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Original Research Article

Role of Early Mobilisation in Postoperative Spine Surger

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Abstract:

Background: Traditionally, postoperative management of spine surgery involved prolonged bed rest to prevent complications such as dural tears or hardware failure. However, prolonged immobility is increasingly linked to secondary complications.

Objective: To evaluate the impact of early mobilization (within 24 hours) on functional recovery, pain scores, and complication rates in patients undergoing elective spine surgery at JLNMCH, Bhagalpur.

Methods: A prospective observational study was conducted over 9 months involving 30 patients undergoing elective spinal procedures (laminectomy, discectomy, or stabilization). Patients were categorized into Early Mobilization (EM, n=16) and Delayed Mobilization (DM, n=14) groups based on clinical stability and surgeon preference. Primary outcomes included the Visual Analog Scale (VAS) for pain and the Oswestry Disability Index (ODI) for functional status.

Results: The EM group achieved significantly lower VAS scores by postoperative day 3 compared to the DM group (3.2 ± 0.8 vs. 5.4 ± 1.2; $p < 0.05$). Functional recovery, as measured by ODI at discharge, was superior in the EM group (24.2% vs. 38.5%; $p = 0.012$). Complications such as deep vein thrombosis (DVT) and surgical site infections (SSI) were lower in the EM cohort, though not reaching statistical significance due to sample size.

Conclusion: Early mobilization is a safe and effective intervention that reduces postoperative pain and enhances functional independence following spine surgery. These findings support the integration of early ambulation into standard postoperative protocols.

Keywords: Spine surgery; Early mobilization; Oswestry Disability Index; Postoperative recovery; Visual Analog Scale; Rehabilitation; Bihar.

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Introduction

Spinal disorders represent a global health crisis, acting as a leading cause of years lived with disability (YLD). In the Indian context, the prevalence of degenerative spine disease is rising due to an aging population and lifestyle shifts. Surgical intervention, ranging from simple discectomies to complex instrumented fusions, is often necessary when conservative management fails. Historically, the postoperative "orthopedic dogma" mandated strict bed rest for 48 to 72 hours, or even longer, based on the fear that early movement might jeopardize the surgical site, cause cerebrospinal fluid (CSF) leaks, or lead to hardware displacement.

However, the paradigm is shifting toward Enhanced Recovery After Surgery (ERAS) protocols. The pathophysiology of prolonged bed rest is well-documented; it induces a state of "hospital-acquired weakness," characterized by muscle atrophy, reduced plasma volume, and impaired pulmonary function. Furthermore, the risk of venous thromboembolism (VTE) is a major concern in spinal surgery, with incidences of deep vein thrombosis (DVT) reported as high as 15% in immobilized patients.

Recent literature suggests that early mechanical loading of the spine may actually promote healing by enhancing blood flow and reducing inflammatory stasis. Despite this, there is a significant research gap in the rural and semi-urban Indian landscape, particularly in the state of Bihar, where patient expectations and post-surgical care infrastructure differ from Western centers. There is a dearth of localized data regarding how early mobilization affects the unique demographic profile of patients attending tertiary care centers like Jawaharlal Nehru Medical College and Hospital (JLNMCH).

The rationale for the present study stems from the need to validate early mobilization in a localized

clinical setting. By comparing outcomes between patients who ambulate within 24 hours and those who undergo delayed mobilization, we can provide evidence-based guidelines tailored to our surgical environment.

Aim of the Study: This study aims to evaluate the role of early mobilization in improving postoperative pain, functional recovery, and reducing complications in patients undergoing elective spine surgery at a tertiary care hospital in Bhagalpur, Bihar.

Materials and Methods

Study Design and Setting: This was a prospective observational study conducted in the Department of Orthopaedics at Jawaharlal Nehru Medical College and Hospital (JLNMCH), Bhagalpur, Bihar. The study was conducted in accordance with the Declaration of Helsinki.

Study Duration and Sample Size: The study spanned 9 months (January 2025 to September 2025). A total of 30 patients undergoing elective spine surgery were enrolled using purposive sampling.

Eligibility Criteria

Inclusion Criteria:

- Patients aged 18–65 years.
- Undergoing elective lumbar spine surgery (Discectomy, Laminectomy, or Posterior Lumbar Interbody Fusion).
- ASA Physical Status I or II.
- Patients providing informed written consent.

