Neurological Outcomes Following Thoracic Decompression Surgery: A Retrospective Cohort Study of 258 Patients

Sennay Ghenbot, Hershil Patel, Rohan Iyer Suresh, John Carbone, Anthony K Chiu, Amit Ratanpal, Hans Krish Prakash, Amil Sahai, Brian Shear, Idris Amin, Louis Bivona, Daniel Lee Cavanaugh, Eugene Young Koh, Steven C Ludwig, Julio J Jauregui

INTRODUCTION:

Thoracic decompression is indicated for a range of pathologies including myelopathy, trauma, tumors, and infection. Despite its efficacy, postoperative neurological deterioration remains a concern and is not well-characterized in large cohorts. This study aims to evaluate the incidence, characteristics, and resolution of new neurological deficits following thoracic decompression and to identify clinical and operative risk factors associated with persistent neurological injury.

METHODS: A retrospective review was performed on 258 patients who underwent thoracic decompression surgery at a single tertiary care center between 2016 and 2023. Indications included degenerative disease (55%), trauma (22%), tumor (14%), and infection (15%). Demographics, preoperative symptoms, ASIA scores, and intraoperative variables were collected. Neurological outcomes were assessed postoperatively and over time, with new deficits tracked longitudinally. Resolution was defined as either full return to baseline or meaningful clinical improvement. Descriptive statistics were used to characterize the cohort, and subgroup comparisons were performed to identify patterns in patients with persistent deficits.

RESULTS:

The mean age of the cohort was 63 ± 14 years, and 51% were female. Most surgeries were performed via a posterior approach (83%), with instrumentation used in 84% and fusion in 69%. New postoperative neurological deficits occurred in 71 patients (28%). Common symptoms included generalized weakness (31%), focal motor deficits (31%), neuropathic pain (12%), and bowel/bladder dysfunction (9%). Among those with new deficits, 51 patients (72%) had adequate follow-up (mean 569.6 ± 101.2 days). Of these, 40 (78%) experienced full or partial resolution of symptoms, typically within 51.7 ± 11.5 days. Chronic deficits persisted in 11 patients, accounting for 4.3% of the total cohort.

Patients with chronic deficits were more likely to present with bowel or bladder dysfunction and were less likely to report chronic back pain preoperatively. Surgical factors such as approach, levels decompressed, and instrumentation did not appear to significantly differ between patients with transient versus chronic deficits. The overall complication rate was 14.3%, with wound infections (6%) and dural tears (5%) being the most frequent.

DISCUSSION AND CONCLUSION: New neurological deficits following thoracic decompression are not uncommon, occurring in over one-quarter of patients, but are predominantly transient. Most deficits resolve within two months, and only a small subset of patients experience long-term neurological impairment. Preoperative absence of chronic back pain and the presence of bowel/bladder dysfunction may signal increased risk for persistent symptoms. These findings support the overall neurological safety of thoracic decompression while highlighting the importance of preoperative counseling and targeted risk stratification.

Table 1. Preoperative Variables

Variable	N	% or ± SD
Total Patients	258	
Age at Surgery		
Average ± SD	63	± 14
18-29	6	2
30-49	36	14
50-69	133	52
70+	83	32
Sex		
Male	127	49
Female	131	51
Race		
White	196	76
Black	57	22
Other	5	2
BMI		
Average ± SD	31	± 12
Substance Use		
Smoking	58	22
Alcohol Abuse	30	12
IVDU	19	7
History of Spine Surgery	118	46
Medical History		
Average Charlson Comorbidity Index ± SD	2	± 2
Uncomplicated Diabetes	63	24
Solid Tumor/ Non-metastatic Cancer	33	13
Peripheral Vascular Disease	33	13
Chronic Pulmonary Disease	26	10
Cerebrovascular Accident (TIA or Stroke)	18	7
CKD	17	7
Metastatic Cancer	16	6
Myocardial Infarction	14	5
Rheumatic Or Connective Tissue Disease	15	6
Mild Liver Disease	12	5
Congestive Heart Failure	10	4
Complicated Diabetes	4	2
Peptic Ulcer Disease	4	2
Hemiplegia or Paraplegia	4	2
HIV or AIDS	4	2
Dementia	1	0
Moderate to Severe Liver Disease	3	1
Leukemia	2	1
Indication		
Degenerative	141	55
Tumor	35	14
Trauma/Fracture	57	22
Infection	38	15
Symptoms		
Myelopathy	185	72
Chronic Back Pain	178	69
Radiculopathy	89	34
Average Days From Symptom Onset Until Surgery	574	± 1411
ASIA Impairment Scale Grade		
A	12	5
B	10	4
C	15	6
D	69	27
E	152	59

