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THE EVALUATION OF PATIENTS WITH MULTIPLE LEVEL SPINAL FRACTURES ADMITTED TO A SINGLE INSTITUTION: A RETROSPECTIVE STUDY

Nur Gülce İşkan[1], Ece Şenyiğit[1], Begüm Söyleyici[1], Mert Çiftdemir[2]

[1] Trakya University School of Medicine, Edirne, TURKEY
[2] Department of Orthopedics and Traumatology, Trakya University School of Medicine, Edirne, TURKEY

ABSTRACT

Aims: The aim of this study is to evaluate the data of the patients who are diagnosed with multiple level spinal fractures and to find out the most common level of fractures. Furthermore, this data will be examined regarding patients' age, gender, fracture type, cause of the injury, and type of the treatment in order to get a baseline data to improve future outcomes.

Methods: The data of 42 patients who were diagnosed with multiple spinal fractures in Trakya University Faculty of Medicine Department of Orthopedics and Traumatology in between 2012 and 2017 was analyzed retrospectively. In order to understand the incidence of multiple spinal fractures in both genders, type of the treatment and cause of the injury, descriptive analysis as arithmetic mean ± standard deviation, number and percentages, median (mini¬mum-maximum) were used.

Results: There were 42 patients including 32 (76.2%) men and 10 (23.8%) women with a mean age of 41 years. The most common level of injury was T12 (17.5%). The incidence of T11-L1 fractures is 62.1%. 20 (47.6%) of the fractures were caused by motor vehicle accidents. 26 patients were treated surgically and 13 patients had conservative treatment.

Conclusion: Multiple level spinal fracture is a very important clinical problem. It is seen mostly in men and middle-aged population. Thoracolumbar transition (T11-L2) is the most affected region due to the biomechanics of vertebral column. The most common causes of the multiple spinal fractures are motor vehicle accidents and falls. Management of multiple level spinal fractures are based on surgical or conservative treatment modalities. Choosing the correct treatment option for a patient with multiple level spinal fractures depends on several factors.

Keywords: Spinal fractures, retrospective study, traffic accidents

INTRODUCTION

Spinal fractures are crucial clinical problems due to the possibility of causing spinal cord injury (1). The prognosis depends on how the whole spinal cord has been affected, therefore it can vary significantly (2). Spinal fractures are more common among men between ages of 15-29 (3).

Thoracolumbar fractures which are the most commonly seen among all other spinal fractures are frequently associated with major injuries of the chest and abdomen with high-energy trauma such as motor vehicle accidents, gunshot wounds, and fall from a height (4, 5).

Studies show that vertebral fractures cause serious morbidity including depression related with chronic pain and deformity, decreased pulmonary functions, psychosocial problems related with mobility failure and decreased quality of life (6).

The most crucial approach in the treatment of spinal fractures is to limit the neurological damages and to prevent them if possible. The aim of the treatment is to maintain the stabilization of vertebral column as the other injuries of skeleton and to provide the continuity of functions. After fracture, stabilization of vertebra is provided with various treatment procedures (1, 4). In treatment, fractures are classified using several classification systems and according to the chosen classifica-

tion, conservative and surgical treatment regimens are followed. However, there is still a debate about treatment of spinal fractures due to the fact that some terms are not approved universally (3).

The aim of this study is to evaluate the data belonging to the patients who are diagnosed with multiple spinal fracture in Trakya University Faculty of Medicine Department of Orthopedics and Traumatology between 2012-2017 and to find out the most common level of fractures. Furthermore, this data will be examined regarding patients' age, gender, fracture type, cause of the injury, and type of the treatment. This analysis will provide a baseline data to improve future outcomes.