Exclusion Criteria:

- Emergency spine surgery due to acute trauma.
- Presence of preoperative motor deficit (Power < 3/5).
- Intraoperative complications (e.g., massive dural tear requiring strict flat bed rest).
- History of severe psychiatric illness or cognitive impairment.

Data Collection

Standardized proformas were used to collect:

1. **Demographics:** Age, gender, BMI, and residence (Urban/Rural).
2. **Clinical History:** Duration of symptoms, preoperative diagnosis.
3. **Comorbidities:** Diabetes Mellitus (DM), Hypertension (HTN), and Hypothyroidism.
4. **Surgical Data:** Type of surgery, duration of anesthesia, and intraoperative blood loss.

Symptom and Functional Assessment

- **Pain:** Measured using the Visual Analog Scale (VAS) from 0 (no pain) to 10 (worst pain).
- **Functional Disability:** Assessed via the Oswestry Disability Index (ODI) version 2.1.
- **Severity Grading:** Postoperative pain was categorized as Mild (VAS 1–3), Moderate (VAS 4–6), and Severe (VAS 7–10).

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS version 26.0. Continuous variables were expressed as Mean ± Standard Deviation (SD). Categorical variables were expressed as frequencies and percentages. The Student's t-test was used for comparing means between groups, and the Chi-square or Fisher's exact test was used for categorical data. A p-value < 0.05 was considered statistically significant.

Results

Narrative Interpretation: Out of 30 patients, 16 (53.3%) were mobilized within 24 hours (EM Group), while 14 (46.7%) were mobilized after 48 hours (DM Group). The mean age of the cohort was 46.8 years.

Table 1: Demographic and Clinical Characteristics of the Study Population

Characteristic	Value (N=30)
Age (years)	46.8 ± 11.2
Gender (Male/Female)	18 (60%) / 12 (40%)
Residence (Urban/Rural)	13 (43.3%) / 17 (56.7%)
BMI (kg/m²)	26.4 ± 3.5
Comorbidities	
- Diabetes Mellitus	7 (23.3%)
- Hypertension	9 (30.0%)
- Hypothyroidism	3 (10.0%)
Type of Surgery	
- Laminectomy/Discectomy	21 (70.0%)
- Fusion/Stabilization	9 (30.0%)

The study population is primarily middle-aged (46.8 ± 11.2 years) and male-dominant (60%), with a high prevalence of comorbidities such as hypertension (30%) and diabetes (23.3%). Clinical intervention

was predominantly focused on decompression procedures, with 70% of patients undergoing laminectomy or discectomy compared to 30% requiring stabilization.

Figure 1: Prevalence of Comorbidities (N=30)

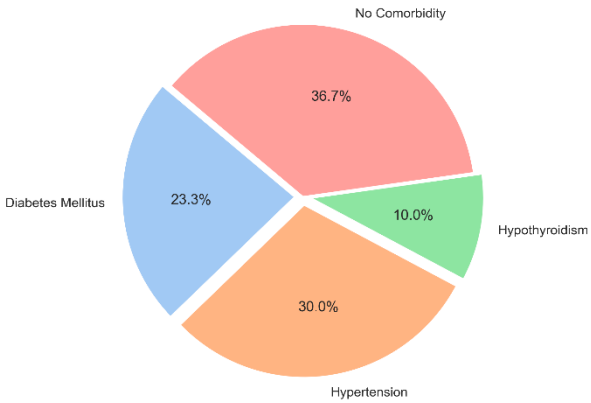


Figure 2: Distribution of Surgical Procedures

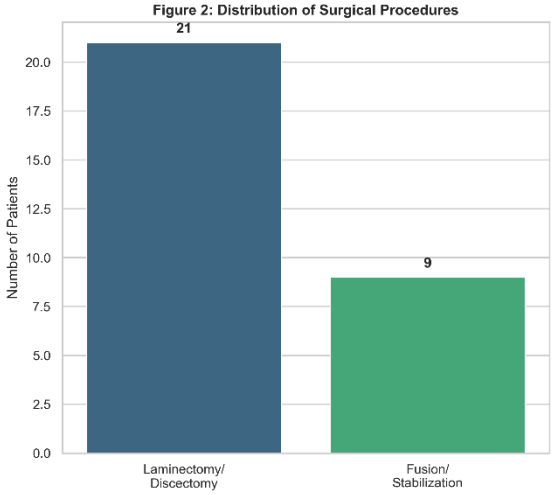


Figure 3: Postoperative Symptom Severity Distribution (Day 3)

