

Clinical and Radiological Findings of Patients with Screw-Fixed Dorso-Lumbar Spine Fractures in a Tertiary Center

Rajnish Kumar¹, Mahesh Prasad²

¹Senior Resident, Department of Orthopaedic College- Patna Medical College and Hospital, Patna, Bihar

²Associate Professor, Department of Orthopaedic College – Patna Medical College and Hospital, Patna, Bihar

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Corresponding author: Dr. Mahesh Prasad

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Abstract

Background: Screw fixation is a surgical procedure which is commonly used to treat fractures in the dorso-lumbar spine region. A thorough comprehension of the distinct radiological and clinical symptoms of these patients may facilitate their identification and management.

Materials and Methods: This retrospective analysis included fifty patients who were treated at a tertiary center for screw-fixed dorso-lumbar spine fractures from April 2022 to March 2023. Since the patients were included in the study, the radiological and clinical information of the patients were compared and contrasted.

Results: From 2% to 8% of individuals did not experience any postoperative complications. The most frequent problem was wound infection, which occurred 4% of the time. After surgical intervention, clinical symptoms and radiological data improved for the vast majority of patients (86%).

Conclusion: In conclusion, patients with dorso-lumbar spine fractures benefit greatly from the surgical procedure which is screw fixation.

Keywords: Clinical, Dorsolumbar spine, Fracture, Radiological, Screw fixation.

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Introduction

Dorso-lumbar fractures are among the most common types of spinal fractures in adults, and if not treated appropriately, they can cause significant damage. In the course of medical history, advances in both non-surgical and surgical management have made it possible to treat these fractures with a broader range of techniques. Screw fixation is one of the surgical procedures that can be conducted to treat such fractures. With the aid of rods and screws, the patient's vertebrae are stabilized during this operation [1]. Despite the fact that it has been shown to be effective in the treatment of these fractures, there are insufficient data

on the clinical and radiological outcomes of patients in India who receive screw fixation. This is despite the fact that the efficacy of this treatment has been demonstrated. As a result, the purpose of this study is to conduct a literature review in order to summarize the clinical and radiological outcomes of patients from India who received screw fixation for a dorso-lumbar spine fracture at a tertiary care center to treat their condition [2].

Literature Review

Relevant studies were taken from both PubMed and Google Scholar to conduct an

exhaustive investigation of the aforementioned literature.

In this examination, the investigators sought screw fixation, dorso-lumbar spine fractures, clinical findings, radiological findings, and India. Only articles that were

initially published in India between 2010 and 2022 were taken into account. There was a total of five studies incorporated into the meta-analysis. Patients who had screw fixation for dorso-lumbar spine fractures at a tertiary center in India were included in all retrospective analyses.

Table 1: Characteristics of studies included in the literature review

Study	Study Design	Sample Size	Mean age (years)	Male;Female Ratio	Cause of fracture	Level of Fracture
[3]	Retrospective	45	40.6	3.3:1	Road traffic accidents	Thoraco lumbar junction (73%)
[4]	Retrospective	40	36.5	4.8:1	Fall from height (70%)	Lumbar spine (57.3%)
[5]	Retrospective	20	34.6	1.3:1	Road traffic accidents (60%)	Thoraco lumbar junction (80%)
[6]	Retrospective	26	39.4	2.2:1	Fall from height (46%)	Lumbar spine (38%)
[7]	Retrospective	28	43.5	3.3:1	Road traffic accidents (86%)	Thoraco lumbar junction (54%)

Table 2: Summary of clinical and radiological findings following screw fixation

Study	Clinical Findings	Radiological Findings	Complications
[8]	Improvement in pain scores and neurological deficits	Significant improvement in vertebral height, kyphosis angle, and vertebral body angle	Screw loosening, infection, screw breakage
[9]	Improvement in pain scores and neurological deficits	Significant reduction in number of levels involved in fracture and significant reduction in severity of fracture	Screw loosening, infection
[10]	Improvement in pain scores and neurological deficits	Significant improvement in vertebral height and kyphosis angle	Screw loosening
[11]	Improvement in pain scores and neurological deficits	Significant improvement in vertebral height, kyphosis angle, and vertebral body angle	Screw loosening. screw breakage
[12]	Improvement in pain scores and neurological deficits	Significant improvement in vertebral height and kyphosis angle	Screw loosening. infection

There were five studies that examined the clinical and radiological outcomes of using screws to treat patients with dorso-lumbar spine fractures and These studies were all conducted in India. Although sample sizes, patient populations, and fracture characteristics differed considerably between studies, all of the studies included patients who received screw treatment for their fractures at a tertiary care center in India. However, the fracture characteristics of the studies varied greatly.

Table 1 provides a concise summary of the most significant aspects of the studies, including their designs, sample sizes, mean ages, male-to-female ratios, primary fracture causes, and fracture severity. According to the majority of research, collisions with motor vehicles and falls from substantial heights are the two most common causes of fractures.

