.0	61.0
	FAI	7	2.1	2.1	63.2
	RTA	120	36.8	36.8	100.0
	Total	326	100.0	100.0	

Table 2: Type of Fracure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A	121	37.1	37.1	37.1
	B	115	35.3	35.3	72.4
	C	90	27.6	27.6	100.0
	Total	326	100.0	100.0	

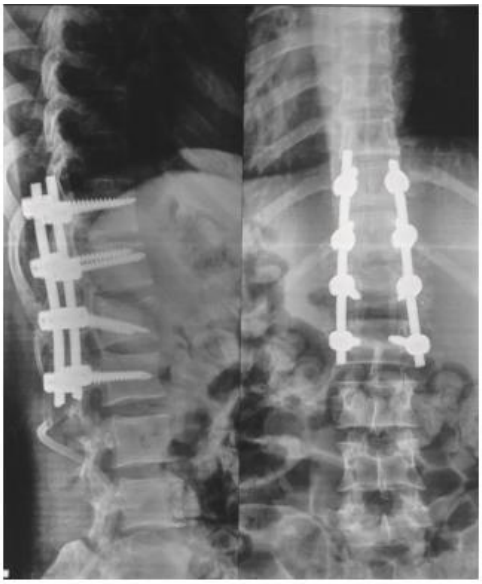
Table 3: Neurological Injury

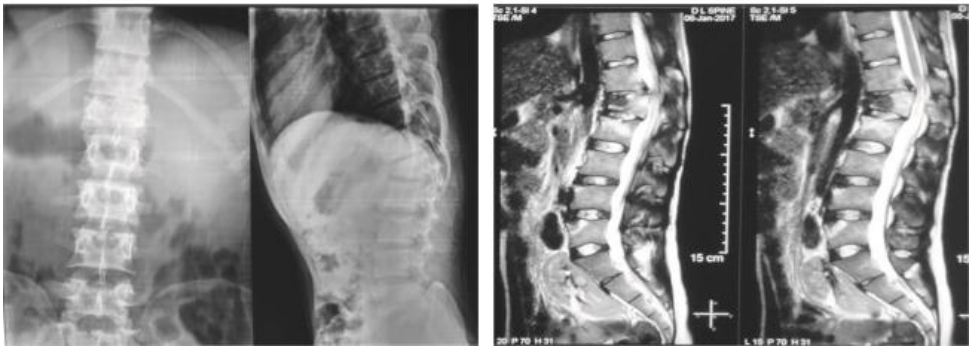
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEUROLOGICAL INJURY	167	51.2	51.2	51.2
	INTACT NEUROLOGY	159	48.8	48.8	100.0
	Total	326	100.0	100.0	

Table 4: Treatment of Spine Injury Patients

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ACDF	35	10.7	10.7	10.7
	ACCF	11	3.4	3.4	14.1
	ANTERIOR SCREW FIXAION	3	.9	.9	15.0
	CONSERVETIVE	44	13.5	13.5	28.5
	ACDF+PSF	1	.3	.3	28.8
	PSF +DECOMPRESSION	78	23.9	23.9	52.8
	Posterior Spinal Fixation	140	42.9	42.9	95.7
	PSO	7	2.1	2.1	97.9
	PVCR	7	2.1	2.1	100.0
	Total	326	100.0	100.0	

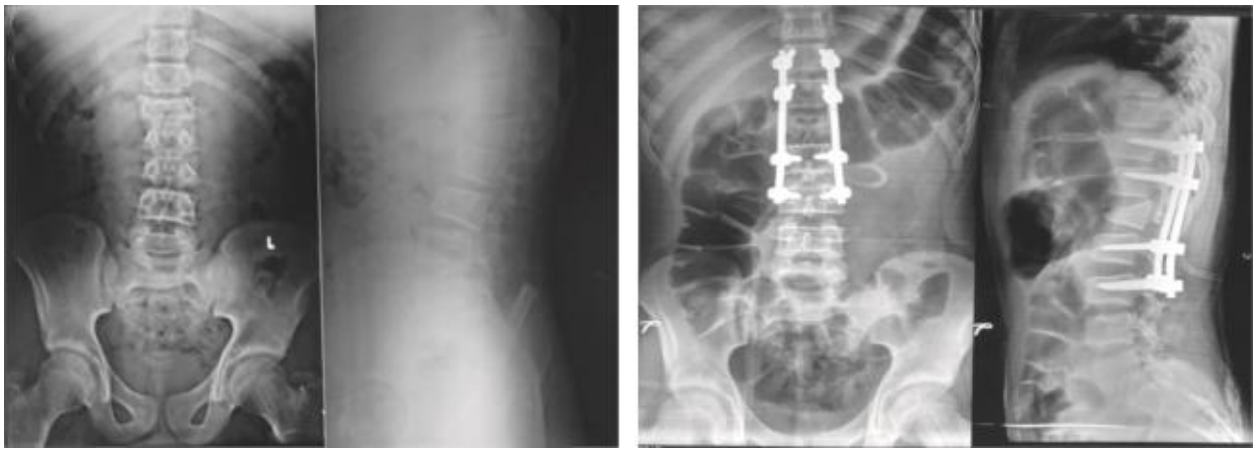
Case 1: L1 fracture, type B, with cord compression. Patient presented with partial neurological deficit. Managed with Decompression + PSF





