Original Article

Surgical Outcome of Transpedicular Fixation in Thoracolumbar Injuries

Adnan Munir, Muhammad Idris Khan, Sajjad Ullah and Sajid Mehboob

ABSTRACT

Objective: The research aims to outline the surgery result of thoracolumbar injuries using short-segment pedicle screw fixation.

Study Design: A retrospective- study

Place and Duration of Study: This study was conducted at the Khyber Teaching Hospital in a time duration of 2 years i.e., from 05-Jan-2020 to 05-Jan-2022.

Methods: All 'thoracolumbar' injuries treated through surgery were reviewed retrospectively. The short-segment approach was used to instrument the 84 participants treated through surgery. A magnetic resonance imaging (MRI), computed tomography scans (CT), prior and post operative images, patient records, and operative records were all obtained. The review included neurologic observations (Frankel functional classification) and follow-up records for a maximum of six months.

Results: Transpedicular stabilization was carried out in 84 individuals. The male to female ratio was 2:1, with 56 male and 28 female patients. Age ranged from 18 to 65 years old, with a mean of 43±14.867. Injuries varied in severity among the age ranges. There were variations in the severity of injuries among different age categories. Frankle grading was used to evaluate the result. There was no increase in neurological impairment in any patient. The majority of patients improved. Eight cases had hardware failure, sixteen had bed-sores, and three had deep venous thrombus. Misplaced screw in 5 scenarios. Eight patients developed superficial wound infections.

Conclusion: The short-term monitoring results indicate an effective outcome for short-segment instrument, even though the long-term monitoring assessment needs to be established.

Key Words: Pedicle screws instrument, 'thoracolumbar' injuries, Short-segment fixing.

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INTRODUCTION

With the advancement of 'Transpedicular fixation' using screws methods and instrument systems, short-segments equipment—which involves fixing the fractured vertebra and a single healthy vertebrae superior and inferior to a wounded segment—has become a common clinical procedure[1]. In 1944, King et al., first described the process of fixing screw into the body of a vertebra through the transfacet entry to the lumbar vertebrae. Boucher et al presented an alternative method of inserting screws into the vertebrae. Pedicle screws have been utilized extensively in lumbar spine disorders ever since pedicle screw fixation became common[2-5].

Department of Neurosurgery, Khyber Teaching Hospital, Peshawar.

Correspondence: Muhammad Idris Khan, Assistant Professor of Neurosurgery, Khyber Teaching Hospital, Peshawar.
Contact No: 0333 3411827
Email: idrisnsw83@gmail.com

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There is ongoing debate regarding the best way to treat 'thoracolumbar' injuries[6]. The Transpedicular short-segment design is for restoration of the anterior spine avoiding the requirement for anterior struts grafts or plates fixing, to avoid an extensive arthrodesis of the mobile parts[6]. The function of the pedicle screw revealed by researches are widened by the usage of these screw, which may limit the range of spinal segment while decreasing harm of delicate tissues and enhance the rate of synostosis over traditional fixing through hooks and wires[7]. Numerous adverse outcomes have been documented thus far using this technique[8–10]. The supporters of conservative therapies argued that the only way to have good outcomes was to use postures in the interventions as well as long-term rest[11,12]. Conversely, for those who recommend surgery, patients should anticipate early ambulation, the ability to carry out rehab measures, the ability to recover from anatomical injuries, and, in the majority of cases, an enhancement in neurological function[13]. Numerous complaints of worsened stenosis of the spine, rising pressure on the body of the vertebrae, increasing curving of the spine, radiculopathy and bed-sores were made following conservative therapies[9]. This paper assesses the result through surgery from

short segment pedicle fixing with screws in 84 'thoracolumbar' spinal injuries.

METHODS

A retrospective- study was conducted for 2 years (05-Jan-2020 to 05-Jan-2022) in Neurosurgery Department of Khyber Teaching Hospital. All surgery treated 'thoracolumbar' injuries was conducted, taking into account a number of clinical factors including age, gender distribution, injury level, and causation. Individuals with 'thoracolumbar' injuries received admission to the neurosurgery department of Khyber Teaching Hospital.

In 84 individuals, short-segment 'Transpedicular fixation' was carried out. Review materials included visuals, operative note, and radiographic images from before and after surgery, CT images, MRI, and data from follow-up visits ranging to six months. Denis three-column system of classification was used to classify injuries.

To evaluate neurologic state, spinal cord injury patients were given a Frankel grading system. A recommendation for surgical intervention that required decompression and fixation: increase curve of the spine greater than 20 degrees, vertebrae collapse more than 50% of whole length, and more than 50% of the canals compromised. Radiography was used for the follow-up evaluation. A standard X-ray was taken to examine the fracture. CTs and MRIs were performed for every individual to make sure reliable detection of the destruction to the vertebrae.

RESULTS

In 84 cases, 'Transpedicular fixation' was carried out, comprising, as indicated in Figure 1, 56 men and 28 women, with a male to female ratio of 2:1. Age ranged from 18 to 65 years old, with a mean of 43±14.86. There were (6) D11 injuries, (9) D12 injuries, (40) L1 injuries, (19) L2 injuries, (8) D 12 & L1 cases, and (2) L3 cases (Fig 2).

