



## Enhanced Recovery After Spine Surgery: An analysis of the interventions that improve quality of patient care, recovery, and outcome

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### Abstract

**Introduction:** The application of Enhanced Recovery After Surgery (ERAS) protocols in spine surgeries remain relatively underrepresented in the existing literature. Despite significant research efforts in this field, a consistent standardization of ERAS practices for spine surgeries has yet to be established.

**Materials and Methods:** We have successfully implemented an Enhanced Recovery After Surgery (ERAS) protocol across a range of spinal procedures. Our comprehensive ERAS protocol encompasses various key elements, such as minimally invasive surgery, avoidance of drains or catheters, multimodal analgesia, early initiation of enteral feeding, prompt mobilization and rehabilitation, and an emphasis on facilitating early patient discharge. These areas span from pre-hospitalization optimization to postoperative care, including monitoring patient satisfaction and tracking outcomes.

**Result:** During a 100-day study period, 54 patients were enrolled in the investigation. The implementation of Multimodal Analgesia (MMA) resulted in a significant reduction in pain for all patients. However, four patients experienced Postoperative Nausea and Vomiting (PONV). Enteral feeding commenced four hours following anesthesia recovery, and mobilization was initiated approximately ten hours after the surgical procedure. Comprehensive rehabilitative care was introduced within 14 to 16 hours post-surgery. On and average, patients remained in the hospital for approximately 29 hours. This approach demonstrates the potential for effective pain management and a relatively short hospital stay for patients undergoing this procedure.

**Conclusion:** Efforts to implement ERAS principles in spinal procedures have shown promise, with some studies indicating potential benefits such as shorter hospital stays, reduced postoperative pain, and quicker return to daily activities.

**Keywords:** Minimally invasive, Multimodal analgesia, Early discharge

### Introduction

Enhanced Recovery After Spine Surgery (ERASS) is a relatively modern approach to healthcare that focuses on comprehensive care strategies designed to accelerate the recovery of patients who have undergone spinal surgeries. The overarching objective of ERASS is to reduce hospitalization

duration and treatment expenses while maintaining the quality of patient care. Its effective implementation calls for a collaborative and multidisciplinary approach. The ERAS concept has its roots in 1997 when it was pioneered by Dr. Henrik Kehlet, primarily for colorectal surgical procedures.<sup>1</sup> Since then, this approach has undergone continuous refinement and adaptation, gradually extending its scope to include spinal surgeries.<sup>2</sup> After surgical procedures, the body undergoes a catabolic state marked by metabolic changes and the onset of insulin resistance.<sup>3,4,5</sup> These shifts towards catabolism significantly impact postoperative health outcomes, leading to elevated rates of morbidity and mortality.<sup>4,5</sup> These physiological changes highlight the importance of strategies like ERASS in managing and improving outcomes for surgical patients.<sup>2</sup> Unlike traditional care pathways, which can lack standardization and are often influenced by individual surgeon preferences, ERAS pathways have demonstrated correlations with improved outcomes in various surgical specialties.<sup>2</sup>

Spinal Enhanced Recovery After Surgery (ERAS) protocols are still in their infancy but are steadily gaining popularity among spine surgeons. This increased interest is attributed to a more profound understanding of the field and the application of advanced surgical techniques.<sup>6</sup> Several expert

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reviews by researchers such as Dietz et al.<sup>7</sup>, Elsarrag et al.<sup>8</sup>, and Corniola et al.<sup>9</sup> have shed light on various spinal procedures for which ERAS pathways have been devised and put into practice.

The existing ERAS spine protocols display significant variations in their preoperative, perioperative, and postoperative elements, making it challenging to assess their individual effectiveness.<sup>10</sup> This underscores the urgent need for continued research and collaboration to establish a consensus and optimize ERAS protocols for spinal surgery.

This study was undertaken as a pilot project to see which interventions resulted in better outcomes after spinal surgeries and compare it with the existing literature.

## MATERIALS AND METHOD

The study was conducted over a period of 100 days, commencing on June 1, 2023, and concluding on September 8, 2023. It was designed as a prospective study

### Study Population:

The study population includes patients undergoing Anterior Cervical Discectomy and Fusion (ACDF), Microscopic Lumbar Discectomy (MLD), percutaneous vertebroplasty and kyphoplasty, percutaneous Spinal Fixation, limited laminectomy and endoscopic disc surgeries.

Exclusion Criteria: Patients with Co-Morbidities and spinal cord pathologies

Ethical Clearance: Ethical clearance was obtained from the Ethical Committee (Human)

## METHOD OF SAMPLE COLLECTION:

All patients who underwent the above-mentioned procedures during the study period were included in the study. The preoperative checkup was done 2 days prior to surgery. Pregabalin 75mg was started 48 hours prior to surgery. The patient was admitted on the proposed day of surgery and after proper written and informed consent, was taken up for the operative procedure. A prophylactic antibiotic (Cefuroxime) was given within 1 hour prior to surgery. The incision was kept as minimal as possible and muscle splitting rather than muscle cutting was done. Minimally invasive techniques were advocated. Intraoperatively the patient received 1gm paracetamol infusion along with  $\pm$  4gm of Dexamethasone. Drains and catheters were avoided as far as possible but if required were removed early on POD 1. Local infiltration of the wound with an Injection of 10ml of 0.5% Bupivacaine + 1ml of 500mg MgSO<sub>4</sub> with 9ml of distilled water was done before wound closure. Postoperatively, paracetamol infusion 100ml twice daily IV was given along with a ketoprofen patch was applied to the right deltoid of the patient. If PONV occurred, 4mg of Ondansetron IV was given stat, and then when required. Oral intake was started 4 hours after the surgery with clear water and semisolid foods after 6 hours and a normal diet after 12 hours. After 12-14 hours, electrotherapy in the form of Interferential Therapy and Short Wave Diathermy was started and on the evening of Post Operative Day 1 patients were discharged with advice.

