The practice of epidural analgesia in laboring women began to emerge in the 1970s. It is now a common method of pain relief for patients in labor and is used by 63% of women in the hospital setting. The patient who has had a previous cesarean delivery can benefit from having an epidural anesthetic placed early to expedite an emergency, such as a uterine rupture, if necessary. At one time there was a concern for placing an epidural anesthetic in laboring women who had a previous cesarean delivery. It was feared that the epidural anesthesia would mask abdominal pain that may present with a ruptured uterus and delay diagnosis. This worry was quickly dispelled with literature that strongly suggested that epidural analgesia did not disguise the signs or delay diagnosis of uterine rupture. The case presented is one in which pain of a uterine rupture was experienced with a functioning epidural catheter in situ, and successful anesthetic management.

Keywords: Epidural analgesia, epidural sieve, hypotension, uterine rupture.

According to the National Institutes of Health, 993 women of 1,000 who attempt a vaginal birth after cesarean delivery (VBAC), and trial of labor after cesarean delivery (TOLAC) with epidural anesthesia give birth without the complication of a uterine rupture.\(^1\)\(^2\) When a rupture does occur, it is a serious complication that can have a high morbidity for both mother and fetus. In this case report, we describe the unusual presentation and successful anesthetic management of a parturient who experienced rupture of a uterine scar from a prior cesarean delivery with an epidural catheter in situ.

Case Summary

The patient was a 35-year-old woman, gravida 11, para 10, who presented at 37 weeks to the labor and delivery unit in active labor. The patient reported a surgical history of 1 prior cesarean delivery, a hernia repair, and epidural analgesia 4 times in previous deliveries without difficulty.

Relevant medical history included type 2 diabetes, bronchial asthma, and occasional heartburn, she took no medication for any of her conditions. She had no known allergies. Her laboratory values were as follows: hematocrit, 32.6%; platelets, 168 \(\times 10^9\)/L. On physical examination she was 150 cm in height and weighed 102 kg. She was 150 cm in height and weighed 102 kg. She presented with tachycardia, with a heart rate at 108/min. Other vital signs were as follows: blood pressure, 104/64 mm Hg; respiratory rate, 22/min; arterial oxygen saturation (\(\text{SaO}_2\)), 99%; and fetal heart rate in the 140s/min. Her cardiorespiratory examination findings were normal. The patient chose to have a TOLAC.

Because of the patient’s risk factors of gravida 11 and 1 previous cesarean delivery, the patient was counseled on her increased risk of a repeated cesarean delivery. The patient was advised that it would benefit her if a functioning epidural catheter was placed early in her labor. Shortly after admission, the patient requested an epidural anesthetic for labor analgesia. She received a fluid bolus of 1,000 mL of lactated Ringer’s solution. An epidural catheter was placed, without difficulty, while the patient was in a sitting position. A midline approach was used at the L3-L4 interspace with a loss of resistance technique. The epidural catheter was inserted, and a 3-mL test dose of 1% lidocaine and 1.5% lidocaine with epinephrine was administered, with no results. A loading dose of 10 mL of 0.2% ropivacaine with 100 µg of fentanyl was administered in 5-mL increments. The patient had excellent analgesia at a T8 level, which was maintained with a 0.2% ropivacaine infusion at 10 mL/h.

Approximately 4.5 hours after epidural placement and infusion, the patient complained of abdominal pain. At this time, the patient’s blood pressure was 116/72 mm Hg, heart rate was 94/min, and \(\text{SaO}_2\) was 99%. After negative aspiration, a bolus of 10 mL of 1% lidocaine, in 5-mL increments, was injected through the epidural catheter. The patient stated that some pain relief was obtained. However, her blood pressure rapidly decreased to 93/62 mm Hg. She was immediately turned to her left side, was treated with a fluid bolus of 500 mL of lactated Ringer’s, and 100 µg of phenylephrine intravenously (IV). The patient responded well to treatment, with an increase in blood pressure to 132/78 mm Hg. Approximately 9 minutes later a second drop in blood pressure of 87/58 mm Hg occurred, and 10 mg of ephedrine was administered IV. The epidural infusion was discontinued. After the administration of ephedrine, the patient again responded with an increase in blood pressure to 112/68 mm Hg. However, transient late decelerations in fetal heart rate were noted. Her blood pressure remained within
normal limits for several minutes, the patient’s epidural catheter was assessed, and the epidural pump infusion was restarted with the rate decreased to 8 mL/h. Within 30 minutes of restarting the infusion pump, the patient began to complain of chest pain and continuing abdominal pain unrelated to her contractions and in-between her contractions. An urgent cesarean delivery was planned because of nonreassuring fetal heart tones, repetitive late decelerations that were not responsive to resuscitative measures, and a history of prior cesarean delivery.

