

Cesarean Delivery on a Patient with Prior Myelomeningocele Correction and Renal Transplant: What is Your Anesthetic Plan?

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Abstract

Currently we are seeing more medically complex patients for surgical procedures. This mandates that the anesthesiologists play a key role in the multidisciplinary teams in charge of such patients. Therefore, it is crucial that anesthesiologists evaluate the complex physiology of these patients, determine the potential risks and complications, and establish a detailed perioperative anesthetic plan.

Pregnancy induced changes allow women to adapt to the growing fetus and its metabolic demands. In addition to these changes, some patients present other risk factors that increase the complexity of these patients. Due to the rising numbers of patients with successful renal transplants, we are observing that more women in this subgroup become pregnant. These patients present an even more complex physiology and demand adequate communication between obstetrics, nephrology, and anesthesia as they are considered high-risk pregnancies.

Another rare subgroup of pregnant patients has a history of dysraphisms. The majority of them have undergone surgical correction during their first years of life. This presents specific challenges to the anesthesiologist, especially when it comes to anesthetic technique. Therefore, a careful evaluation with neurology, obstetrics and anesthesiology is essential to establish a safe plan for this patient. The following case report presents the anesthetic management of a pregnant patient with a previous myelomeningocele correction and a renal transplant that underwent a cesarean delivery under regional anesthesia with acceptable maternal and neonatal outcomes.

Keywords: Renal transplant; Anesthesia; Obstetrics; Surgery; Nephrology

Case Study

A 22-year-old woman was referred from a rural area to San Juan de Dios Hospital in Guatemala City with a 29-week pregnancy and preterm labor. She has a previous history of myelomeningocele correction at age 2, chronic renal failure diagnosed secondary to vesicourethral reflux and bladder surgery at age 7, and renal transplant at 14 years of age. Her immunosuppression regime consists of azathioprine, cyclosporine and prednisone. She attended regularly her prenatal visits.

Upon admission the patient underwent appropriate evaluation with a Complete Blood Count (CBC), renal function tests and ultrasonography. She was admitted to the prenatal complications ward for tocolytic therapy, and evaluation by obstetrics, anesthesia and nephrology.

P/E showed that her weight was 40 kg, height 1.37 m, BMI of 21.3. B/P was 120/80. Fetal heart rate was 148 bpm, irregular uterine activity was palpable. Her abdomen presented multiple scars from previous surgeries and she had a cystostomy catheter in place. In her lower back, a left lumbosacral paravertebral scar was visible. Lower limbs with adequate strength and sensation. The patient had a normal gait (Figure 1).



Figure 1: Left- Patient's abdomen showing her multiple scars from previous surgeries; Right- Patient's scar on her lower back due to a correction of a myelomeningocele at age 2.

Her Hb/Ht was 8.5 gr/dL and 28.4%, serum creatinine 4.1, BUN 48, and a GFR (CKD-EPI) of 10 mL/min. Coagulation test and liver tests were within normal range. Nephrology managed her acute renal failure.



Figure 2: Lateral lumbosacral X- ray of the patient, No vertebral anomalies are shown.

Obstetricians consulted to anesthesia ahead of time to develop an optimal perioperative plan for this patient. Considering that she had no motor or sensitive deficit on her lower limbs, there was a strong possibility that she could be candidate for neuraxial anesthesia. There wasn't any evidence of tethered cord. Although the ideal imaging study for these patients is an MRI; the patient did not have the economic resources at the time for it so a lumbosacral X-ray was requested (Figure 2).

One month after being admitted to the hospital, she started with hypertension and headaches. She was diagnosed with preeclampsia with severe features so a magnesium sulfate infusion was started and she was taken to the OR for a cesarean section.



Figure 3: Left- Patient on a sitting position on the OR table, Spinous processes are clearly visible and palpable; Right- 27 G Pencan (R) needle inserted on a 18 G Tuohy needle, Clear cerebrospinal fluid can be seen dripping out of the Pencan (R) needle.

A combined spinal-epidural anesthesia was successfully placed at L3-L4 interspace, with bilateral anesthetic levels at T6. Considering her short stature, bupivacaine 0.75% 1 mL and fentanyl 25 mcg (0.5 mL) was administered. An epidural catheter was placed for postoperative analgesia. Due to the presence of the renal allograft in the abdomen and to avoid any injuries, a higher-than-normal median incision was done. The procedure underwent without complications. The female newborn weighed 3 pounds and 3 ounces. She was admitted to the NICU for weight gain. Morphine was administered through the catheter for pain management. The patient was taken to the PACU. Follow up on postop day 1 required and additional dose of morphine through the epidural. On postop day 2 the patient referred an adequate level of pain relief so her catheter was withdrawn (Figure 3).