MATERIAL AND METHODS

This study was approved by Trakya University Faculty of Medicine Scientific Research Ethics Committee with the decree no. 11/14. In this study, the data of 42 patients who were diagnosed with multiple level spinal fractures between 2012 and 2017 in Trakya University Department of Orthopedics and Traumatology were analyzed retrospectively. Patients pre-diagnosed with multiple spinal fractures were selected from online database of Trakya University Hospital. Afterwards, the patients' diagnoses were confirmed using Picture Archiving and Communication Systems (PACS). In evaluating the data, injury mechanism, patients' age and gender were recorded and fractures are classified according to Magerl's classification: type A (vertebral body compression), type B (anterior and posterior element injury with distraction), and type C (anterior and posterior injury with rotation) (7).

After data collection, all of the data was analyzed by using SPSS. In order to understand the frequency of multiple level spinal fractures in both genders, injury mechanisms, and treatment options descriptive analysis as arithmetic mean ± standard deviation, number and percentages, median (minimum-maximum) were used.

RESULTS

The data of 42 patients were analyzed. 76.2% of patients were male and 23.8% were female. Among 42 patients, minimum age was 12 and maximum age was

69. The mean of ages was found as 41 years.

A total of 120 fractured vertebrae were found in cervical, thoracic and lumbar regions of 42 patients. Table 1 shows the numbers and the percentages of all fractures in each level of vertebral column. Both thoracic and lumbar fractures were observed in 18 (42.9%) patients. In 12 (28.6%) patients, only thoracic fractures were noticed and 8 (19%) patients had only lumbar fractures. C5 and C6 were the most fractured vertebral levels in cervical level. In lumbar levels, L1 was the most common fractured vertebral level with the percentage of 16.67%. 13 fractures of 120 were in L2. T12 was noticed as the most frequent one among thoracic vertebrasewith 21 fractures (17.5%). The most common fractured vertebrae are shown in Table 2. The type of the fractures can be seen in Table 3.

Table 1: All fractures in each level of vertebrae

Level	Number (n)	Percentage (%)
Cervical	5	4.17
Thoracic	32	26.67
Thoracolumbar	67	55.83
Lumbar	16	13.33

Table 2: The most common fractures in spinal column

Level	Number (n)	Percentage (%)
T12	21	17.5
L1	20	16.66
T11	13	10.83
L2	13	10.83

Table 3: The type of the fractures (Type A: vertebral body compression, type B: anterior and posterior element injury with distraction, and type C: anterior and posterior injury with rotation (7))

Type	Number (n)	Percentage (%)
A	31	73.8
A and B	3	7.1
B	4	9.5
C	4	9.5

Twenty of the fractures (47.6%) were caused by motor vehicle accidents. Falling was the second most common cause with the percentage of 38.1%. The data of 4 patients were missing.

Twenty-six patients (61.9%) underwent surgical treatment and 13 patients (31%) had conservative treatment. 1 patient was sent to epicenter because of his own request and the data of 2 patients were missing.

DISCUSSION

Multiple level spinal fractures are clinically important because of the risk of spinal or brain injury (1). They can be caused by motor vehicle accidents, fall from a height or any other accidents which happen in daily life (4, 5).

In this study, it is found that multiple level spinal fractures are more common in men than women with a percentage of 76.2%. This finding is compatible with the literature (1, 3). Since the most common causes of multiple spinal fractures in this study are motor vehicle accidents (47.6%), it is important to evaluate the gender ratio among drivers. In 2015, the percentage of male drivers in Turkey is 76.2% (8). Therefore, it could be said that because most of the drivers are male, it is expected men to be affected by multiple spinal fractures more than women.

According to the literature, spinal fractures are more common in the age of 38 than in previous years and mean is increasing year by year (3). In this study, the mean of ages was found as 41. Therefore, the results are compatible with the literature.

In this study, T11, T12, L1, and L2 are the most affected levels of the spinal column. These vertebrae constitute the thoracolumbar transition. The increased susceptibility of this region to fractures is due to the transition of the rigid thoracic spine to mobile lumbar spine (9). Neurological deficits occur more often in these situations due to biomechanical features of the spinal column (3, 9). According to the local studies, the percentage of T11-L1 fractures is 62.1% (3). It is also showed in many multi-centered studies that this region is the most commonly affected level (3). In addition, C5 and C6 were the most common fractured vertebrae. This may be due to the overexposal of C5 and C6 to functional overloading and micro traumas of daily life (10).

