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### Case

A 32-year-old primigravida at 5-cm dilatation, with regular contractions and intact membranes, is admitted to the labor floor in active labor. She is obese [body mass index (BMI) 41] and has a Mallampati Class III airway. The rest of her medical history is unremarkable. After addressing her questions and concerns and signing consent, you perform a traditional epidural with loss of resistance to air, 6 cm from the skin. Aspiration and test dose are negative. The epidural catheter is loaded with 10 ml bupivacaine, 0.125 %, and fentanyl, 50  $\mu$ (mu)g. Patient-controlled epidural analgesia with both continuous and demand dosing is initiated before you leave the room.

Thirty minutes later, the nurse calls and informs you that the patient is still reporting moderate to severe pain during her contractions. You decide to load the epidural catheter with an additional 5 ml of a stronger concentration of bupivacaine (0.25 %). Fifteen minutes after the top-up, you return to the labor room. As per the nurse, cervical dilatation is unchanged. The patient still looks uncomfortable, and after your assessment, you realize there is no discernible sensory or motor block. You explain to the patient that the epidural catheter appears not to be working and should be replaced. The patient agrees.

It is 6 p.m., and the overnight resident is here to relieve you. After excusing yourself, you meet the senior night float resident in the on-call room. Explaining what has just happened; the resident interrupts you and says, "This has just taken too long. Poor lady! You should have done a combined spinal epidural (CSE) from the beginning."

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### Question

Compared to a traditional epidural, is a combined spinal epidural technique more reliable and safer?

**PRO** Acceptance of the CSE technique among certain practitioners has been slow because of the concern that an epidural catheter placed after administration of an intrathecal anesthetic is untested and unreliable. This is especially evident if the epidural needs to be activated soon after placement ( $\sim 1$  h) for an emergent cesarean section. When a catheter is placed utilizing the traditional technique, we must wait 20 min after the loading dose to assess whether it is working. If the patient remains uncomfortable and the initial sensory block is not what was anticipated, most practitioners will err on the side of manipulating or redosing the catheter with a higher concentration and reassessing 20 min later. By the time the patient agrees to a replacement and a new catheter is placed and loaded, an hour has elapsed. This is no difference in the time it takes the initial sensory block achieved with a standard subarachnoid CSE dose [2.5 mg bupivacaine and 10–15  $\mu$ (mu)g fentanyl] to resolve or wear off. Thus, the time during which the catheters remain untested is similar, regardless of the technique utilized for placement. Ultimately, it is our vigilance and clinical suspicion that will help us identify which catheters are likely to fail.

**CON** If a CSE technique is used and the patient requires an emergency cesarean delivery, the untested epidural anesthetic can be patchy, one-sided, or not work at all. This puts the patient, newborn, and anesthesiologist at risk should a general anesthetic be required for a true emergency. If a CSE is performed with 2.5 mg of bupivacaine and 10–15  $\mu$ (mu)g of fentanyl, the patient will be comfortable for an hour, and at best you can reliably test for intravascular placement without truly knowing the risk of dosing an inadvertent intrathecal catheter. After placement of a pure epidural catheter, it should not take more than 20 min to determine whether your catheter is properly placed.

By performing a dural puncture with a 25-, 26-, or 27-gauge needle you increase the risk of a headache, which is of primary concern because of patient dissatisfaction and lawsuits. By penetrating the dura, which serves as a protective barrier, you create a channel through which infectious agents can reach the CNS, increasing the possibility of meningitis. I agree that a CSE provides more reliable initial analgesia than an epidural. But I feel safer knowing I have a reliable working catheter should an emergency arise.

**PRO** I agree that albeit small, there is increased morbidity when a CSE is performed. Nonetheless, if passing a 27-G pencil-point needle with its 1 % chance of spinal headache helps an anesthesiologist confirm location of the epidural space, such a risk is justifiable. A 1 % incidence of post-dural puncture headache (PDPH) is smaller than that incurred if you continue to advance and pierce the dura unintentionally with the epidural needle. Furthermore, the consequences of a spinal headache are far less detrimental than those that may complicate the replacement of an epidural catheter (bleeding, infection, nerve damage). Thus, when faced with the predicament of passing a spinal needle and confirming it with the visualization of CSF, or threading a catheter after a “suspicious” loss of resistance, it is preferable to pass the spinal needle. In fact, seeing CSF removes some of the subjectivity from the procedure. It is not surprising that a growing amount of evidence shows that there is a lower rate of catheter replacement and a higher rate of successful catheter activation for cesarean sections after a CSE [1, 2]. Safety is not compromised but rather enhanced with a CSE technique.

**CON** What if it is a dry tap (you are really in the epidural space but there is no CSF)?

When placing an epidural, if I encounter a loss of resistance but I am not sure that I have entered the epidural space, I pull it out and start again rather than advancing my needle

or puncturing the dura unnecessarily with a spinal needle. Even if you have CSF confirmation, it does not guarantee that the epidural catheter will function appropriately should the need arise. The advantage of a CSE is that in some patients, it is hypothesized that the communication channel created allows for the diffusion of local anesthetic from the epidural into the spinal canal, thus providing better sacral analgesia.

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## Summary

The advantages of the combined spinal epidural technique are that it provides faster analgesia and better sacral coverage. The disadvantages are that it comes at the expense of a small increase in the risk of PDPH and meningitis. Which catheter is more reliable, one placed during a CSE or during a traditional epidural, is a subject of much debate. Beside the technique or approach used for catheter placement, there are probably other factors that will ultimately affect catheter safety. How experienced the anesthesiologist is with either technique and his/her ability to detect and replace suboptimal or non-working catheters are difficult to measure, yet critical factors. In other words, the CSE or the epidural is only as good as the anesthesiologist performing and managing it.

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## References

1. Pan P, Bogard T, Owen M. Incidence and characteristics of failures in obstetrical neuraxial analgesia and anesthesia: a retrospective analysis of 19,259 deliveries. *Int J Obstet Anesth.* 2004;13:227–33.
2. Gonzalez A, Sachs A, Aaronson J, Smiley R. Catheter replacement rates in labor; combined spinal epidural vs. epidural technique. Abstract presented at 46th Annual Meeting Society of Obstetric Anesthesia and Perinatology; 14–18 May 2014; Toronto.