Follow-up was done on a telephonic basis on day 1 then day 3

and then day 5 post discharge and a physical follow-up was done after 14 days.

## RESULTS AND OBSERVATION

The present study was carried out on 54 patients in the Department of Neurosurgery in our institute from 1st June 2023 to 8th September 2023.

The results and observations made in the study are as follows:

*Table 1.1: Distribution of patients by age (n=54)*

Age in Years	Number	Percentage (%)
<20 years	2	3.70
21-40	7	12.96
41-60	36	66.66
>60	9	16.66

*Table 1.2: Distribution of patients according to procedure performed*

PROCEDURE	TOTAL	MALE	FEMALE
Anterior Cervical Discectomy and Fusion	13	7	6
Percutaneous Vertebroplasty	14	4	10
Percutaneous Spinal Fixation (2 Level)	8	3	5
Limited Laminectomy	8	4	4
Endoscopic Spine Surgery	11	6	5

*Table 1.3: Average length of stay for each procedure*

Procedure	Average length of stay (Hours)
Anterior Cervical Discectomy and Fusion	35.2
Percutaneous Vertebroplasty	17.6
Percutaneous vertebral fixation	36.7
Limited Laminectomy	30.7
Endoscopic spine surgery	24.8

.Regarding the severity of pain, we have used the visual analog scale and have recorded pain scores every hourly.

Telephonic Follow-ups of all the patients were done on day 1, day 3, and day 5 after discharge, and physical follow-up was done after 14 days.

## DISCUSSION

This study was undertaken as a pilot project with a duration of 100 days, primarily concentrating on the critical facet of pain management in spine surgeries. The study encompassed a total of 54 patients. Most of the patients we assessed fell within the age range of 40 to 60 years whereas 9 patients were above

60 years, 7 were in the age group of 21-40 years and only 2 were below 20 years of age. Feminine patients accounted for 42.59% (23) of the total cases. In contrast, males accounted for 57.40% (31) with a male-to-female ratio of 1.34:1. Out of 54 patients, 4 patients developed postoperative nausea and vomiting for which a 4mg ondansetron stat dose was given IV. Only one patient in our study group was readmitted after 24 hours of discharge. He was a case of limited laminectomy done for L4-L5 prolapsed intravertebral disc and the reason for readmission was an increase in intensity of pain despite on pain medications. After admission, we started him on intravenous paracetamol (1gm) 12 hourly and electrotherapy following which his pain subsided, and was discharged the next day. Follow-ups of all the patients were done rigorously with a telephonic conversation on days 1, 3 and 5 post-discharge and a physical follow-up after 2 weeks. We have done a thorough literature search and have compared our study in terms of the length of stay, pain score evaluation, and pre-operative and intraoperative use of paracetamol, Gabapentin, or Non-steroidal anti-inflammatory drugs with the existing literature which is elaborated in Table 1.4.

*Table 1.4: Comparison of various studies about the length of stay, pain scores, and pre-operative analgesia.*

Procedure	Length of stay	Pain score evaluation	Use of Pre-operative or Intraoperative Acetamin-
Soffin EM et al. (2019) (11)			
(Lumbar decompression, microdiscectomy)	237 minutes	Yes	yes
Staartjes VE et al. (2019) (12)			
Anterior cervical discectomy and fusion versus cervical disc arthroplasty	416 minutes	Yes	Yes
Chakravarthy VB et al.(2019) (13)			
Discectomy, microdiscectomy, laminotomies, degenerative scoliosis	Not Specified	No	Yes
Ali ZS et al. (2019) (14)			
Laminectomies, discectomy, foraminotomies	3.6 days	Yes	Yes
Soffin EM et al. (2019) (15)			
Lumbar decompression microdiscectomy	279 Minutes	Yes	Yes
Debono B et al. (2017) (16)			
Lumbar microdiscectomy	612 Minutes	Yes	No

Eckman WW et al.(2014) (17)			
Lumbar decompression/microdiscectomy	Same Day Discharge	Yes	NS
Staartjes VE et al.(2019) (18)			
Tubular microdiscectomy, mini-open decompression, minimally invasive Anterior and Posterior fusion approaches	1.1 day	Yes	Yes
Our Study			
Anterior Cervical Discectomy and Fusion, Percutaneous Vertebrplasty, Percutaneous Spinal fixation, Limited laminectomy, Endoscopic Spine Surgery	29 Hours	Yes	Yes

## CONCLUSION

Enhanced Recovery After Surgery (ERAS) protocols can be extended to include spine surgeries, provided that the essential infrastructure is in position, and patients are thoughtfully chosen based on rigorous criteria. It has several notable benefits including a reduction in the duration of hospital stays, decreased healthcare expenditures, and enhanced functional outcomes for patients. It's a more efficient and patient-centric approach to spinal surgeries, culminating in an elevation of the overall quality of care and patient satisfaction.

CONFLICT OF INTEREST: NONE  
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