Anticoagulants for Lumbar Epidural Steroid Injections

Byron J. Schneider, MD[1], David C. Miller, MD, MA[2], Ryan Mattie, MD[3], Zachary L. McCormick, MD,[4] and Clark C. Smith, MD, MPH[5] on behalf of the Spine Intervention Society's Patient Safety Committee

[1]Vanderbilt University Medical Center, Department of Physical Medicine & Rehabilitation, Nashville, Tennessee, U.S.A.;
[2] Napa Pain Institute, Napa, California, U.S.A.;
[3]Synovation Medical Group, Interventional Pain & Spine, Los Angeles, California, U.S.A.;
[4]University of Utah, Division of Physical Medicine and Rehabilitation, Salt Lake City, Utah, U.S.A.;
[5]Columbia University Medical Center, Rehabilitation and Regenerative Medicine, New York, New York, U.S.A.

Myth: Therapeutic anticoagulation (AC) should be discontinued prior to all lumbar epidural steroid injections (ESIs).

Fact: Published literature demonstrates a non-zero risk of thrombotic events when stopping therapeutic AC for spine interventions. The decision to continue AC, temporarily discontinue therapeutic AC prior to a lumbar ESI, or withhold the intervention should be a shared decision with the patient that accounts for the risk of epidural hematoma, the risk of a thrombotic event, and the patient-specific medical indication for therapeutic AC. If the decision to hold therapeutic AC is made, this should also be approved by the prescribing physician.

According to *Interventional Spine and Pain Procedures in Patients on Antiplatelet and Anticoagulant Medications (Second Edition)* [1], lumbar transforaminal epidural steroid injections (TFESI) and lumbar interlaminar ESI are both classified as intermediate-risk procedures, for which anticoagulant (AC) medications should be stopped. These recommendations focus on the prevention of epidural hematomas, a potential catastrophic complication leading to neurologic compromise. However, the risk of epidural hematoma must be balanced with the risk of a serious thrombotic event such as deep vein thrombosis/pulmonary embolism, cerebrovascular accident, or myocardial infarction [2,3]. Published evidence provides insight as to the relative risk of these complications.

Endres *et al.* reported on 1,438 interventional pain procedures during which therapeutic AC was stopped, resulting in nine serious thrombotic complications [0.4% (95% confidence interval (CI): 0.2-0.7%)] [3]. Recently, another cohort study reported that after therapeutic AC medications were stopped prior to an interventional spine procedure in 1,117 cases there were six thrombotic complications [0.5% (95%CI: 0.2-1.2%)] [4]. There are also case reports of such complications [5]. Clearly, there is a measurable risk of catastrophic thrombotic complications when stopping therapeutic AC, even in the short window of time prior to a spine injection. Importantly, this risk is dependent on the specific indication for therapeutic AC and patient-specific risk factors.

The risk of thrombotic complications must be balanced against the risk of epidural hematoma. A recent systematic review found no reports of epidural hematoma in three large cohort studies of patients who received lumbar TFESIs while continuing therapeutic AC [3,6-8]. Subsequent large cohort studies have demonstrated the same finding [4,9]. Alternatively, there is only one published case of an epidural hematoma associated with a lumbar TFESI procedure, following a series of three consecutive injections in a patient on therapeutic AC who had pre-existing severe central canal stenosis. The hematoma occurred contralateral to the side of injection, calling into question causality [10]. There are rare cases of foraminal/paraspinal hematoma occurring after TFESI was performed [11,12]. In both cases, needle placement was not in a traditional sub-pedicular location, and there are uncertainties regarding the extent of the hematoma. No reported cases have resulted in lasting neurological deficits.

There are reports of epidural hematoma following lumbar interlaminar ESI [13,14], as well as interlaminar epidural access for catheter placement, electrode placement, and spinal anesthesia [1,15]. These specifically include patients receiving AC medication [16,17]. Compared with TFESIs, there is a paucity of large cohort studies of patients who underwent interlaminar ESI continued on therapeutic AC. For interlaminar access, the final needle is located within the epidural space that is only

millimeters thick, in close proximity to a thin-walled venous plexi, and confined posteriorly by the rigid structures of the ligamentum flavum and spinal lamina [18,19]. These factors may contribute to increased risk of hematoma during interlaminar access as compared with transforaminal access, though this relative risk has yet to be quantified.

AC therapy is indicated in a wide range of consequential medical conditions. The decision to continue or discontinue AC therapy ideally takes into account the following factors: estimation of the bleeding risk from the proposed procedure (interlaminar versus transforaminal), estimation of the clotting risk due to stopping the AC, the duration of AC interruption, and bridging AC. While current guidelines are helpful, decisions should be patient-specific.

Conclusions & Recommendations

Interventionists must be familiar with hemorrhagic versus thrombotic risks associated with lumbar ESIs when deciding whether to continue or temporarily discontinue therapeutic AC during the procedure versus withhold the intervention. These decisions should be made in consultation with the patient and the physician prescribing AC medications. If the decision to hold therapeutic AC is made, this should also be approved by the prescribing physician. If therapeutic AC is continued, medications that have standard assays for therapeutic levels should be checked prior to the procedure. Issues to consider when making this decision include:

Lumbar TFESI

- The risk of clinically significant epidural hematoma, irrespective of therapeutic AC status, is extremely low.
- The literature suggests a non-zero risk, approximately 0.4-0.5%, of a serious thromboembolic event when stopping AC medication for this procedure.
- The published data suggests that the risk of a clinically significant epidural hematoma if therapeutic AC is continued is less than the risk of a clinically significant thromboembolic event if therapeutic AC is stopped for this procedure.