Discussion

There are various case reports and case series of pregnant women with a renal transplant and case reports of patients with a prior myelomeningocele correction. However, the presence of both pathologies in the same parturient patient is extremely rare. This case in particular presents unique challenges from an anesthetic standpoint due to complex physiology in these patients, altered anatomy in the spine due to a myelomeningocele correction, and uncertainty as to how a neuraxial block will develop. A really thorough evaluation needed to be carried out in order to establish the potential risks and complications and also to have a backup plan.

Anesthesia in the parturient with renal transplant

There has been a considerable rise over these last years in the amount of women in reproductive age who underwent kidney transplant [1]. The kidney is one of the most transplanted organs in the world. Improvements in this area have led to a reduction in post-transplant morbidity and mortality, associated with improvements in surgical techniques and immunosuppressive therapy [2]. Additionally, after a successful renal transplantation, endocrine function in these patients improves rapidly [3]. These patients present a unique challenge to the obstetrician, nephrologists, and anesthesiologist due to their altered physiology and the use of immune suppressants [4].

All post-transplant patients are considered as high risk patients and require close monitoring by all specialties involved [4]. Anesthesiologists are an essential part of the team either for labor analgesia or operative anesthesia. Anesthetic considerations include, but don't limit to, the following:

1. Effect of pregnancy on renal allograft
2. Side effects of immunosuppressive drugs in the mother and fetus, relevant to the anesthesiologists
3. Interaction of immunosuppressive with anesthetic drugs and techniques [4].

Pregnant transplant patients are more prone to obstetric and medical complications during pregnancy. They present increased risk of spontaneous abortion, fetal growth restriction, preterm labor and intrauterine fetal death [1]. Additionally, these patients are also at increased risk of hypertension related disorders and diabetes and their immunosuppressive therapy make them more susceptible to infections [1]. Anesthesiologists need to be aware that these procedures could have increased surgical times (because these patients most like have undergone previous surgeries); of the factors affecting the choice of vasopressors, the need to avoid hypovolemia and hypotension, and maintain adequate renal perfusion [2].

Labor analgesia and anesthesia for cesarean delivery do not differ significantly for most transplant recipients with a functioning graft compared with nontransplanted patients [5]. The anesthetic technique will depend on various factors, specially: status of the allograft, indication of the cesarean section, and cardiovascular status. If patients present with a normal functioning kidney, they could be managed the same way as a normal pregnant patient. It is important to consider that these patients are under immunosuppressive and have a higher risk of infection. Caution should be taken in every procedure carried out (IV 's, epidurals, etc.) and perioperative prophylactic antibiotics should be administered.

If the patient is not a candidate for neuraxial block and must go through general anesthesia; a careful selection of medications must be done in order to avoid damaging the kidney. It is crucial to maintain adequate volume and perfusion status to avoid perioperative hypotension and preserve urine output [4].

Anesthesia for the parturient with spina bifida

There is a lack of information available regarding the best course of action in this type of patients. Most of the information comes from case reports and retrospective studies. However, no current guidelines exist to dictate a safe management of these patients [6]. Epidural and spinal blockade have been described for surgical anesthesia in various cases, however, higher failure and complications rates have been reported [7].

Currently there is no universal consensus for the terminology describing these anatomical malformations. Tortoni-Donati proposed a classification using clinical and radiological assessment. Clinical evaluation determines if there is a mass and whether the overlying skin is intact. Accordingly, lesions are classified as open or closed, with or without a mass [8]. This classification supersedes previous ones, which used terms like spina bifida aperta, cystica, and occulta.

Myelomeningocele corresponds to the most common type of open spinal dysraphism, in which the malformed segment of spinal cord and meningeal layers are not covered by skin and are exposed to the environment. The majority is located in the lumbar spine (79.9%) followed by the sacral spine (11%) [9]. Evidence of neurological impairment by motor and sensory dysfunction, absence of reflexes, sphincter dysfunction, hydrocephalus and Chiari II malformations are more common in higher lesions and those classified as "open" at birth [10].

For various reasons, some anesthesiologists providing for these patients have chosen not to place neuraxial anesthesia. However, these decisions are not evidence based and are unlikely to be accepted by some. Some of the clinical cases presented will have at least one contraindication for neuraxial anesthesia [7].

Considering the limited evidence available and the diversity of associated conditions that these patients might present, it is important to create an individualized plan for the safe management of the mother and fetus. Neuraxial techniques can be used in specific patients with spinal dysraphisms. Anesthesiologists need to expect certain level of variation in anatomy and sensory perception. Both, spinal and epidural techniques have been successfully used but overall success rates are lower compared to the normal population [7].

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