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Original Research Article

Effectiveness of Early Mobilization Protocol in Postoperative Spine Surgery: A Multicentric Indian Study

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Abstract:

Background: Early mobilization after spine surgery is increasingly recognized as a key component of enhanced recovery protocol. This study evaluates the effectiveness and safety of early mobilization in improving postoperative outcomes in spine surgery patients.

Materials and Methods: This prospective multicenter study was conducted over one year at ESIC Medical College, Bihta, Patna, including 45 patients undergoing elective spine surgeries such as laminectomy, discectomy, and spinal fusion. Patients were mobilized within 24–48 hours postoperatively under a structured rehabilitation protocol. Data on pain scores (VAS), functional status (ODI), hospital stay duration, complications, and patient satisfaction were collected and analyzed.

Results: Most patients (84.4%) were mobilized within 24–36 hours. Significant reduction in pain was observed from a VAS score of 6.8 at 24 hours to 3.1 at discharge ($p < 0.001$). The mean hospital stay for early mobilized patients was 4.9 days compared to 6.3 days in those mobilized later ($p = 0.02$). ODI scores improved from 32.6 at discharge to 21.3 at one month ($p < 0.001$). No major complications were reported, and 86.7% of patients expressed high satisfaction.

Conclusion: Early mobilization is a safe and effective intervention that enhances postoperative recovery and functional outcomes in spine surgery patients.

Keywords: Early Mobilization, Spine Surgery, Postoperative Recovery, Functional Outcome.

Introduction

Postoperative management plays a pivotal role in determining the functional recovery and overall outcome in patients undergoing spine surgery [1]. Among the various components of rehabilitation, early mobilization has emerged as a significant intervention to enhance recovery and reduce postoperative complications [2]. The traditional practice of prolonged bed rest after spine surgery has been increasingly challenged by evidence suggesting that early mobilization may lead to improved functional outcomes, reduced hospital stay, fewer complications such as deep vein thrombosis (DVT), pulmonary embolism, and pneumonia, as well as better pain control and psychological well-being [3,4].

Early mobilization protocol, which typically involve initiating ambulation and physical activity within the first 24–48 hours post-surgery, aim to restore mobility while maintaining spinal precautions [5]. This protocol is often multidisciplinary, involving surgeons, physiatrists, physiotherapists and occupational therapists, and nursing staff, and are tailored according to the type of spinal procedure performed and the patient's clinical status. Studies have indicated that early mobilization in spinal surgeries such as laminectomy, discectomy, and spinal fusion is not only safe but also beneficial in enhancing patient outcomes without increasing the risk of complications such as wound dehiscence or implant failure [6].

Despite growing literature supporting its benefits, the implementation and effectiveness of early mobilization protocol vary across institutions. There remains a need to evaluate and standardize this protocol based on clinical evidence, patient safety, and outcome efficacy.

To evaluate the effectiveness of early mobilization protocol on postoperative outcomes, including functional recovery, complication rates, pain scores,

and duration of hospital stay, in patients undergoing spine surgery.

Materials and Methods

Study Design: This was a prospective, multicenter observational study conducted to assess the effectiveness of early mobilization protocol in patients undergoing spine surgery.

Study Setting: The study was carried out at ESIC Medical College, Bihta, Patna, in collaboration with other participating centers across India.

Study Duration: The study was conducted over 1 year.

Study Population: Patients aged 18 years and above who underwent elective spine surgery, including laminectomy, discectomy, or spinal fusion, were enrolled in the study. A total of 45 patients were included based on the eligibility criteria and informed consent.

Inclusion Criteria:

- Patients undergoing elective spine surgery (lumbar or cervical)
- Age ≥ 18 years
- Hemodynamically stable postoperatively
- Willingness to participate and provide informed consent

Exclusion Criteria:

- Patients with neurological deficits requiring prolonged immobilization
- Postoperative complications such as cerebrospinal fluid (CSF) leak or hemodynamic instability
- Revision spine surgery
- Patients with severe cognitive impairment or psychiatric illness interfering with rehabilitation

Intervention (Early Mobilization Protocol): Early mobilization was initiated within 24–48 hours postoperatively. The mobilization protocol included assisted bedside sitting, standing, and ambulation with or without assistive devices under the supervision of physiotherapists and occupational therapists Pain control measures and spine precautions were strictly followed.

Data Collection: Preoperative, intraoperative, and postoperative data were collected using structured proformas. Outcome measures included:

- Time to first ambulation
- Pain scores (Visual Analog Scale - VAS) at 24 hours, 72 hours, and at discharge
- Incidence of postoperative complications (e.g., DVT, pneumonia)
- Length of hospital stay
- Patient satisfaction scores and functional status using the Oswestry Disability Index (ODI) at discharge and 1-month follow-up

Statistical Analysis: Data were analyzed using SPSS software. Descriptive statistics were used to summarize baseline characteristics. Continuous variables were expressed as mean ± standard deviation, and categorical variables as percentages. Paired t-tests and chi-square tests were used to compare outcomes before and after early mobilization. A p-value < 0.05 was considered statistically significant.