It is found that the most common causes of the fractures are motor vehicle accidents (74.6%) followed by falling (38.1%). According to the literature, motor vehicle accidents are also the leading cause and after the age of 45, the leading cause becomes falls (11). Motor vehicle accidents cause a high-energy trauma in the spine and falling causes a direct axial compression to the vertebral column which may lead to multiple level spinal fractures (12).

There are different methods in treatment strategies and while choosing the best treatment approach, the neurological condition of the patient, additional injuries (if any is present), the relationship of the patient with his biological and social environment before the trauma, patient's expectations, and the medical condition of the patient is important (1). The goal of the treatment is to maintain the stabilization of vertebral column with improving or maintaining its functions. (1, 4). Surgical or conservative treatment are the main approaches included in this study (Figure 1 and Figure 2). Surgical treatment is used in most of the patients because of its advantages such as providing early stability in the patients who do not tolerate the plaster or long-term bedrest. Therefore, the patients can move or sit and start the rehabilitation earlier (3).

As a conclusion, multiple level spinal fracture is a very important clinical problem. It is seen mostly in adult males. Thoracolumbar transition (T11-L2) is the most affected region due to the biomechanics of vertebral column. The most common causes of the multiple level spinal fractures are motor vehicle accidents and falls. In management of multiple spinal fractures, there are different approaches such as surgical or conservative treatments.

Figure 1: The pre-operative MRI (A) and post-operative radiographic images (B, C) of a patient who had type A fractures of T11-12 and L1-2.
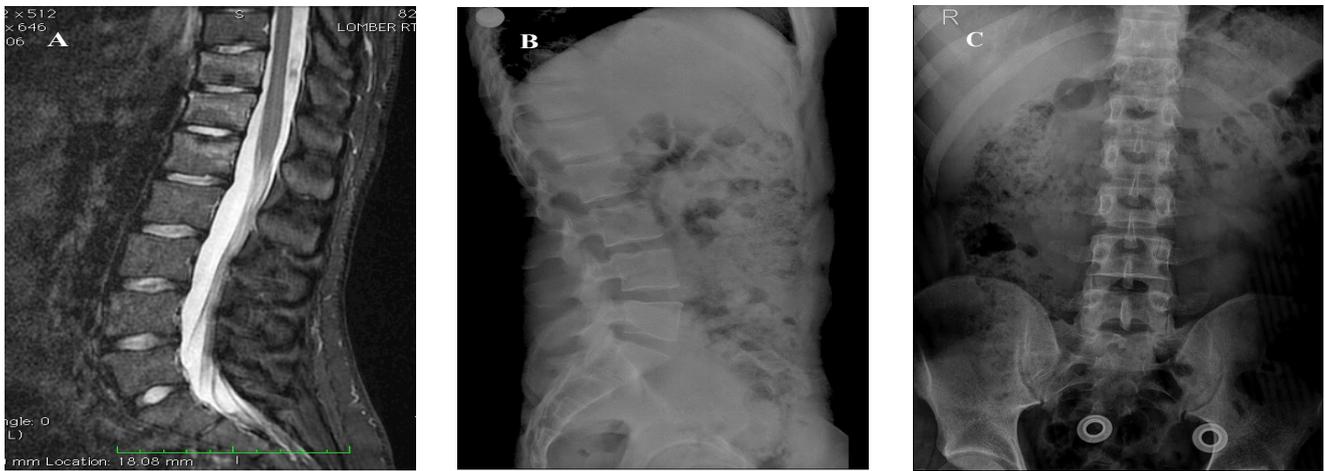

Figure 2: The MRI of a patient who had type A fractures of T11-12 and L1 (A) and radiographic images with TLSO corset (B, C).

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