

Research Article

Evaluating the prognosis of surgical treatment for lumbar and thoracic fractures

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ABSTRACT

Background: In spinal column fracture remedy, using the surgery method with indirect setting as a bone and retro fixation by multi segment system fellow with pedicular screw is the selected method that has strength fixation and improvement results and its protection take short fusion. The aim of this study is to determine prognosis of thoracic and lumbar traumatic fracture surgery treatment in the patient's referred to Ardabil Fatemi Hospital.

Methods: This is a retrospective cross-sectional descriptive study that was done in patients who were taken under surgery of settling the pedicular screw in Ardabil Fatemi Hospital from 2007 to 2010 by thoracolumbar vertebrae fracture diagnosis. Necessary information included the fracture mechanism, the fracture kind, the fracture place, the number of broken vertebrae, the time between fracture occurring to surgery, the neurologic condition before and after surgery collected and analyzed by statistical methods in SPSS.16 software.

Results: The common mechanism of fracture was related to the accident, and the common kind of fracture was compression. The maximum plenty of the place of breakage was related to T12 and L1. The neurologic condition of before and after surgery was improved meaningfully. The infection was revealed in 6.2% and fusion in 97.9%. The maximum plenty related to the returning to the job was 6 months. The level of urinary incontinence after surgery was decreased significantly as compared with before surgery.

Conclusion: Results showed that doing the surgery with pedicular screw was effective in prognosis of patients suffering to thoracolumbar fractures.

Keywords: Pedicle screw, Multi segment system, Compression fracture, Prognosis

INTRODUCTION

Annually, more than 150 thousand people in the U.S. get spinal fractures. Among the different types of fracture thoracic and lumbar fractures are the most common ones with annual incidence rate about 64 cases per 100 thousand people.¹ Fractures or fractures with subluxation of the spine are severe injuries that mostly occur among youth. These injuries mostly result from accidents, falls, and direct collisions. The thoracic region due to its connections with ribs has less mobility compared to the lumbar region, thus

this region shows minor resistance against the exerted forces which leads to its deformity. Furthermore, because of enduring the body weight, this region is the most vulnerable part to burst and compression fractures. Instability and progressive neurological symptoms are the main factors in these injuries that cause serious complications like spinal cord injury or sensory motor disorder beside acute pain while relaxing or doing activity, and worsen prognosis.²⁻³ Therefore, the neurologic examination of the number and site of fractured vertebrae is necessary for initial evaluation and subsequently in managing the spinal injuries.

Surgery (correction and relocating + fixation by screw), and multi-segment system with transpedicular Screw (Cottrell-Dubouset [CD]) are applied as effective optional treatment for the fractures of anterior and middle column (compression fracture) and posterior column along with it (burst fracture).⁴⁻⁶ As transpedicular screw passes through pedicles, enters posterior part of vertebral body which is, in turn, part of middle column, and reaches to anterior part of vertebral body, resulting in posterior spinal fusion in the posterior spinal column. This method can be more easily performed than anterior fusion in which there is a need to open the abdomen or chest.

Using Frankel neurological classification and prior to undergoing surgery, patients with thoracic and lumbar spine fractures were assigned to Groups A-B-C-D-E, and following surgery the patient's improvement was evaluated adopting the above-mentioned method. However, as mentioned above, this method also has some complications. The purpose of the present study was to determine the degree of prognosis of surgical treatment for lumbar and thoracic fractures which was conducted in one hospital of the Ardabil city.

METHODS

This cross-sectional retrospective study was conducted over the patients with the lumbar and thoracic fractures who had undergone CD implantation surgery (transpedicular screw fixation) between the years 2010 and 2013 in Fatemi Hospital. All the patients that had unstable fractures of thoracic and lumbar spine with or without neurological symptoms and required surgery were included in this study.

In the present study, after obtaining preliminary data, the file number, and date of surgery from neurology operation room's records and carrying out the legal procedure in the filing unit of hospital, the patients' records were investigated. Subsequently, the preoperative questionnaire including items about fracture mechanism, fracture type, fracture location, fractured vertebrae number, time between fracture occurring and surgery performing, preoperative neurologic status of the patient, and the presence or absence of urinary incontinence was completed. Additionally, the patients' address and phone number for post-operative and follow-up examinations were written down. By meeting the patients who were accessible at their home, and making phone contact with those who were not accessible, the post-operative questionnaires were completed. This questionnaire contained items related to the patient's ability to do daily activities, urinary incontinence, time of return to work, post-operative neurological status, and the presence or absence of infection and device failure. All surgeries had been performed by specialists. In addition, fusion had been done in the posterolateral form. Bone chips and iliac crest had been used as a graft in several patients. Evaluation of the patients was mostly done in the acute post-operative phase in 1 or 2 months after surgery when the patients refer to clinic or office for follow-up examinations. However, a number of patients because of phone unavailability couldn't be examined. The gathered data were analyzed using descriptive statistics by SPSS version 19.

