

Management of a Suspected Intravascular Epidural Catheter



Justin Tai, MD | Abdul-Haseeb Sheikh, MD || Department of Anesthesiology, Vassar Brothers Medical Center, Poughkeepsie, NY 12601

Introduction

- **Neuraxial anesthesia** is commonly used to administer medication into the subarachnoid or epidural space.
- **Inadvertent intravascular injection** of a local anesthetic during neuraxial anesthesia has several consequences, including circumoral numbness, facial tingling, metallic taste in the mouth, and potentially local anesthetic systemic toxicity, which can lead to cardiovascular collapse¹.
- In this report, we present a case of a patient suspected of having an intravascular epidural catheter with an epidural catheter placement despite repeated negative aspiration tests.

Case Description

- 26 year old female, G1P0, PMH of severe anxiety, preeclampsia, and gestational DM.
- **Epidural** requested and placed, using a Tuohy needle and a loss of resistance technique with air. An **aspiration test** was performed, using a 3cc needle positioned below the catheter insertion site, with negative CSF or blood.
- A **pharmacologic test dose** was administered (3cc of 1% lidocaine with 1:200,000 epi), and shortly after, our patient became tachycardic with a heart rate (HR) of 130 beats per minute (baseline of 90), and hypertensive with a systolic blood pressure (SBP) of 170 (baseline of 140). She denied any ringing in her ears or a metallic taste in her mouth.
- The **aspiration test was repeated** and was negative. A **repeat test dose with epinephrine** was then administered, with a positive response. Our differential at this time included **anxiety** and an **intravascular catheter**, and so the epidural catheter was capped. Fifteen minutes later, we administered a **placebo test dose** of 3cc of normal saline, which was negative. Given the negative response to the placebo, we suspected an intravascular catheter. Treatment options were discussed.
- Our patient would not tolerate replacement of the epidural catheter. A decision was made to **pull the epidural catheter 2cm**. Aspiration with a 3cc needle was negative. Two test doses with epinephrine were administered, with negative symptoms.
- Shortly afterwards, our patient reported feeling numbness in her legs bilaterally. At this time, we were convinced the catheter was in the epidural space. She reported feeling **significant pain relief from the epidural catheter until delivery** via c-section conversion 12 hours later. Prior to the c-section, her epidural was tested with the aspiration technique and an epinephrine test dose, with negative symptoms.

Discussion

- Though many techniques have been described, a **perfect test to detect an intravascular epidural catheter does not exist**. Epidural medications should therefore be administered in an **incremental fashion** to minimize risk of cerebral or cardiac toxicity. Aspiration with a needle is a common technique, though false negatives have been described as high as 50%. It is important to combine this technique with another, commonly with a pharmacologic test dose with epinephrine.
- The mainstay of treatment of a detected intravascular epidural catheter is **to replace the catheter at a different interspace**. However, this may be difficult if the initial placement was challenging or if there is poor patient cooperation. Our patient would not tolerate replacement of the epidural catheter. A **salvage method** has been described in which an epidural catheter with positive aspiration of blood is withdrawn 1/2 cm at a time until blood can no longer be aspirated⁴. In our case, we withdrew our catheter 2cm with success. We hope this study highlights the various methods of detecting an intravascular catheter.

Author	Method	Comments
Bell 2007	Aspiration	False negatives as high as 50%
Bell 2007	Absorption wick	Blood staining of wick implies intravascular placement
Bell 2007	Test dose with epinephrine	3 ml of 1.5% lidocaine with epi 1:200,000; Increase in HR ≥10-20 bpm, or SBP ≥15mmHg within 2 min of injection
Bell 2007	Test dose of succinylcholine (Historical)	Apnea within 60 seconds if intravenous succinylcholine (30-40mg), with minimal effects if given in the epidural space
Yoshi 1993	Test dose of fentanyl	Dizziness and drowsiness after IV fentanyl (100 µg) injection is more rapid and more pronounced
Tsui 1999	Electrical stimulation	Following injection of local, electrical current required to produce a motor response should increase.
		If unchanged, can suggest intravascular placement.
Jeon 2018	CT fluoroscopy	During epidural steroid injections
Visnjevac 2015	Digital subtraction angiography	Improved sensitivity when combined with CT fluoroscopy

Table 1: Various methods of detecting an intravascular epidural catheter

References

1. Jeon J, Lee IH, Yoon HJ, Kim MG, Lee PM. Intravascular migration of a previously functioning epidural catheter. Korean J Anesthesiol. 2013 June;64(6):556-7.
2. Dun-Chi Lin J, Sivanesan E, Horlocker TT, Missair A. Two for One: A Case Report of Intravenous Lipid Emulsion to Treat Local Anesthetic Systemic Toxicity in Term Pregnancy. A A Case Rep. 2017 May 1;8(9):235-237.
3. Bell DN, Leslie K. Detection of intravascular epidural catheter placement: A review. Anaesth Intensive Care 2007 June; 35: 335-341.
4. Patteson SK, Smith AA, James RL.; Management of an Intravascular Epidural Catheter. Anesthesiology 1988 July; 69:153–154.
5. Yoshii WY, Miller M, Rottman RL, Kotelko DM, Wright WC, Stone JJ, Rasmus KT, Rosen PJ. Fentanyl for epidural intravascular test dose in obstetrics. Reg Anesth. 1993 Sep-Oct;18(5):296-9.
6. Visnjevac O, Kim P, Farid-Davari S, Johnson P, Nader ND. Digital subtraction angiography versus real-time fluoroscopy for detection of intravascular penetration prior to epidural steroid injections: meta-analysis of prospective studies. Pain Physician. 2015 Jan-Feb;18(1):29-36.
7. Tsui BC, Gupta S, Finucane B. Determination of epidural catheter placement using nerve stimulation in obstetric patients. Reg Anesth Pain Med. 1999 Jan-Feb;24(1):17-23.