Intraoperative Management in a Patient with a History of Left Ventricular Noncompaction Cardiomyopathy Undergoing Repeated Cesarean Section

Primary Author: Kevin Lee BS
Rowan University School of Osteopathic Medicine

Co-Authors: Adil Mohiuddin, MD; Danielle Levin, BA; Geza Kiss, MD; Rong Zhao, MD, PHD; Scott Mellender, MD; Shaul Cohen, MD;

Introduction:
Hemodynamically compromised patients undergoing high-risk obstetrical operations provide clinically insightful and compelling learning opportunities for clinicians. We present a case of a 22 year old female G2P1001 at 37+1 weeks with a past medical history of Left Ventricular Noncompaction Cardiomyopathy (LVNC) undergoing repeated cesarean section. LVNC is a type of familial cardiomyopathy in which the myocardium of the left ventricle does not compact to smooth and solid musculature. Patients with this impaired cardiac remodeling are prone to developing heart failure, arrhythmias leading to a greater susceptibility to developing thromboembolism. Our patient was evaluated as part of second trimester prenatal care and found to have a LVEF 35-40% on echocardiography consistent with her underlying history of familial cardiomyopathy. We highlight the anesthetic management involved with evaluating the cardiac pathophysiology in this patient by demonstrating that epidural anesthesia is the most efficacious and optimal for regulating hemodynamic parameters.

Case Report:
A 22 year old female G2P1001 at 37+1 weeks with a past medical history of familial cardiomyopathy and pituitary adenoma was admitted to the obstetrical floor for evaluation prior to an elective, repeated cesarean section. Patient was not being managed with any medications and had no known drug allergies. Previous obstetrical history 2 years prior to presentation included a failed induction of labor at 36 weeks, requiring an emergent cesarean section. An echocardiogram ten days prior to admission revealed a left ventricular ejection fraction of 35-40% and most recent amniotic fluid index at 36 weeks was 15.8 (normal 8-18). Patient was evaluated regularly as part of the standard prenatal care with fetal biophysical profile and ultrasound revealing no anatomical abnormalities or delays in fetal development.

On admission vitals T-98.1 F, BP 120/67, HR 88 and O2 sat 98%. Labs Hb 10.7, HCT 33.0 and WBC of 11.7. Standard monitoring, triple leumen CVP was placed in right internal jugular vein and Arterial line was placed in the right wrist. An epidural catheter was placed and secured at L3-L4 in sitting position and 4 divided doses of 2% lidocaine, 5 mcg/ml of fentanyl and 5 mcg/ml of epinephrine were administered into the epidural space in 16 minutes. Patient had adequate T4 anesthesia.
During the transverse cesarean section 1900 mL of LR and 250 mL of 5% albumin solution. Intraoperatively the patient remained in sinus rhythm throughout. A total of 300 mcg of phenylephrine was administered to treat hypotension associated with post epidural placement. To maintain BP between 100/50 to 110/60 mmHg throughout the surgery. Heart rate was maintained between 75 and 90 beats per minute and CVP was maintained at 11-15 mmHg.

A female infant was delivered weighing 2930 grams with Apgars 8 and 9 in the vertex position and clear amniotic fluid. Twenty units of Pitocin were administered to facilitate uterine contractions. Patient had a total of estimated blood loss of 600 mL and urine output of 300 mL, total of 1900 mL LR. Following surgery patient received epidural analgesia for post C-section pain with ropivacaine 0.025% and fentanyl 3mcg/ml, at 15ml/hr, 4ml PCA dose and lockout time 10 minutes for 48hrs. She was discharged two days later. Upon discharge patient was given 600 mg ibuprofen and acetaminophen-oxycodone 325 mg-5 mg oral tablet for Q6h for pain control.

Discussion:

LVNC is characterized by an inherited impairment of cardiomyocyte function and ultimate depressed kinesis of the left ventricle. This leads to systolic dysfunction and an inability to maintain sufficient cardiac output. Consequently, the heart attempts to maintain cardiac output by increasing the heart rate. This paradoxically causes worsening of heart failure symptoms as a result of a reduction in left ventricle end-systolic volume and peripheral vascular resistance leading to further impairment of the cardiac muscle.

Patients with LVNC undergoing cesarean sections pose intraoperative challenges hemodynamically due to the inherent pathophysiology. The focus of delivering an anesthetic technique with hemodynamic compromise is to maintain an adequate heart rate and blood pressure without sudden changes. Inhalation agents cause depression of myocardial contractility and peripheral vasodilation reduces tissue perfusion including uteroplacental perfusion. Inhalation agents also cause a dose-dependent reduction in uterine perfusion and uteroplacental perfusion which can cause increased blood loss from patient intrauterine blood vessel.[3] Furthermore, in addition to severe respiratory depression, opioids can cause bradycardia and arterial and venous vasodilation contributing to the cardiac suppression seen with inhalation agents. Propofol used for induction has potential for cardiac depression and decreased myocardial perfusion resulting in severe drops in mean arterial pressure, systemic vascular resistance and cardiac contractility. [4]

We chose epidural anesthesia as it can provide excellent pain relief, improves cardiac output with minimal vasodialation with minimal effect on myocardial contractility. Epidural anesthesia maybe a good choice for C-section in parturient with mild to moderate cardiomyopathy.

References

