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TRAUMATIC THORACIC AND LUMBAR SPINE FRACTURES

İsmail İŞTEMEN[1],
Kemal Alper AFŞER[1],
Celil Can YALMAN[1],
Ali ARSLAN[1],
Zeki BOĞA[1],
Ali İhsan ÖKTEN[1]

[1] *Adana Numune Training and Research Hospital, Department of Neurosurgery, Adana.*

Address: İsmail İŞTEMEN, Adana Numune Eğitim ve Araştırma Hastanesi, Adana.
Tel: 0 505 277 53 59
E-Mail: drismailistemen@gmail.com
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ABSTRACT

Aim: To analyses the operated cases of traumatic thoracal and lumbar vertebral fracture cases.

Material and Method: Ninety-three patients who admitted to Adana Numune Training and Research Hospital Department of Neurosurgery between 2015-2017 years for traumatic thoracal and lumbar fractures inspected retrospectively. Data's were inspected from the patient's files and radiology PACS system. Decompression surgeries for these fractures were posterior instrumentation-fusion and laminectomy. Patients were evaluated with age, gender, type of trauma, level of trauma and neurological condition..

Results: A total of 93 patients were included in this study. The mean age of the participants was 43.1 ± 18.6 years, and 62.4 % of the population were males. Most frequent cause of admission was falling from height (60.2 %), which was followed by motor vehicle occupant trauma (20.4 %) and non-occupant motor vehicle trauma (12.9 %). Most frequently fractured vertebrae were L1 (40.9 %), T12 (21.5 %), and L2 (19.4 %). Types of the fractures were distributed as compression fracture (49.5 %), burst fracture (48.4 %), and dislocated fractures (2.2%). The comparisons of the general characteristics between males and females revealed that non-occupant and occupant motor vehicle traumas were significantly higher in men, and falling from height and osteoporosis were significantly higher in women (p=0.008). However, the age distribution (p=0.544) and the types of fractures (p=0.480) were similar in both sexes. The effect of surgery on findings in neurological examination was significant. When the outcomes in post-operative period were compared with the pre-operative findings, the patients were found to have significantly improved neurological outcomes (p<0.001).

Conclusion: Thoracic and lumbar fractures are frequently seen healthcare problems. Surgery or conservative treatment could be chosen according to fracture type. Surgery must be done urgently if neurological deficit is present. Our clinical results that similar to literature show us that early decompression-fusion surgery could give positive feedback to recovery of neurological deficits.

Key words: Thoracal vertebral fractures, thoracal trauma, spinal traumas

Level of Evidence: Retrospective clinical study, Level III

INTRODUCTION

Spinal fractures are usually the result of high-energy injuries and the incidence of these injuries increases by development of technology. Traffic accidents are seen 40 % to 45 % and voluntary or involuntary falls are 15 % to 30 % that includes suicides. Other injuries accounts for 15 % to 25 % as sport, work and leisure accidents [5]. Studies showed that, 230 of one million person have spinal fractures each year [7]. Spinal fractures can also see attending by 30 % cranial trauma, 16 % to 18 % thoracic trauma and 10 % abdominal trauma [8].

The most common spinal fractures are seen at thoracolumbar region because it is the transition zone between the relatively rigid thoracic and more flexible lumbar spine [4]. Neurologic deficit rate is 15 % to 30 % in this region [1].

MATERIAL AND METHOD

Ninety-three patients who admitted to Adana Numune Training and Research Hospital Department of Neurosurgery between 2015-2017 years for traumatic thoracal and lumbar fractures inspected retrospectively. Data's were inspected from

the patients files and radiology PACS system. Decompression surgeries for these fractures were posterior instrumentation-fusion and laminectomy (Figure-1,2,3,4). Patients were evaluated with age, gender, type of trauma, level of trauma and neurological condition.

Figure-1. Preoperative thoracal fracture sagittal CT image

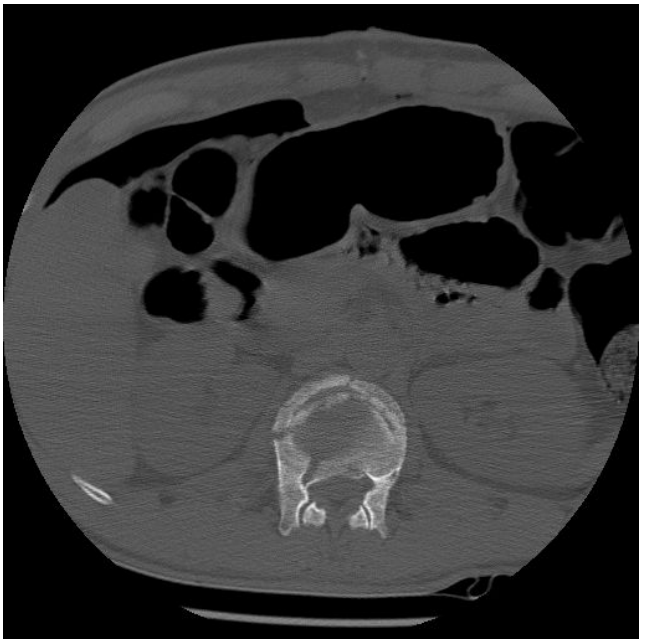

Figure-2. Preoperative thoracal fracture axial CT image

Figure-3. Postoperative thoracal fracture sagittal CT image

Figure-4. Postoperative thoracal fracture axial CT image

STATISTICAL ANALYSES

Numerical variables were presented as mean and standard deviation, and categorical variables were presented as frequency and percent. The comparisons between independent groups were conducted by Mann-Whitney U test for numerical variables, and

Chi-square test for categorical variables. Changes in neurological examinations over time were tested by Friedman non-parametric analysis of variances. A Type-I error level of 5 % was considered as statistical significance in all analyses. The SPSS 21 software (IBM Inc., Armonk, NY, USA) was used for the statistical analyses in this study.

