Postoperative Paraplegia After Video-Assisted Thoracoscopic Surgery

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INTRODUCTION

Postoperative paraplegia (POP) is a rare (0.08%) but devastating postoperative complication of thoracic surgery. Etiologies include epidural abscess, epidural hematoma, intrathecal migration of an epidural catheter, local anesthetic neurotoxicity, trauma to the spinal cord, congenital spinal cord narrowing, surgical positioning, and spinal cord ischemia (intraoperative/postoperative hypotension or thrombosis of spinal cord arterial supply). We describe the case of a 77-year-old female undergoing VATS wedge resection of left upper lobe lung cancer who developed postoperative paraplegia.

CASE REPORT

77yoF with PMH of severe COPD (home O2 2L NC), CAD with hx of cardiac arrest, carotid artery disease, type 2 DM, tobacco abuse, CKD, HFpEF underwent VATS wedge resection of left upper lobe lung carcinoma under general anesthesia. Induction and intubation were unremarkable. Patient was positioned in R lateral position and c-spine supported with foam donut and pillows. Intraoperative course: no issues with one lung ventilation and no episodes of prolonged hypotension. An erector spinae plane catheter was placed prior to emergence. Patient was extubated deep with no coughing or bucking. On POD1, patient woke up and reported RUE weakness and bilateral LE paralysis. ESP infusion was discontinued. Emergent CT and MRI head and neck showed no evidence of stroke with left central disc herniation at C5-C6 causing severe canal stenosis and cord compression, moderate to severe canal stenosis at C4-C5. Returned to OR emergently for C4-C7 laminectomy and medial facetectomy with decompression of nerve roots and C4-T1 fusions. No measurable SSEPs in bilateral LE with some decrement in UE SSEPs due to positioning that recovered near fully by end of case. POD #16: returned to OR for C2-C3, T1 laminectomy/medial facetectomy with decompression and fusion for increased BUE weakness and worsening bradycardia/hypothermia. Patient was discharged to LTACH on POD28 with intact upper extremity motor strength but persistent paraplegia.

DISCUSSION

In our case, the cause of POP was likely unidentified and asymptomatic cervical canal stenosis that placed the patient at risk for spinal cord compression and ischemia. Likely, despite careful positioning with spine support, lateral decubitus positioning during VATS resulted in decreased spinal cord perfusion resulting in POP. Figure 2 provides factors that affect spinal cord blood flow. Full lateral decubitus positioning of patients for optimal exposure may compress spinal vessels, causing reduced arterial perfusion, or venous compression with subsequent elevated venous pressure in the cord, reduction in medullary perfusion pressure, and decreased resorption of cerebrospinal fluid. There are reports of paraplegia in patients undergoing hip surgery with pre-existing but asymptomatic spinal stenosis placed in the lateral position on the operating table. This position, combined with severe spinal stenosis caused enough compression on the neural elements to produce permanent paraplegia. Others report POP secondary to acute T11-12 disc herniation after lumbar discectomy in the prone position. With knowledge of these potential complications, neurological exam is important in the immediate postop period as early identification of deficits can allow rapid intervention to salvage function of the spinal cord. If there is concern for deficits there should be a low threshold to have neurology/neurosurgery evaluate the patient and obtain imaging as needed.

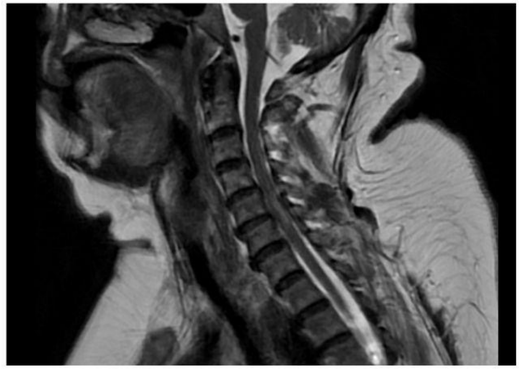

Figure 1. T2-weighted FRFSE PROPELLER MRI of the cervical spine demonstrating C4-7 canal stenosis and cervical spinal cord compression.

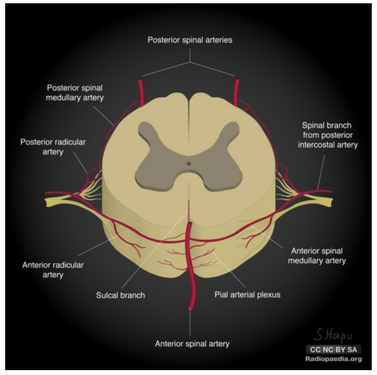

Figure 2. Blood supply to the spinal cord. Courtesy of Dr. Francis Deng, Radiopaedia.org

Perioperative spinal cord and nerve root injury

ETIOLOGY	PRESENTATION
Compression	Variable; depends on level of lesion
Disc herniation	Back pain
Abscess	Motor/sensory deficits
Hematoma	Cauda equina syndrome
Stretch	Anterior spinal artery syndrome
Hypoperfusion	Most common presentation of spinal cord infarction
Regional/global hypoperfusion	Paraplegia; loss of pain and temperature sensation
Thrombus	
Embolus	**WORKUP**
Direct trauma	
Exposure to neurotoxic material	Urgent MRI
	Expert consultation (neurology, neurosurgery)
RISK FACTORS	
	MANAGEMENT
Spinal canal deformity (e.g., spinal stenosis)	
Abnormal coagulation	Surgical intervention if amenable
Abnormal vascular supply	Nonoperative → neuroprotective measures
Immunosuppression	BP management (avoid hypotension)
Extremes of patient positioning (e.g., hyperlordosis)	CSF drainage
	Anticoagulation
	Note: steroids not clearly demonstrated to be helpful

Factors Affecting Spinal Cord Blood Flow

Iatrogenic	Natural
INTRAOPERATIVE	Atherosclerosis
	Polycythemia
Lateral flexion of spine	Anatomic changes of the spine (e.g., kyphoscoliosis)
Thoracic vascular surgery	Vascular malformation
Left thoracotomy	Infection
Ligation of intercostal vessels	Hypercoagulability
Hypotension	
Blood loss	
Direct trauma to spinal cord during surgery or epidural placement	
POSTOPERATIVE	
Hypotension	*Adopted from: Popat, et al. Postoperative Paraplegia after Nonvascular Thoracic Surgery. The Internet Journal of Anesthesiology. 2003;8(1).*
Compression from epidural hematoma or surgical hematoma	
Vasoconstrictors in epidural infusion	

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