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Anesthetic Management of the Parturient for Lumbar Disc Surgery in the Prone Position

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Background: While back pain is common in pregnancy, urgent surgical intervention is rarely required.

Case Report: A parturient in the third trimester presented with foot drop and sensory deficits. Surgical intervention was deemed necessary and was performed in the prone position to facilitate exposure. A multidisciplinary approach was vital to the management plan.

Conclusion: For any pregnant patient undergoing nonobstetric surgery, the care provided should be individualized and thoughtful, keeping in mind both the mother and fetus.

Keywords: *Anesthesia–obstetrical, disc herniation, diskectomy, nonobstetric surgical procedures, prone position*

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INTRODUCTION

While back pain is common in pregnancy, urgent surgical intervention is rarely necessary. Here we report the case of a parturient in the third trimester who presented with foot drop and sensory deficits.

CASE REPORT

A 27-year-old gravida 1 para 0 patient was scheduled for back surgery in the prone position at 27 and 4 weeks' gestation. Her medical history included chronic lumbar back pain, sciatica, degenerative disc disease, fibromyalgia, migraines, irritable bowel syndrome, and anxiety. Prior to presentation, the patient's lumbar radiculopathy was being managed with epidural steroid injections (ESIs) and chiropractic therapy. At 26 and 3 weeks' gestation, the patient experienced acute progression of sciatic pain and development of left foot weakness and numbness. She reported trouble walking, sitting, and squatting.

During physical examination, she was found to have a left foot drop and sensory deficits in the left L4 distribution. She had 4/5 motor strength in the left tibialis anterior and gastrocnemius. Magnetic resonance imaging showed disc extrusion at L3-L4 with impingement on the left L4 nerve root and moderate central canal stenosis. Neurosurgery was consulted, and conservative management with dexamethasone was started. Performing a left transforaminal ESI was discussed; however, there was hesitation secondary to the risks of positioning and radiation exposure to the fetus. After 6 days, the patient's symptoms had not improved, and the decision was made to proceed with a left minimally invasive L4-L5 hemilaminectomy, medial facetectomy, microdiscectomy, and foraminotomy.

Aspiration prophylaxis administered preoperatively included citric acid-sodium citrate 30 mL, famotidine 20 mg, and metoclopramide 10 mg. Nifedipine (Procardia) 10 mg was administered for tocolysis and was dosed every 6 hours for 24 hours. In the operating room, standard American Society of Anesthesiologists monitors were applied (electrocardiogram, noninvasive blood pressure cuff, pulse oximeter, and end-tidal carbon dioxide monitoring), and a roll was placed under the patient's right hip to provide left uterine displacement. She was induced with propofol and succinylcholine. Rapid sequence intubation using cricoid pressure and a GlideScope video laryngoscope (Verathon, Inc.) ensued without complication. A radial arterial line was placed for hemodynamic monitoring. Anesthesia was maintained with a remifentanil and propofol infusion.

The patient was then turned prone onto the Jackson table. Care was taken to pad all pressure points, and the abdomen was allowed to hang freely, supported by a sheet. The surgery lasted approximately 3 hours. She remained stable throughout the procedure with heart rate and blood pressure never deviating more than 20% from baseline. One hour after surgery started, an arterial blood gas test was done with all results within normal range and no signs of maternal acidosis (pH=7.39, $PaCO_2$ 35.7 mmHg, PaO_2 247 mmHg on an inspired oxygen fraction of 50%, base excess -3). Once the operation concluded, the patient was returned to the supine position and extubated without complications.

Fetal heart tones were monitored preoperatively and postoperatively; however, no fetal heart rate monitoring was performed intraoperatively. Fetal heart tones just prior to surgery were approximately 140 bpm. Postoperatively, fetal heart tones were approximately 120 bpm. The patient did not develop uterine contractions perioperatively.

In the postoperative period, she received physical and occupational therapy. Her pain was controlled with oral oxycodone-acetaminophen and cyclobenzaprine. On postoperative day 2, the patient's symptoms of pain and weakness had improved, and she was discharged home with home health physical therapy. At the postoperative appointment, the patient had no radicular pain, mild lower back pain, and almost complete strength in her left foot.

At 39 and 2 weeks' gestation, the patient presented to the labor and delivery unit with rupture of membranes. She stated she had complete resolution of her previous symptoms and had enjoyed an otherwise normal pregnancy. An epidural was easily placed at the L3-L4 interspace on first attempt. Proceeding to cesarean section was necessary for delivery secondary to fetal bradycardia, and her epidural catheter was successfully used for cesarean section. The patient and her baby were discharged on postoperative day 3.