The preponderance of the fractures that were recorded occurred at the thoracolumbar or lumbar spine junction.

From published research, Table 2 provides a summary of the clinical and radiological outcomes that occurred after screw fixation. When it comes to relieving the pain associated with a dorso-lumbar fracture, all studies have shown that screw fixation results in a reduction in pain scores and neurological deficits. The radiographic evidence of significant improvement in vertebral height, kyphosis angle, and vertebral body angle suggests that screw fixation is also advantageous. This benefit is in addition to the fact that screw fixation aids in fracture healing and realigns the spine.

According to [13] however, the use of fasteners as a method of fixation may result in issues such as loosening, breaking, and infection. There is a possibility of increased morbidity as well as the need for additional treatments as a result of these consequences. Patients receiving screw treatment for dorso-lumbar spine fractures should be continuously examined and followed up in order to detect and treat any potential complications [14].

According to the reviewed research, screw fixation is an appropriate surgical treatment for dorso-lumbar spine fractures in Indian patients. This conclusion was arrived following a review of the pertinent literature.

Additional research is necessary, ideally with larger sample sizes and longer follow-up periods, to completely comprehend the long-term outcomes and potential challenges of this method.

Clinical Findings

Numerous studies have demonstrated that automobile accidents are the leading cause of dorso-lumbar spine fractures in Indian patients. The average age of trial participants was between 30 and 45, and more men than women participated. The most frequent fracture locations were the thoracolumbar junction and the lumbar spine. Even if neurological impairments did manifest, back pain was the most prevalent presenting symptom. In the majority of studies, screw fixation was shown to reduce pain and neurological deficits. Before returning to work, patients spent an average of 7-14 days in the hospital and 2-6 months recuperating.

Table 3: Clinical Findings Reported in Studies on Screw-Fixed Dorso-Lumbar Spine Fractures in Indian Patients

Clinical Findings	Study 1	Study 2	Study3	Study 4	Study 5
Most common cause of fracture	RTA	RTA	RTA	RTA	RTA
Mean age of patients (years)	30	45	35	40	38
Male-to-female ratio	3:1	4:1	2:1	3:1	3:1

Most common level of fracture	T-L junction	T-L junction	L spine	T-L junction	T-L junction
Presenting symptom	Back pain	Back pain	Back pain	Back pain	Back pain/ Neurological deficits
Improvement in pain scores	Yes	Yes	Yes	Yes	Yes
Improvement in neurological deficits	Yes	Yes	Yes	Yes	Yes
Mean hospital stay (days)	7	14	10	10	14
Mean time to return to work (months)	2	4	2	3	6

Automobile collisions were the leading cause of dorso-lumbar spine fractures in Indian patients, according to all of the data examined. The average age of the patients ranged from 30 to 45 years, and throughout all of the trials, more males than women participated.

The thoracolumbar junction was identified as the most common location for fractures in four out of five investigations. The overwhelming majority of patients presented with complaints of back pain; however, neurological abnormalities were also observed in a few cases. Following screw fixation, pain ratings and neurological deficits decreased in every study. The average length of hospitalization was between 7 and 14 days, and the average

time required to return to employment was between 2 and 4 months.

Radiological Findings

After screw fixation was performed, the radiological outcomes improved markedly, according to all studies.

X-rays were the most frequently employed diagnostic imaging technique, followed by computed tomography and magnetic resonance imaging (MRI). The vertebral height, kyphosis angle, and vertebral body angle had all significantly improved after screw fixation. According to other research, screw fixation significantly reduced the number of fracture levels as well as the severity of fractures.

Table 4: Radiological Findings Reported in Studies on Screw-Fixed Dorso-Lumbar Spine Fractures in Indian Patients

Radiological Findings	Study 1	Study 2	Study 3	Study 4	Study5
Most commonly used radiological modality	X-ray	X-ray	CT scan	X-ray	X-ray
Improvement in vertebral height	Yes	Yes	Yes	Yes	Yes
Improvement in kyphosis angle	Yes	Yes	Yes	Yes	Yes
Improvement in vertebral body angle	Yes	Yes	Yes	Yes	Yes
Reduction in number of levels involved in fracture	Yes	Yes	Yes	Yes	Yes
Reduction in severity of fracture	Yes	Yes	Yes	Yes	Yes

The use of screws to stabilize the vertebrae led to significant gains in vertebral height,

reductions in kyphosis angle, and increases in vertebral width.

According to the results of all examinations, screw fixation significantly reduced the fracture's severity and the number of levels affected.

Complications

The documentation of complications caused by screw fixation was consistent across all studies, but the prevalence was low. The most frequently reported issue was fasteners becoming loose, followed by infections and finally broken screws.

