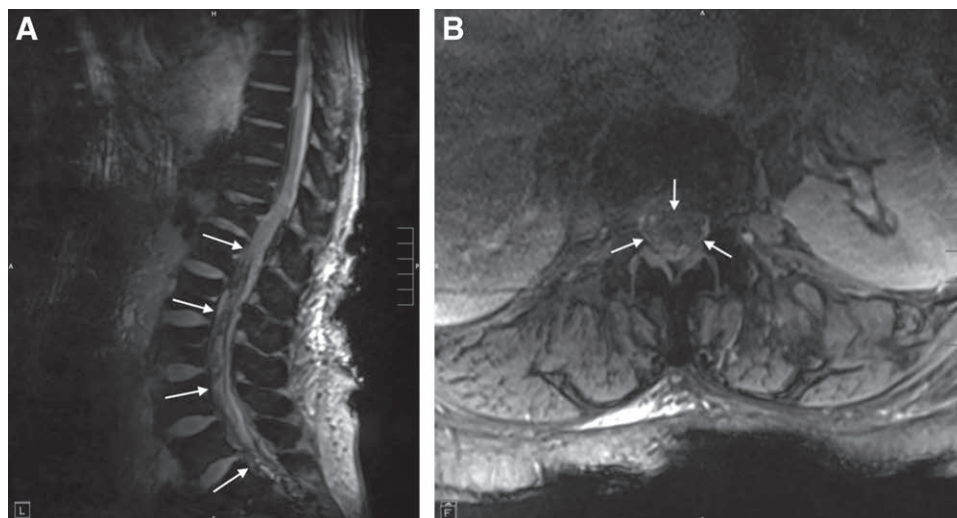


Bloody Cerebrospinal Fluid Drainage

Adrian J. Maurer, M.D., Jeffrey Kedrowski, D.O., Richa Wardhan, M.D.



The present images were obtained 48 h after thoracic endovascular aortic repair. The T2-weighted sagittal magnetic resonance image of the spine demonstrates a ventral subdural and subarachnoid hemorrhage (*white arrows*) extending from T12–L1 to the termination of the thecal sac at S2 (*panel A*). The axial image at L1 shows (*white arrows*) severe ventral compression of the conus medullaris (*panel B*). Lower extremity paresthesias followed by leg weakness were noted immediately after intended removal of a spinal drain prompting emergent magnetic resonance imaging necessitating surgical evacuation. Notably, 36 h before the first complaint of neurologic symptoms, bloody cerebrospinal fluid (CSF) was noticed in the spinal drain. The patient had normal coagulation status throughout the event.

Bloody CSF is considered benign if it ensues intraoperatively because the likely reason is visceral reperfusion causing reperfusion hyperemia and edema.¹ However, if the CSF was clear at the start of drainage and then became bloody, it may be a sign of intracranial or spinal bleed.^{2,3} The risk of hematoma increases when volume drained approaches the upper range of circulating volume (140 to 165 ml per day).¹ Spinal fluid drainage limited to a pressure less than 6 mmHg (~8 cm H₂O) in open TAAA surgery and less than 8 mmHg (~14 cm H₂O) in thoracic endovascular aortic repair is associated with low risk of complications.¹

The following measures are recommended if blood-tinged CSF indicating intracranial or spinal bleed is seen in the postoperative period.¹

- Discontinue further spinal drainage
- Initiate hourly neuro-examinations

- Correct coagulopathy and hold anticoagulation
- Consider imaging

Competing Interests

The authors declare no competing interests.

Correspondence

Address correspondence to Dr. Wardhan: richa.wardhan@ufl.edu

References

1. Wynn MM, Sebranek J, Marks E, Engelbert T, Acher CW. Complications of spinal fluid drainage in thoracic and thoracoabdominal aortic aneurysm surgery in 724 patients treated from 1987 to 2013. *J Cardiothorac Vasc Anesth.* 2015; 29:342–50
2. Mehmedagic I, Resch T, Acosta S: Complications to cerebrospinal fluid drainage and predictors of spinal cord ischemia in patients with aortic disease undergoing advanced endovascular therapy. *Vasc Endovascular Surg* 2013; 47:415–22
3. Rong LQ, Kamel MK, Rahouma M, White RS, Lichtman AD, Pryor KO, Girardi LN, Gaudino M: Cerebrospinal-fluid drain-related complications in patients undergoing open and endovascular repairs of thoracic and thoraco-abdominal aortic pathologies: A systematic review and meta-analysis. *Br J Anaesth* 2018; 120:904–13

Published online first on April 22, 2020. From the Department of Anesthesiology, College of Medicine, University of Florida, Gainesville, Florida.

Copyright © 2020, the American Society of Anesthesiologists, Inc. All Rights Reserved. *Anesthesiology* 2020; 133:196. DOI: 10.1097/ALN.0000000000003334