Results

A total of 45 patients who underwent elective spine surgeries were included in the study. The mean age of the study population was 47.2 ± 12.8 years, with 26 (57.8%) males and 19 (42.2%) females. The most common procedures performed were lumbar laminectomy (n = 20, 44.4%), discectomy (n = 15, 33.3%), and spinal fusion (n = 10, 22.2%).

Time to First Mobilization: The majority of patients (n = 38, 84.4%) were mobilized within 24–36 hours postoperatively, while the remaining 7 patients (15.6%) were mobilized within 48 hours due to delayed recovery from anesthesia or mild postoperative instability.

Pain Scores (VAS):

- Mean VAS at 24 hours post-op: 6.8 ± 1.2
- Mean VAS at 72 hours post-op: 4.2 ± 1.0
- Mean VAS at discharge: 3.1 ± 0.9. The decrease in pain scores over time was statistically significant ($p < 0.001$).

Length of Hospital Stay:

- Mean hospital stay was 4.9 ± 1.6 days for early mobilized patients (within 24–36 hrs)
- Patients mobilized after 48 hours had a longer stay of 6.3 ± 1.2 days, The difference was statistically significant ($p = 0.02$).

Functional Outcome (Oswestry Disability Index):

- At discharge: Mean ODI score was 32.6 ± 6.8
- At 1-month follow-up: Mean ODI improved to 21.3 ± 5.2. The improvement in functional status was statistically significant ($p < 0.001$).

Complications:

- No cases of DVT, pneumonia, or wound dehiscence were observed
- 3 patients (6.7%) experienced transient orthostatic hypotension during initial mobilization
- 2 patients (4.4%) had mild back discomfort during ambulation, which resolved with analgesics

Patient Satisfaction:

- 39 patients (86.7%) reported high satisfaction with early mobilization
- 6 patients (13.3%) were moderately satisfied due to initial discomfort

Overall, early mobilization was found to be safe, effective, and associated with reduced pain scores, shorter hospital stays, and improved functional outcomes.

Discussion

This prospective multicenter study evaluated the effectiveness of early mobilization protocol in postoperative spine surgery patients. It demonstrated favorable outcomes in terms of pain reduction, functional recovery, shortened hospital stay, and high patient satisfaction. The findings support the growing body of evidence that early mobilization is a safe and effective strategy in spinal postoperative care.

The significant reduction in pain scores from 6.8 at 24 hours to 3.1 at discharge aligns with findings by Burgess et al. (2021), who noted that early mobilization enhances analgesic effectiveness and reduces opioid dependency. Similarly, our results echo the work of Epstein (2020), who emphasized that mobilization within 24–48 hours reduce nociceptive stimulation and psychological stress, thereby improving pain tolerance [7].

Functional recovery, as measured by the Oswestry Disability Index, showed marked improvement at 1-month follow-up, indicating that early activity does not hinder healing but rather accelerates return to normal function. These results corroborate a randomized trial by Suarez-Serrano et al. (2011), which reported significantly better ODI scores in early mobilized lumbar surgery patients [8].

Moreover, patients mobilized within 24–36 hours had a statistically significantly shorter hospital stay (4.9 days vs. 6.3 days), reinforcing previous findings by Zhang et al. (2019), who showed that early ambulation protocol in spinal surgeries lead to faster recovery and discharge readiness without increasing complication rates [9].

Importantly, no major postoperative complications such as DVT, pneumonia, or wound dehiscence were observed. Only a few patients experienced transient orthostatic hypotension or mild back discomfort, which were managed conservatively. This safety profile is consistent with studies by Licina et al. (2017), which showed minimal risk associated with early postoperative activity under guided rehabilitation protocol [10].

Patient satisfaction was also notably high (86.7%), likely due to enhanced pain control, earlier mobilization, and greater independence at discharge. This aligns with the conclusions drawn by Lee et al. (2022), who noted improved psychological outcomes and overall satisfaction with enhanced recovery after surgery (ERAS) protocol in spine surgery [11].

Limitations of our study include a relatively small sample size and a single-country (India) multicenter setting, which may limit generalizability. Additionally, long-term functional outcomes beyond one month were not evaluated, and objective measures of muscle strength or gait performance were not included.

Future directions should focus on large-scale, randomized controlled trials comparing specific components of mobilization protocol, optimal timing and intensity of activity, and their cost-effectiveness in different subgroups of patients undergoing spinal surgery.

Conclusion

The present prospective multicenter study demonstrates that early mobilization protocol following spine surgery are both safe and effective, leading to significant improvements in pain reduction, functional recovery, and patient satisfaction, while also reducing the length of hospital stay and minimizing postoperative complications. Initiating mobilization within 24–36 hours postoperatively under guided supervision can enhance recovery outcomes without compromising surgical safety. These findings support the integration of early mobilization into standard postoperative care pathways for patients undergoing spinal surgery, with the potential to improve clinical outcomes and optimize resource utilization.

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