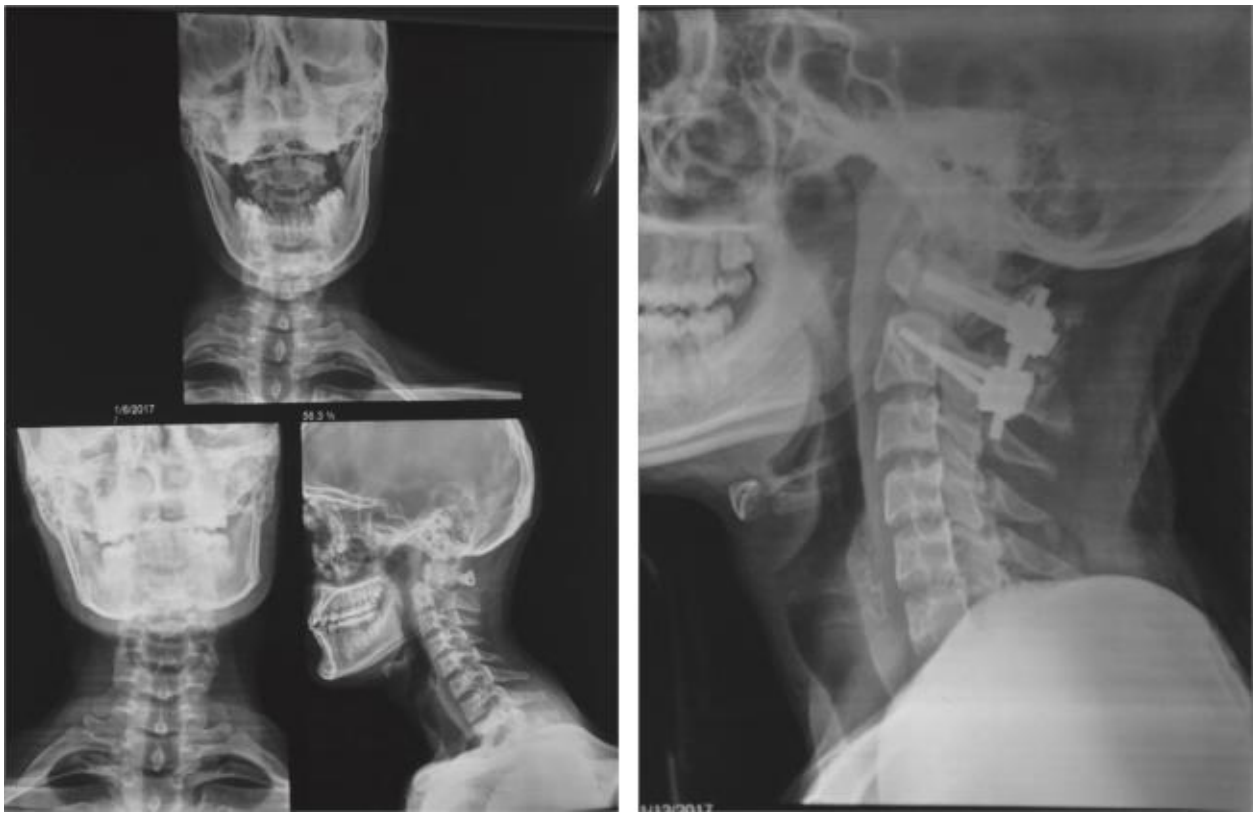
L1 fracture Type B Plain Radiograph MRI showing Cord Compression

Post-operative Radiograph: Pedicle screws were also inserted into the fractured vertebra.
Case 2: D12-L1 Fracture dislocation (type C)



Pre & Post-Operative Radiographs

Case 3: Odontoid Fracture, Displaced. Managed with C1-C2 fixation.



Pre & Post-Operative Radiographs

In our series, neurological injury was present in 167(51.2%), out of which 76(23.3%) had complete while 91(27.9%) had incomplete neurology. (Table 3)

ASIA E, A and C were the most common grading respectively.

Spinal cord injury directly correlated with the type of fracture. Spinal cord injury was present in only 9

patients out of 121 patients with type A fractures. On the other hand, only 15 patients out of 90 had intact neurology with type C fractures. 83 patients out of 115 type B fractures had neurological involvement. Similarly, complete loss of neurology was observed in 53 type C fractures out of 90. In type B fractures ASIA C grading was the most prevalent, 45 out of 115 patients.