RESULTS

A total of 93 patients were included in this study. The mean age of the participants was 43.1 ± 18.6 years, and 62.4 % of the population were males. Most frequent cause of admission was falling from height (60.2 %), which was followed by motor vehicle occupant trauma (20.4 %) and non-occupant motor vehicle trauma (12.9%). Most frequently fractured vertebrae were L1 (40.9 %), T12 (21.5 %), and L2 (19.4 %). Types of the fractures were distributed as compression fracture (49.5 %), burst fracture (48.4 %), and dislocated fractures (2.2 %). General characteristics of the patients were presented in Table-1.

The comparisons of the general characteristics between males and females revealed that non-occupant and occupant motor vehicle traumas were significantly higher in men, and falling from height and osteoporosis were significantly higher in women (p=0.008). However, the age distribution (p=0.544) and the types of fractures (p=0.480) were similar in both sexes (Table-2).

The effect of surgery on findings in neurological examination was significant. When the outcomes in post-operative period were compared with the pre-operative findings, the patients were found to have significantly improved neurological outcomes (p<0.001).

Table-1. General characteristics of patients

	Mean	**Standard Deviation**
Age (years)	43.1	18.6
	n	**%**
Gender		
Male	58	62.4
Female	35	37.6
Cause of admission		
Non-occupant motor vehicle trauma	12	12.9
Motor vehicle occupant trauma	19	20.4
Falling down from height	56	60.2
Contusion	4	4.3
Osteoporosis	2	2.2
Level of injury		
T2	1	1.1
T3	3	3.2
T4	4	4.3
T5	2	2.2
T6	3	3.2
T7	3	3.2
T8	4	4.3
T9	5	5.4
T10	5	5.4
T11	5	5.4
T12	20	21.5
L1	38	40.9
L2	18	19.4
L3	7	7.5
L4	7	7.5
L5	1	1.1
Type of fracture		
Compression fracture	46	49.5
Burst fracture	45	48.4
Fracture and dislocation	2	2.2

Table-2. General characteristics of patients according to gender

	Male		**Female**		**p**
	Mean	**SD**	**Mean**	**SD**	
Age (years)	42	18.3	44.8	19.2	0.544
	n	**%**	**n**	**%**	
Cause of admission					0.008
Non-occupant motor vehicle trauma	10	17.2	2	5.7	
Motor vehicle occupant trauma	15	25.9	4	11.4	
Falling down from height	29	50	27	77.1	
Contusion	4	6.9	-	-	
Osteoporosis	-	-	2	5.7	
Type of fracture					0.480
Burst fracture	26	44.8	19	54.3	
Compression fracture	30	51.7	16	45.7	
Fracture and dislocation	2	3.4	-	-	

DISCUSSION

Thoracolumbar fractures are more frequent in man (2/3) than in woman (1/3) and peak between the ages of 20 and 40 years [4]. Traumatic fractures occur at the thoracolumbar junction between 15 % and 30 % of, whereas 9 – 16 % occur in the thoracic spine [4]. Spinal cord injury occurs in 10 – 30 % of traumatic spinal fractures [6].

There is no consensus about timing and type of surgery about thoracal and lumbar fractures but stability of the vertebral column must be the focus of treatment [11]. There are many treatment options varying from conservative treatment to surgery for thoracolumbar fractures [2]. Early decompression (<12hour) resulted in better outcomes compared to both delayed decompression (>24hour) and conservative management in the literature [9]. The result of our study is supporting early decompression with better results.

Surgical options for thoracal and lumbar vertebral fractures are stabilization-fusion, vertebroplasty - kyphoplasty, laminectomy, discectomy and minimal invasive techniques like endoscopic and thoracoscopic approaches [10]. Thoracic and lumbar vertebral anatomy must be evaluated well before the surgery. Fusion is defined as a surgical technique used to join two or more vertebrae. The goal of internal fixation for fusion is to reconstruct the compromised columns within a spinal motion segment with non-biologic materials, affording temporary immobilization and stabilization until bony fusion can develop [11]. Bone graft is used in conjunction with the body's natural bone growth processes to fuse the vertebrae. Fusion with instrumentation utilizes stainless steel, titanium or non-metallic devices to stabilize the spine. Fixation is successful when a construct can withstand the wear and tear of stresses and strains until fusion occurs [10].

Thoracic and lumbar fractures are frequently seen healthcare problems. Surgery or conservative treatment could be chosen according to fracture type. Surgery must be done urgently if neurological deficit is present. Our clinical results that similar to literature show us that early decompression-fusion surgery could give positive feedback to recovery of neurological deficits.

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