Lumbar Interlaminar ESI

- There is a risk of epidural hematoma with all interlaminar epidural injections, even when stopping AC medication [6,20].
- It is likely, but not founded in published data, that this risk of hematoma is greater if therapeutic AC is continued for this procedure; therefore, alternative treatments to lumbar interlaminar ESI should be considered in patients with high thrombotic risk for whom discontinuation of therapeutic AC may be ill-advised.
- Based on data from lumbar TFESI studies, the risk of a serious thromboembolic event is approximately 0.4-0.5% if therapeutic AC is discontinued for the period of time necessary to complete this procedure [3,4].
- There is insufficient evidence to quantify the relative risk of stopping versus continuing therapeutic AC for this procedure.

References

1. Narouze S, Benzon HT, Provenzano D, Buvanendran A, De Andres J, Deer T, et al. Interventional Spine and Pain Procedures in Patients on Antiplatelet and Anticoagulant Medications (Second Edition): Guidelines From the American Society of Regional Anesthesia and Pain Medicine, the European Society of Regional Anaesthesia and Pain Therapy, the American Academy of Pain Medicine, the International Neuromodulation Society, the North American Neuromodulation Society, and the World Institute of Pain. Reg Anesth Pain Med 2018;43(3):225–62.
2. Furman MB, Bernstein J, McCormick ZL, Schneider BJ. Concerns regarding 'Interventional spine and pain procedures in patients on antiplatelet and anticoagulant medications (second edition).' Reg Anesth Pain Med 2019. [Epub ahead of print]
3. Endres S, Shufelt A, Bogduk N. The risks of continuing or discontinuing anticoagulants for patients undergoing common interventional pain procedures. Pain Med 2017;18(3):403-409.
4. Bernstein J, Furman MB, Gilhool L, Kurup A, Bednarek C, Caplan C. The risks of continuing or discontinuing anticoagulants in diverse interventional pain procedures. SIS 2018 Annual Meeting Abstracts. Pain Med 2018;19:1885–903.
5. Linn AJ, Desilva C, Peeters-Asdourian C. Thromboembolic stroke: a rare complication associated with peri-procedural management of an epidural steroid injection. Pain Physician 2009;12(1):159–62.
6. Smith C, Schneider B, McCormick Z, Gill J, Loomba V, Engel A, et al. Risks and benefits of ceasing or continuing anticoagulant medication for image-guided procedures for spine pain: a systematic review. Pain Med 2018;19(3):438-448.
7. Manchikanti L, Malla Y, Wargo BW, Cash KA, McManus CD, Damron KS, et al. A prospective evaluation of bleeding risk of interventional techniques in chronic pain. Pain Physician 2011;14(4):317–29.

8. Goodman BS, House LM, Vallabhaneni S, Mallempati S, Willey MR, Smith MT. Anticoagulant and antiplatelet management for spinal procedures: a prospective, descriptive study and interpretation of guidelines. Pain Med 2017 Jul 1;18(7):1218-1224.
9. Schneider B, Rosati R. The risk of continuing medications with anti-platelet or anti-coagulant effects during select spine interventions: a cohort of 276 injections. SIS 2018 Annual Meeting Abstracts. Pain Med 2018;19:1885–903.
10. Gungor S, Aiyer R. Epidural hematoma development contralateral to dura after lumbar transforaminal epidural steroid injection. Pain Manag 2017;7(5):367–75.
11. Alyousef M. Foraminal hematoma following lumbar transforaminal steroid injection causing reversible motor deficit: a case report. Open Access J Neurol Neurosurg 2017; 3(5): 555623. Available from: https://juniperpublishers.com/oajnn/OAJNN.MS.ID.555623.php
12. Desai MJ, Dua S. Perineural hematoma following lumbar transforaminal steroid injection causing acute-on-chronic lumbar radiculopathy: a case report. Pain Pract Off J World Inst Pain 2014;14(3):271–7.
13. Page J, Moisi M, Oskouian RJ. Lumbar Epidural hematoma following interlaminar fluoroscopically guided epidural steroid injection. Reg Anesth Pain Med 2016;41(3):402–4.
14. Shanthanna H, Park J. Acute epidural haematoma following epidural steroid injection in a patient with spinal stenosis. Anaesthesia 2011;66(9):837–9.
15. Kaneda T, Urimoto G, Suzuki T. Spinal epidural hematoma following epidural catheter removal during antiplatelet therapy with cilostazol. J Anesth 2008;22(3):290–3.
16. Sandhu H, Morley-Forster P, Spadafora S. Epidural hematoma following epidural analgesia in a patient receiving unfractionated heparin for thromboprophylaxis. Reg Anesth Pain Med 2000;25(1):72–5.
17. Onishchuk JL, Carlsson C. Epidural hematoma associated with epidural anesthesia: complications of anticoagulant therapy. Anesthesiology 1992;77(6):1221–3.
18. Meijenhorst GC. Computed tomography of the lumbar epidural veins. Radiology 1982;145(3):687–91.
19. Nickalls RW, Kokri MS. The width of the posterior epidural space in obstetric patients. Anaesthesia 1986;41(4):432–3.
20. Xu R, Bydon M, Gokaslan ZL, Wolinsky J-P, Witham TF, Bydon A. Epidural steroid injection resulting in epidural hematoma in a patient despite strict adherence to anticoagulation guidelines. J Neurosurg Spine 2009;11(3):358–64.