Out of 326 patients 44(13.5%) were treated conservative while the rest were operated. Posterior spinal fixation (PSF) was the most common procedure performed. 140(42.9%) underwent PSF in our series while in 78(23.9%) PSF with decompression was performed. In 7 patients pedicle subtraction Osteotomy (PSO) while in 7(2.1%) vertebral column resection was done. In the cervical spine majority of the patients were treated from anterior approach. In 35 Patients out of 66 anterior cervical discectomy and fusion (ACDF), in 11 anterior cervical corpectomy and fusion (ACCF) while in 3 patients anterior screw fixation for odontoid fracture was done. In 14 patients PSF was performed, in one patient combine procedure while 2 patients were treated conservative. (Table 4)

In 26(8.0%) out of 326 patients we had major complications. We had dural tear in 5(1.5%) patients, infection in10 (3.1%), new onset neurological deterioration in 2(0.6%) patients, proximal junction kyphosis in 2(0.6%) patients and in 7 (2.1%) patients we had implant failure.

DISCUSSION

The effects of spinal trauma on patient's life may be life long. It affects every aspect of life. Due to spinal cord injury, it can change every thing for patients and their families. Spinal cord injury leads to permanent disability with different medical problems like bedsores, chest infections, and deep venous thrombosis [15]. Spinal injuries with spinal cord injuries put a huge economic burden on the society. In one study done in Canada the estimated lifetime cost for incomplete paraplegia was1.5 million and $3 million for complete paraplegia [16]. These kinds of expenditures are far from the reach of many of our patients. But this is only one aspect of the effects of spinal cord injury on patient's life. Psychosocial effects on patient's life is more profound and some time difficult to assess [17]. One study estimated around 2-fold increase in new onset depression and anxiety in patients with traumatic spinal cord injury. Male, young and patients with low socioeconomic status were more prone to psychological disorders [18].

In a study of 965 patients with traumatic spine injuries done in Australia Tee JW et al [19] found male predominance 68.7% male versus 31.3% female with 2.2:1 ratio. Mean age was 50.9 years in their group. RTA was the cause of spinal injury in 45.2% while fall in 20%. Only 4 % of their patients had spinal cord injury while 3% had root injuries. The most common region was thoracic spine followed by lumbar and cervical spine. In their series, there were 189(8.1%)

C0-C2 level injuries. The operation rate was 12.8% while 87.2% were treated conservatively. In our study, also male was predominant 73.6% against 26.4%. Mean age was 32.9 years which is very less compared to their group, which can be attributed to differences in life expectancy between developed and underdeveloped world. In our study, the main cause of spinal injuries was fall out of 326 patients 199(61.0%) had a history of fall while 120(36.8%) patients had RTA. in our study, cervical spine injuries were common but they were in majority subaxial and very few (6 out of 66 cervical cases) had upper cervical spine injuries. in our series 51.2 % patients had spinal cord injury compared to 4 % in their study. Majority of our patients 86.5% underwent surgical intervention compared to 12.8 % in their series. This is mainly due to the reason that our study conducted at a tertiary care level where all the severe spinal injuries are referred. Another study done in Canada reported 23.3% spinal cord injury and RTA being the primary cause of spinal injuries [6].

Locally a study conducted at a tertiary care unit reported that out of 214 patients with spinal injuries 88.3% were male while 11.5 % were female [20]. In their series fall was the most common reason like in our series and only 8.4% had intact neurology. So, in their series about 91.6% patients had neurology. This study was conducted in 2003-2007 in neurosurgery tertiary care unit, where the neurological instability takes priority over mechanical instability. Similarly, another study locally done on 671 reported 39.1 years mean age, fall in 62% patients, spinal cord injury in 76% patients and majority of fractures were around T11-L1 [21].

In making decision about surgical intervention we found AO classification very convenient and reliable. The main focus of examination and investigations is to detect posterior column involvement and hence classified accordingly. Majority of type A fractures we treat conservative except those with spinal cord injury or burst A4 fracture in young adults at the junction and for early mobilization of polytrauma patients. We prefer

direct decompression at our center whenever there is some neurological injury present.

We would like to comment on our complications. We had suspected infection in 10 patients. They were all early washed, culture taken and antibiotics given accordingly. This is our department's policy to do early wound wash for even slight suspicion of impending infection. Majority of the dural tears were found as concomitant injury with linear fracture of lamina. We had implant failure in 7 patients. All were young patients, had one level above and below fixation and local implants were used. Among the two patients with neurological deterioration, one had ankylosing spondylitis and hematoma collection was thought to be the cause. The other patient had screw in the fractured vertebra. We would recommend that pedicle screw placement in fractured vertebra should not be done when there is gross communition of the body and decompression is not planned.

CONCLUSION

We concluded that the fall from height is a major cause of spine injuries in our set up followed by RTA. Majority of the patients presents with unstable fractures type B, type C and some type A. likewise, majority of these patients are young and have neurological deficit at presentation requiring early intervention. Preventive measures need to be instituted to lessen the devastating outcome.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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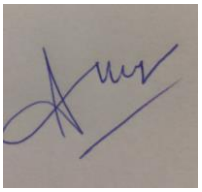
1	Abdul Satar	Writing the Article, literature review	
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3	Muhammad Rafiq	Data collection	
4	Muhammad Inam	Data Analysis	
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6	Muhammad Arif Khan	Conceptualization and Study designing	