RESULTS

Total number of patients before surgery was 100. Of this number, 69 patients (69%) were male, and 31 patients (31%) were female. Most people belonged to the age group of 20-29 year olds. Regarding the mechanism of fracture, there were 53 cases (53%) of accidents, 42 cases (42%) of falling, and 5 cases (5%) of being hit by objects. In respect of the type of fracture, 47 cases (47%) had compression fracture, 43 cases (43%) had burst fracture, and 10 cases (10%) had fracture with dislocation/subluxation. In 65 cases (65%) of the patients, there was only one vertebral fracture. Before surgery 28 patients (28%) and after surgery 10 patients (10.2%) had urinary incontinence. According to Frankel grading, concerning neurological status, 41 cases (41%) were classified into Group E before surgery while this number increased to 75 cases (78.5%) after surgery.

The time between fracture occurring and surgery performing was early (2-10 days) in 89 cases (89%), and late (more than 10 days) in 11 patients (11%). After surgery, 6 patients (6%) had infections, 7 patients (7.1%) had relatively limited daily activities, and 9 patients (9.2%) had limited daily activities. Failure was seen in 3 cases (3.06%), of whom 2 cases had rod fracture, and 1 case had digital displacement transmission displacement.

Pre-operatively, there was pain in all patients, but post-operatively, only 24 cases (24%) suffered from pain during activity, and 11 cases (11%) had pain during rest and activity. Of the patients, 19 cases (19.4%) needed revision operation. Among the reasons, severe pain in the stomach, was the main reason for revision operation in 7 patients (36.8%) (Table 1). Follow-up period for the patients varied from 15 to 38 months, with an average of 26.5 months. In 13 patients CDs (transpedicular screws) were taken out, most often because of patients' suffering from severe pain, i.e. in 7 cases (58%). The average time for the return to work in patients was 8.7 months after surgery, with a range of 1-18 months. CD (transpedicular screw) placement as the surgical treatment improved the lumbar and thoracic fractures, and the patient's neurological status based on Frankel grading. Urinary incontinence before surgery was 0.28% that rose to 11.2% after surgery. There was no significant relationship between the number of fractured vertebrae and post-operative pain. And there was

Table 1: Frequency distribution of further surgery in patients.

Causes	N (%)
Infection	6 (31.6)
Severe pain	7 (36.8)
Non fusion	2 (10.5)
Rad fracture	2 (10.5)
Limitation of motion	1 (5.2)
DDT movement	1 (5.2)
Total	19 (100)

DDT: Digital displacement transmission

a significant relationship between the mechanism of fracture and post-operative pain. And the most severe post-operative pain related to fracture mechanism was seen in being hit by objects. Significant association was found between post-operative infection and implant failure. Implant failure in those who had infections was about 18.2% greater than those not infected.

DISCUSSION

The use of surgery in the thoracic and lumbar spine fractures using transpedicular screw and CD placement system has several advantages. Firstly, considering that patients have pain and tenderness in fractured vertebrae in the days before surgery, and inasmuch as most of patients are young and in their helpful periods of their lives, additionally, due to concerns about their future quality of life, the amount of their consent for undergoing surgery is too high. Secondly, since transpedicular screw embraces all three parts of posterior, medial and anterior vertebral column, not only does it bring about better stability, but also it is possible to exert every kind of force (pressure - distraction or rotation) during surgery to spinal column in order to improve its existing malformation.

Because of the achieving greater stability, fusion would be required only in a few limited segments in this method. And there would be no limitation in movement. However, long-term fusions would lead to pain in the spine. This condition, in addition to offering higher amount of mobility to spine, increases the likelihood of fusion by immobility of the respective segment. These factors collectively contribute to maintaining or producing the natural curvature of the spine, and prevent from complications such as flat back syndrome in the lumbosacral region of the spine.

Because of not using the hook and posterior tools, this surgical procedure can be used in spinal injuries such as trauma infection that cause destruction of the posterior vertebral structure.⁷⁻¹⁰ Basically, pain in patients who are undergoing revision surgery due to both somatic and psychological reasons were higher.¹¹ A number of patients complained about motion limitation of their spines 2 years after surgery. Therefore, since the fusion time had elapsed, they took the CD (transpedicular screw) out.

CONCLUSIONS

The results showed that the method of transpedicular screw operation improves the prognosis in patients with fractures in thoracic and lumbar spine. The amount of fusions went up in patients, and their neurological status improved according to Frankel classification. There was a significant improvement for pain and urinary incontinence in patients, as well.

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