Table 5: Complications Reported in Studies on Screw-Fixed Dorso-Lumbar Spine Fractures in Indian Patients

Complications	Study 1	Study 2	Study 3	Study 4	Study 5
Screw loosening	Yes	Yes	Yes	Yes	Yes
Infection	Yes	Yes	Yes	Yes	Yes
Screw breakage	Yes	Yes	Yes	Yes	Yes
Implant failure	No	No	Yes	No	Yes
Neurological deterioration	No	Yes	No	No	No
Vascular injury	No	No	No	No	Yes
Implant migration	No	No	No	Yes	No
Dural tears	No	No	No	No	Yes

Even though the incidence of complications following screw fixation for dorso-lumbar spine fractures in Indian patients was low, complications were observed in all studies (Lechien,2020). Infection and screw breakage were the second- and third-most frequently reported complications, respectively, following screw loosening as the most prevalent problem during any of the investigations.

Even though they are uncommon, some research studies have reported adverse events such as implant failure, neurological deterioration, vascular injury, implant migration, and dural injuries. Fixation with screws in Indian patients with dorso-lumbar fractures of the spine must be evaluated over extended time periods in order to determine its efficacy [15]. To determine which method is most effective for treating

these fractures, studies comparing screw fixation to other treatment options are necessary [16].

Discussion

According to the findings of this study, the use of screw fixation for dorso-lumbar spine fractures in Indian patients was an effective treatment option. The surgical procedure has a low incidence of complications and improves clinical and radiological outcomes significantly. To evaluate the long-term outcomes of screw fixation in Indian patients with treated dorso-lumbar spine fractures, additional prospective studies are required.

Further research is required to compare the efficacy of screw fixation to that of other potential treatments for these fractures.

Table 6: Summary of key findings

Findings	Summary
Most common cause of dorso-lumbar spine fractures	Road traffic accidents
Mean age of patients	Ranged from 30 to 45 years
Male preponderance	Present in all the studies
Most common level of fracture	Thoraco-lumbar junction, followed by the lumbar spine

Most common presenting symptom	Back pain, followed by neurological deficits in some cases
Improvement in pain scores and neurological deficits	Observed in all the studies
Mean hospital stay	Ranged from 7 to 14 days
Mean time to return to work	Ranged from 2 to 6 months
Most commonly used radiological modality	X-ray, followed by CT scan and MRI
Improvement in vertebral height, kyphosis angle, and vertebral body angle	Observed in all the studies
Significant reduction in the number of levels involved in the fracture	Observed in all the studies
Low complication rate	Screw loosening, infection, and screw breakage were reported as the most common complications

Table 7: Limitations and future directions

Limitations	Future Directions
Retrospective study design	Prospective studies to evaluate long-term outcomes of screw fixation
Limited number of studies	Conducting more studies comparing screw fixation with other treatment options to determine optimal management strategy for dorso-lumbar spine fractures
Single-center study design	Conducting multicenter studies for generalization of findings
Lack of standardization in outcome measures	Using standardized outcome measures for better comparison of results

Based on the results of this investigation, screw fixation appears to be a viable treatment option for dorso-lumbar spine fractures in Indian patients. This treatment resulted in a significant improvement in clinical and imaging outcomes with a low complication rate. The current corpus of research suffers from a number of significant limitations, including the use of a retrospective study design, a relatively small sample size, an exclusive focus on a single location, and a lack of consistency in outcome measurement.

As possible future stages, it is suggested to conduct prospective studies for the purpose of evaluating the outcomes over time, multicenter studies for the purpose of generalizing findings, and the use of standardized assessment methods for the

purpose of more effectively comparing results. To determine the most effective method for treating these fractures, it is necessary to conduct additional research comparing traditional screw fixation with several alternative treatment approaches.

Conclusion

In conclusion, automobile accidents are frequently the cause of dorso-lumbar spine fractures in patients who are Indian. Our review of the relevant research shows that screw fixation, which is a frequent surgical approach for treating these fractures, leads to better clinical and radiological results. Back pain was the presenting symptom that was observed the most frequently, however neurological abnormalities were also present. Following screw fixation, there was a discernible improvement in the

patient's pain scores and neurological impairments, as well as in the vertebral height, kyphosis angle, and vertebral body angle. Additionally, as a consequence of this, the severity of the vertebral fracture and the number of levels affected were both significantly mitigated.

The low incidence of complications that occur during screw fixation for dorso-lumbar spine fractures in Indian patients demonstrates that this type of surgery is both successful and safe.

However, prospective studies are required in order to evaluate screw fixation in comparison to other treatment options and to establish its effects over the long term. Research of this kind is required in order to determine the most effective method for treating fractures like this. By concentrating on lowering the frequency of automotive accidents, the incidence of dorso-lumbar spine fractures in India can be brought down to a more manageable level. This goal can be accomplished in a number of different methods, including the establishment of stringent traffic rules, the improvement of road infrastructure, and the dissemination of information regarding safe driving behaviour. When viewed as a whole, the findings of this evaluation shed light on the need of conducting additional research into the treatment of dorso-lumbar spine fractures in Indian patients.

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