DISCUSSION

While back pain is common during pregnancy, lumbar disc herniation with resultant neurologic symptoms is rare, occurring in about 1 in 10,000 pregnancies.[1-3] Often, these symptoms can be managed conservatively; however, in certain situations emergency discectomy may be required to prevent permanent neurologic sequelae.[2] Pregnancy is not a contraindication to discectomy, particularly if the mother is in danger of developing a permanent neurologic deficit.[3-6] Several treatment options were entertained for our patient, including ESI. While ESI is certainly a less-invasive option than surgery, concern still exists over radiation exposure to the fetus, as well as problems with patient positioning during the injections. Ultimately, if imaging reveals a lesion that corresponds to the clinical scenario, surgery is the definitive treatment.[4,5,7]

Several important factors should be considered when contemplating a surgical intervention for the parturient in her third trimester, including positioning, anesthetic type, fetal heart rate monitoring, plans for urgent delivery, monitoring of maternal blood pressure, aspiration prophylaxis, and tocolysis for the prevention of preterm labor. Anesthetic management should center on preventing hypoxemia, hypotension, acidosis, and hyperventilation.[6] In our case, an arterial line was placed to carefully monitor maternal blood pressure. Maternal hypotension decreases uterine blood flow and can lead to fetal hypoxia. Severe alterations from maternal baseline blood pressure must be avoided to maintain adequate uterine blood flow.[8] An arterial blood gas test was performed during the procedure to ensure these parameters were maintained in the normal range.

In our review of the literature, we found other reports of disc surgery performed in pregnant patients, although the surgical technique and anesthetic management differed slightly. Kathirgamanathan et al described a patient in her third trimester with cauda equina syndrome who successfully underwent lumbar laminectomy in the lateral position under general anesthesia.[7] Lateral positioning was considered in our case, but the neurosurgical team decided that adequate exposure would be unachievable in this position. Therefore, we used prone positioning. Also in the Kathirgamanathan et al case report, a transcutaneous electrical nerve stimulation unit was used for labor analgesia in place of an epidural when the patient presented at term.

Al-areibi et al reported a case of a patient at 35 weeks' gestation who underwent a cesarean section in the supine position followed immediately by a laminectomy in the prone position under general anesthesia.[9] One of the major concerns for that patient was risk of airway edema with prone positioning after the cesarean section. We were less concerned with this risk because we were not expecting the rapid fluid shifts one normally sees after delivery. However, airway edema is always a consideration for a patient undergoing surgery in the prone position. As has been well documented, pregnant patients can experience increased airway edema; therefore, we ensured an air leak prior to extubation. Brown and Levi described the cases of three patients in their second trimester of pregnancy who had successful surgery for lumbar disc herniation under epidural anesthesia. These patients were prone, as was our patient; however, these patients were able to position themselves because they did not undergo general anesthesia.[3]

Although several cases in the literature report similar techniques used, our case is novel for several reasons. Our patient was placed in the prone position during surgery in the third trimester of pregnancy. She underwent general anesthesia using a total intravenous anesthesia technique. While we did not perform intraoperative fetal monitoring, we used an arterial line to carefully monitor maternal blood pressure, avoiding hypotension that could result in decreased uterine blood flow. The American College of Obstetricians and Gynecologists released a committee opinion in 2011 stating that the decision to use intraoperative fetal monitoring should be determined by a multidisciplinary team and based on each patient's unique circumstances and the surgery to be performed. To use intraoperative fetal monitoring in the most appropriate way, suspending the surgery must be safe at any point to allow for an emergency delivery.[10] The neurosurgical team pointed out that there would be times when it would not be safe to interrupt the laminectomy. In addition, the surgery was deemed a relatively low-risk procedure in an otherwise healthy female with low potential for fetal compromise.

Nonobstetric surgery in the pregnant patient presents several ethical dilemmas and should not be considered for elective cases. In our patient, urgent surgery was deemed necessary because of the risk of severe, permanent neurologic injury. The obstetric, neurosurgical, and anesthesia teams were in constant communication about this patient.

CONCLUSION

Our case, supported by a thorough review of the literature, demonstrates that surgery for a herniated disc

can be safely performed in the second and third trimesters of pregnancy without exceptional risk to the mother or fetus. No single anesthetic technique has proven to be superior over another. For any pregnant patient undergoing non-obstetric surgery, care should be individualized and thoughtful, keeping in mind both the mother and fetus.

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