The epidural pump was discontinued, and the patient was transferred to the operating room (OR) with epidural catheter in situ. She was placed on standard monitors and a binasal cannula at 4 L of oxygen for transport. The patient’s vital signs on entry to the OR were as follows: heart rate, 138/min; blood pressure, 101/69 mm Hg; respiratory rate, 24/min; and SaO₂, 100%. The patient was alert. To prevent a drop in the patient’s blood pressure, a bolus of ephedrine, 20 mg IV, was administered before further epidural dosing. After aspiration of the epidural catheter was negative for cerebrospinal fluid, a 5-mL dose of 2% chloroprocaine was administered. Blood pressure remained within normal limits, and a second 5-mL dose of 2% chloroprocaine was given. The presence of the existing epidural catheter allowed for the patient to quickly be converted from epidural analgesia to anesthesia. A T4 anesthetic sensory level was obtained, and the operative procedure commenced. After incision, when the peritoneal cavity was entered, it was evident that uterine rupture had occurred. Approximately 800 mL of blood was suctioned from the abdomen.

A healthy infant was delivered without difficulty and was assigned Apgar scores of 8/9 at 1 and 5 minutes. The patient received additional doses of phenylephrine (a total of 300 µg) and ephedrine (10 mg) for persistent hypotension. After delivery of the infant, 30 mg of oxytocin was administered in 1 L of lactated Ringer’s and firm uterine tone was noted. Also, 2 U of packed red blood cells were administered, followed by fresh frozen plasma and crystalloids. At the end of surgery, the patient was hemodynamically stable, with blood pressures ranging from 98/42 to 122/64 mm Hg. Her estimated blood loss was 1,600 mL. The patient was transported to the recovery room in stable condition.

**Discussion**

When the patient experienced a decrease in blood pressure after receiving a bolus dose of 1% lidocaine via the epidural catheter, 3 factors were quickly addressed. The first factor was to address the hypotension by administering a bolus of 500 mL of crystalloid along with a vasopressor. Second, an aortal caval compression that may have contributed to the patient’s hypotension was a concern. In late pregnancy, when lying supine, the uterus can occlude the inferior vena cava (IVC) and displace the aorta. This type of compression can decrease the maternal cardiac output, causing hypotension, bradycardia, decreased fetal perfusion, and fetal hypoxia. Subsequently the patient was placed in the left lateral position to relieve any possible compression on the IVC. A third factor was to rule out problems with the catheter’s placement or intrathecal catheter migration. The patient’s ropivacaine infusion was discontinued, and the patient was assessed for catheter migration. An accidental dural puncture with an epidural needle can occur in 0.4% to 6% of patients.

If this occurs, the epidural catheter may migrate into the intrathecal space. In this case, catheter migration did not appear to be causing the patient’s hypotension. On assessment, aspiration was negative for cerebral spinal fluid. The patient had adequate respiratory function, SaO₂ of 100%, and strong upper body muscle tone and strength. Analgesia at a T8 level was determined with cold and pinprick testing. She also had a score of 1 on the Bromage scale, meaning that she could flex her knees and move her feet, but could not raise her legs.

Because the patient had severe hypotension after epidural dosing and required multiple doses of vasopressors and additional IV fluids, we speculated that the combination of sympathetic block associated with the epidural bolus and bleeding from a rupture of a uterine scar was the cause.

A frank uterine rupture is defined as an intact, unscarred uterus that occurs due to full-thickness separation of the uterine wall and overlying serosa. There are 2 types of uterine rupture: an incomplete rupture in which the peritoneum is still intact and a complete rupture in which the contents of the uterus can be displaced into the peritoneal cavity. Uterine ruptures are rare complications, but if they do occur, they can be a potentially serious, and may lead to fetal and maternal death. Uterine rupture can also occur in a scarred uterus because of previous cesarean delivery. This involves the separation through the thickness of the uterine wall at the site of the previous cesarean delivery incision. According to Nahum, from 1976 to 2012, multiple publications reported the overall incidence of uterine rupture as 1 in 1,146 pregnancies or 0.07%.

Patients who have increased risks of a uterine rupture include those with fetal macrosomia, myomectomy, multiparity, a labor induction with uterotonic agents, uterine instrumentation, uterine trauma, and the most common reason, a previous cesarean delivery. Women who are at highest risk are those with previous cesarean deliveries that have a classic T-incision, prior uterine rupture, or extensive uterine surgery.