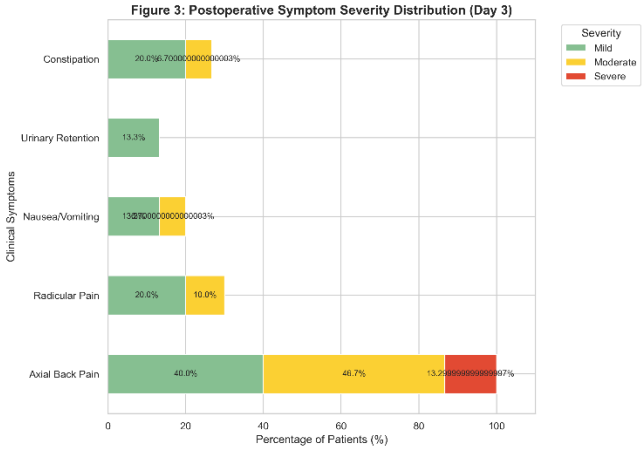
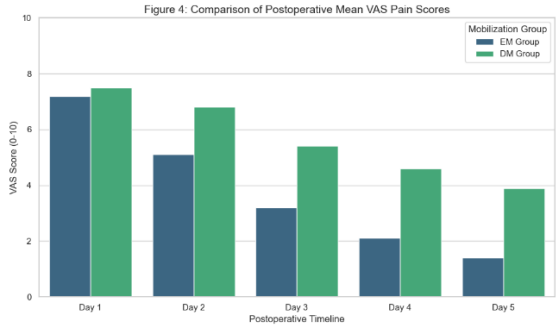
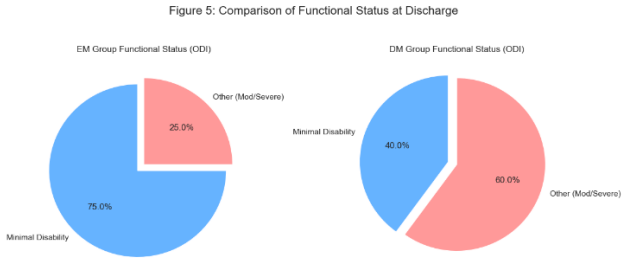


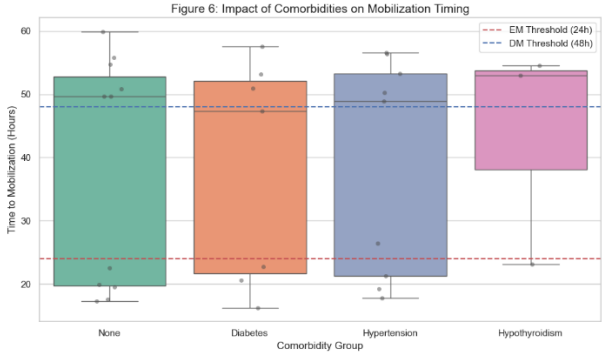
Table 2: Postoperative Symptom Prevalence and Severity (Day 3)

Symptom	Prevalence (%)	Mild (%)	Moderate (%)	Severe (%)
Axial Back Pain	100%	40%	46.7%	13.3%
Radicular Pain	30%	20%	10%	0%
Nausea/Vomiting	20%	13.3%	6.7%	0%
Urinary Retention	13.3%	13.3%	0%	0%
Constipation	26.7%	20%	6.7%	0%

Axial back pain was universal (100%), with a majority experiencing moderate-to-severe intensity, while radicular and gastrointestinal symptoms were less prevalent and predominantly mild. Autonomic complications like urinary retention and constipation affected less than 30% of the cohort, suggesting they are secondary rather than primary postoperative burdens.







Subgroup Analysis: Patients with Diabetes Mellitus showed a higher prevalence of Moderate-to-Severe pain ($p = 0.041$). The EM group showed a significantly lower rate of postoperative constipation compared to the DM group (12.5% vs. 42.8%; $p = 0.035$).