Table 2. Intraoperative Variables

Variable	N	% or ± SD
Total Patients	258	
Procedure Type		
Primary	182	71
Revision	76	29
Approach		
Posterior	215	83
Anterior	2	1
Combined	41	16
Instrumentation	218	84
Fusion	177	69
Thoracic Levels Decompressed		
T1	20	8
T2	27	10
T3	32	12
T4	39	15
T5	40	16
T6	40	16
T7	43	17
T8	54	21
T9	74	29
T10	100	39
T11	123	48
T12	117	45
Levels Decompressed		
Average ± SD	3	± 2
Levels Instrumented		
Average ± SD	6	± 3
Operative Diagnosis		
Thoracic Stenosis	15	6
Thoracic Myelopathy	108	42
Fracture	51	20
Distraction Injury	5	2
Epidural Abscess	6	2
Osteomyelitis	23	9
Tumor/ Metastatic Lesion	23	9
Deformity/Kyphosis	16	6
Thoracic Disc Herniation	11	4
Length of Surgery (Hours)		
Average ± SD	3	± 3
EBL(mL)		
Average ± SD	622	± 701
Intraoperative Blood Transfusion	23	9
Use of Intraoperative Neuromonitoring	243	94

Table 3. Postoperative Complications

Variable	N	% or ± SD
Total Patients	258	
Postoperative Blood Transfusion	68	26
Postoperative Blood Transfusion Total Units		
Average ± SD	2	± 1
Perioperative Corticosteroids	69	27
Death	25	10
Death Within 90-Days Postoperatively	11	4
Median Days Postoperatively	105	
Average Days Postoperatively ± SD	312	± 472
Length of Stay		
Median	7	
Average ± SD	10	± 12
Discharge Disposition		
Home	76	29
Home with Assistance	25	10
Acute Rehab	80	31
Skilled Nursing Facility	12	5
Subacute Rehab	64	25
Transfer	1	0.4
30-Day Readmission	20	8
30-Day ED Visit	27	10
Need for Revision	39	15
Follow Up (Days)		
Median	187	
Average ± SD	421	± 586
Complications		
Wound Infection	15	6
Dural Tear	13	5
DVT	2	0.8
Intercostal vessel bleed	1	0.4
Reintubation	1	0.4
Pleural effusion	1	0.4
Hardware failure	1	0.4
Seroma	1	0.4
Bacterial meningitis	1	0.4
Myocardial infarction	1	0.4

Table 4. Neurologic Changes

Variable	N	%	N	%
Chronic Back Pain	176	68	124	48
Opioid Medication for Chronic Back Pain	95	37	82	32
Bowel/bladder functional deficits	46	18	25	10
Urinary Retention	21	8	14	5
Urinary Incontinence	24	9	12	5
Constipation	4	2	3	1
Fecal Incontinence	15	6	10	4
Paresthesias	97	38	32	12
UPPER Extremity Paresthesia	8	3	1	0
LOWER Extremity Paresthesia	89	34	33	13
Extremity Neuropathic Pain	77	30	32	12
UPPER Extremity Neuropathic Pain	7	3	3	1
LOWER Extremity Neuropathic Pain	80	31	29	11
Neurological Sensory Deficits	52	20	26	10
UPPER Extremity Generalized Loss of Sensation	2	1	1	0
LOWER Extremity Generalized Loss of Sensation	53	21	24	9
UPPER Extremity Focal Sensory Deficit	0	0	0	0
LOWER Extremity Focal Sensory Deficit	7	3	1	0
Abnormal Reflexes	22	9	3	1
UPPER Extremity Hyper or Hyporeflexia	5	2	0	0
LOWER Extremity Hyper or Hyporeflexia	19	7	2	1
Clonus	38	15	3	1
Babinski	29	11	0	0
Generalized Extremity Weakness	152	59	79	31
UPPER Extremity Generalized Weakness	3	1	2	1
LOWER Extremity Generalized Weakness	161	62	81	31
Neurological Motor Deficits	106	41	79	31
UPPER Extremity Paralysis	2	1	1	0
LOWER Extremity Paralysis	34	13	20	8
UPPER Extremity Focal Motor Deficit	3	1	5	2
LOWER Extremity Focal Motor Deficit	44	17	29	11
Overall, was there a postoperative deficit?			71	28