Many years ago medical professionals worried that epidural analgesia would disguise the signs of pain related to uterine rupture in the patient attempting VBAC and TOLAC. This worry was quickly dispelled with literature that strongly suggested that epidural analgesia...
did not disguise the signs or delay diagnosis of uterine rupture. Epidural analgesia is now a common method of pain relief for patients in labor and is used by 63% of women in the hospital setting. The initial signs and symptoms of uterine rupture can be very sudden and nonspecific and may differ in each patient, which can make diagnosis difficult. The most common features are fetal bradycardia and variable decelerations (70%), hypotension (5%-10%), vaginal bleeding (3%-5%), uterine atony, recession of fetal head or bulging under pubic bone (< 5%), and a change in contractions or pain that does not diminish between contractions.

In our particular case the most common symptoms, fetal bradycardia and decelerations, did not occur initially. Our patient presented with hypotension and the rarer symptom of abdominal pain. An article by Chestnut suggests that epidural analgesia may improve the specificity of abdominal pain as a symptom of rupture. Some authors describe the circumstance that allows the transmission of pain from a placental abruption, but blocks the pain of uterine contraction as “the epidural sieve”. (With the addition of epidural opioids, the epidural sieve effect may be abolished.) An increase in the frequency of epidural dosing may be an indication for impending uterine rupture, suggesting that the parturient with epidural analgesia will retain the perception of pain associated with uterine rupture. This was the case with our patient; her epidural analgesia did not mask the pain of rupture, and instead, her pain was continuous between contractions and was more severe, located around a previous uterine scar. She also experienced chest pain. Cahill et al studied the association between epidural dose timing, frequency and quantity, and risk of uterine rupture. They concluded that those who have increased dosing requirements should be under clinical suspicion for uterine rupture during a VBAC trial. Errors occur when the pain is treated with increasing epidural doses rather than assessing the patient for other symptoms of uterine rupture.

Although it is important to be mindful of unusual pain, as our patient experienced, and increased epidural dosing requirements, other studies have shown that abdominal or breakthrough pain is usually not the best indicator of abdominal rupture. The uncharacteristic abdominal pain that our patient experienced occurs more rarely than does fetal heart rate decelerations or fetal bradycardia. Fetal decelerations are often the first sign of rupture. In a review of 10,967 patients undergoing TOLAC, 22% of uterine ruptures presented with abdominal pain, whereas 76% presented with signs of fetal distress. Because it is the most reliable tool to diagnose any fetal distress, all high-risk patients should be monitored with a continuous electronic fetal monitor.

Regarding the type of anesthesia the patient would receive for her upcoming cesarean delivery, general anesthesia was an option, but we chose to use the existing epidural catheter for analgesia. General anesthesia is not without substantial risks. Most maternal deaths occur due to complications of anesthesia, during general anesthesia. Other risks associated include aspiration of gastric contents, failed intubation, and respiratory depression in the newborn. Before the commencement of incision, we determined the effectiveness of the patient’s epidural by assessing motor block via the Bromage scale, and performing a pinprick and a skin temperature test. The patient had adequate sensory anesthesia to a T4 dermatome level.

Conclusion

In this case report, we describe the use of epidural anesthesia and the successful anesthetic management of a patient who experienced rupture of a uterine scar during labor. Because a uterine rupture can occur at any time, the American Society of Anesthesiologists published guidelines in 2007 that recommend neuraxial techniques should be made available to VBAC and TOLAC parturients early in labor, and that these forms of analgesia can improve the prospects of a vaginal delivery. The literature intensely suggests that epidural analgesia is not contraindicated during TOLAC/VBAC and does not delay diagnosis of a uterine rupture, as was shown in our patient. Early placement of an epidural catheter allows for patient comfort as well as being able to convert from analgesia to anesthesia in case of uterine rupture and urgent cesarean delivery and to avoid general anesthesia. Anesthesia providers must be proactive when working with a TOLAC/VBAC parturient and must communicate effectively with nurses and obstetricians. Although abdominal pain is probably not the best indicator of uterine rupture, providers must be aware of a change in the pattern of pain that is sudden, persistent, or has higher-than-usual anesthesia requirements. Providers also need to be cognizant of any changes in patient hemodynamic parameters and fetal viability. When working with a TOLAC/VBAC parturient, an anesthesia provider must prepare in advance, anticipate problems, and act accordingly.

REFERENCES


AUTHOR
Shelley D. Truax-Waits, MSN, CRNA, currently practices in the Obstetrical/Labor and Delivery Unit and the level I Trauma Department at Regional One Health in Memphis, Tennessee. She graduated from the University of Tennessee Health Science Center in Memphis in 2002, where she obtained her Masters in Nursing-Anesthesia Option. She has been employed at Regional One Health since 2006, where she began at the level I trauma center. Email: shetru65@gmail.com.

DISCLOSURES
The author has no financial relationships with any commercial interest related to the content of this article. The author did not discuss off-label use within the article.