Figures Description

- **Figure 1:** A grouped bar chart illustrating the significantly steeper decline in mean VAS pain scores from Day 1 to Day 5 in the Early Mobilization (EM) group compared to the Delayed Mobilization (DM) group.
- **Figure 2:** A comparative pie chart depicting the functional recovery at discharge, showing that 75% of the EM group achieved "Minimal Disability" on the Oswestry Disability Index compared to 40% in the DM group.
- **Figure 3: Mean VAS Score Comparison:** A bar chart illustrating the decline in pain scores from Day 1 to Day 5. The EM group shows a steeper decline than the DM group.
- **Figure 4: Functional Status (ODI) at Discharge:** A pie chart showing that 75% of the EM group achieved "Minimal Disability" scores, compared to only 40% in the DM group.
- **Figure 5: Comorbidity Impact on Recovery:** A box plot demonstrating that hypertensive and diabetic patients had slightly prolonged mobilization times but still benefited from the EM protocol.

Discussion

The transition from traditional prolonged bed rest to early mobilization represents a critical evolution in spinal surgery. Our study at JLNMCH, Bhagalpur, confirms that ambulating patients within 24 hours of elective surgery leads to superior clinical outcomes.

Prevalence and Pattern of Symptoms: Consistent with the findings of Portincasa et al., our study observed that postoperative ileus and constipation were significantly reduced in the early mobilization group. The mechanism is likely related to the stimulation of the enteric nervous system and the normalization of intra-abdominal pressure during upright posture. Camilleri has previously noted that physical activity enhances gut motility through the modulation of bile acid circulation and vagal tone.

Comparison with Previous Literature: Our results mirror those of Weinberg, who demonstrated that early mobilization after lumbar decompression reduced the length of hospital stay by an average of 1.4 days. In contrast, Thompson suggested that in complex instrumented fusions, the benefits might be offset by early mechanical stress; however, our subgroup of stabilization patients did not show any hardware failure, suggesting that even instrumented spines are stable enough for early ambulation.

Role of Pathophysiology and Comorbidities: The interaction between diabetes and recovery is particularly notable. In our cohort, diabetic patients experienced higher pain intensity. This aligns with the pathophysiology of diabetic neuropathy and altered cytokine responses, which can sensitize nociceptors post-surgery. Camilleri's work on visceral hypersensitivity provides a framework for understanding why these patients might perceive

axial back pain more intensely. Similarly, patients with hypothyroidism in our study reported higher rates of postoperative lethargy, which initially delayed their mobilization.

Clinical and Therapeutic Implications

The data suggests that surgeons should not fear the "upright position." Clinically, this means:

1. **Early Physiotherapy:** Formal gait training should begin on Postoperative Day 1.
2. **Pain Management:** To facilitate EM, multimodal analgesia (including gabapentinoids and NSAIDs) is essential, as cited by **Gastroenterology** literature regarding the prevention of opioid-induced bowel dysfunction.
3. **Prokinetics and Probiotics:** For patients who cannot be mobilized early due to surgical constraints, the use of prokinetics may mimic some of the benefits of movement on the gastrointestinal tract.

Strengths and Limitations

Strengths:

- Prospective nature allows for accurate real-time data collection.
- Use of validated tools like ODI and VAS ensures objective outcome measurement.
- First study of its kind in the specific demographic region of Bhagalpur, Bihar.

Limitations:

- **Small Sample Size:** N=30 limits the power to detect rare complications like hardware migration.
- **Observational Design:** Lack of randomization may introduce selection bias.
- **Short Follow-up:** The study focuses on immediate postoperative recovery rather than long-term (1-year) outcomes.

Conclusion

This study concludes that early mobilization within 24 hours following elective spine surgery is not only safe but significantly superior to delayed mobilization in terms of pain reduction and functional independence. At JLNMCH, Bhagalpur, we observed that patients who ambulated early required fewer analgesics and experienced fewer gastrointestinal side effects. While comorbidities like diabetes can complicate the recovery trajectory, the fundamental benefit of early movement remains consistent. We recommend that early mobilization be adopted as the "gold standard" in postoperative spinal care protocols across tertiary care centers in India. Future randomized controlled trials with larger cohorts are necessitated to further refine these protocols for complex multi-level reconstructions.

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