Using the Frankel grading system, the postoperative outcomes are as follows: Among Grade (A) patients, 3 individuals advanced to Grade (B), while the remaining patients remained at Grade (A). In the case of Grade (B) patients, 12 individuals experienced improvement and progressed to Grade (C). Within the Grade (C) category, 15 patients showed improvement, moving up to Grade (D) (Table 1 and 2). Patients initially classified as Grade (E) showed no observed changes and remained static. It is important to note that all patients were enrolled in rehabilitation programs within three weeks of their surgeries, indicating a prompt and proactive approach to postoperative care.

Short segment trans-pedicure fixation with decompression of neural components was the surgical technique. Each individual had six months of monitoring and follow-up. Following surgery, the individuals were evaluated using the Frankle grade. There were 6 incidents of hardware failure and 18 incidents of bed-sores on, 2 cases of deep venous thrombosis, 7 cases of a misaligned the screws and 9 cases of infections of wounds.

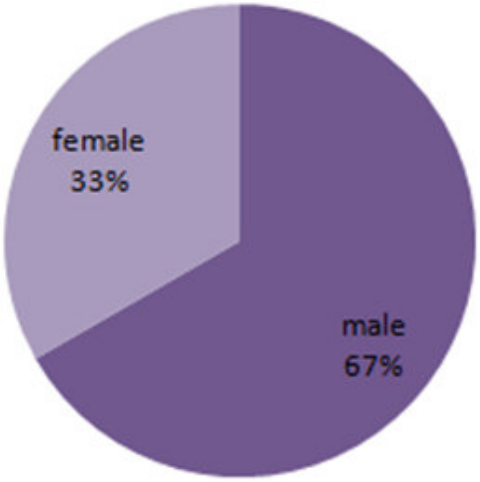

Figure No. 1: Show prevalence of males and females

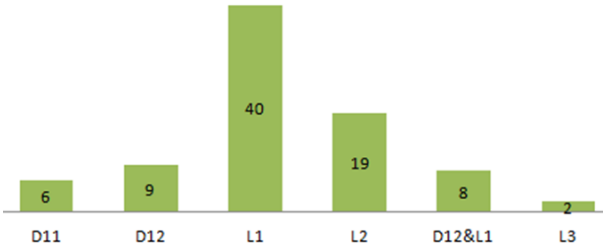

Figure No. 2: Fracture at Various Levels

Table No. 1: Frankle Grading of individuals prior to surgery

Grades	No (n)	Percentage (%)
A	18	21.4%
B	20	23.8%
C	30	35.7%
D	10	11.9%
E	6	7.1%

Table No. 2: Frankle Grading of individuals after surgery

Grades	No (n)	Percentage (%)
A	15	17.8%
B	11	13.0%
C	27	32.1%
D	25	29.7%
E	6	7.1%

DISCUSSION

The aim of treatment fractured vertebrae is to stabilize the physically damaged vertebrae segments, achieve early neurological decompression, and achieve a stable and solid fixation in order to begin recovery and

rehabilitation early[14]. In many healthcare facilities, pedicle screw fixation in thoracolumbar spine fractures is the standard therapy for fusion and stability[8, 11, 12, 15]. Clinically comparison and assessments between pedicle screw, hook, Luque rod, sub laminar wire, and Harrington rod were conducted on participants. The results showed that pedicle screws fixing could be applied to short segment than any other fixing posterior tool[16].

As a result, an excellent posterior fixing technique perfect for this use is pedicle screw fixation[17]. Benefits of short segment fixation are that it fuses a short segment of the spine and thus maintains the mobility of other healthy segments. It is also widely accepted and simple for spine surgeons. However, the challenge of reconstructing the anterior column is acknowledged as a drawback. Failing to regain the anterior column stability can result to subsequent curving of spine, instability, unease and later development of neurologic issues, depends mostly on remaining stress transfer capability of the injured vertebra segment.

This trial showed positive outcomes, with no patient experiencing a worsening of their neurological condition following pedicle screw implantation. Pedicle screws are helpful in cases of serious injuries including injuries displacement and can be used in both the lumbothoracic vertebra of the spine. Despite posterior fixing and fusion, published reports suggested an implant infectivity of roughly 6%[2], however, no sign of implant infection was observed in this study.

According to another study, individuals with thoracolumbar segments injuries but without neural injury responded good to conservative treatment. Though these results were unrelated to the radiological finding, individuals with thoracic and lumbar segmental injuries without neural injury were able to return to their normal lives more easily after undergoing surgical spinal fixing[9].

Significant benefits of fixing through surgery over interim therapies include timely individual mobility following fixing, which reduces the risk of neural injury by stabilizing the spine[2]. Neurologic abnormalities can be restored, shields injured structures from outside influences, and replaces the damaged structure with the proper internal fixing tools. According to another study, posture-based therapies would suffice and allow patients to regain mobility following a long time rest that restored their core strength[18].

CONCLUSION

The Transpedicular fixing technique is a secure, simple, reliable method. In simulated anatomy, individuals revealed adequate fusion and effective recovery without any issues. However, this research's shorter follow-up time poses a limitation.

Author's Contribution:

Concept & Design of Study:	Adnan Munir
Drafting:	Muhammad Idris Khan, Sajjad Ullah
Data Analysis:	Sajid Mehboob
Revisiting Critically:	Adnan Munir, Muhammad Idris Khan
Final Approval of version:	Adnan Munir

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