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MULTIDISCIPLINARY ANESTHETIC CARE IN EMERGENCY CESAREAN SECTION FOR CARDIAC ANOMALIES: A CASE OF ASD AND PAPVD

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Abstract

Cardiac diseases in pregnancy, such as atrial septal defect (ASD) and partial anomalous pulmonary venous drainage(PAPVD),presentuniquechallengesduetothephysiologicalchangesofpregnancy,whichincrease cardiovascular demands. This case report describes the anesthetic management of a 24-year-old pregnant woman at 37 weeks and 4 days of gestation with a history of ASD and PAPVD undergoing an emergency lower segment cesarean section (LSCS). The patient's preoperative evaluation revealed stable vitals but identified multiple ectopic beats on electrocardiography (ECG), necessitating close perioperative monitoring. A combined spinal-epidural anesthetic technique was employed, using low-dose hyperbaric bupivacaineandfentanylforspinalanesthesia,andropivacainewithlignocainefortheepiduralcomponent. This approach provided effective pain control while maintaining hemodynamic stability. The intraoperative course was uneventful, with estimated blood loss of 300 mL and adequate urine output, reflecting optimal fluid balance management. Postoperative recovery was smooth, with no complications, and the neonate was delivered healthy. This case highlights the importance of a multidisciplinary approach, individualized anesthetic planning, and vigilant perioperative monitoring in managing high-risk pregnancies complicated by congenital heart disease. The successful outcome emphasizes the need for integrating obstetric, anesthetic, and cardiology expertise to optimize maternal and neonatal outcomes in complex obstetric cases.

INTRODUCTION

Cardiac diseases in pregnancy pose significant challenges for both obstetricians and anesthesiologists, requiringmeticulousplanningandmultidisciplinarymanagementtoensurematernalandfetalsafety.Atrial septal defect (ASD) and partial anomalous pulmonary venous drainage (PAPVD) are congenital cardiac anomaliesthatcancomplicatepregnancy,potentiallyleadingtohemodynamicinstabilityandincreasingthe risk of adverse outcomes during delivery (1,2). While advancements in medical care have improved the survival and reproductive potential of women with congenital heart diseases, their management during pregnancy, particularly in emergency settings, remains complex (2,3).

Wereportacaseofa24-year-oldgravida1para0(G1P0)at37weeksand4daysofgestationwithahistory of ASD and PAPVD who underwent an emergency lower segment cesarean section (LSCS). This case highlights the perioperative anesthetic strategies and challenges associated with balancing maternal hemodynamics and fetal well-being in a high-risk obstetric patient.

Atrialseptaldefect(ASD)isacommoncongenitalheartdefectcharacterizedbyanabnormalopeninginthe interatrialseptum,allowingleft-to-rightshuntingofblood.WhilemanyASDsarerepairedduringchildhood, undiagnosed or untreated cases may persist into adulthood, posing unique risks during pregnancy due to increased intravascular volume and cardiac output (1,2). Partial anomalous pulmonary venous drainage (PAPVD), a rarer congenital anomaly, occurs when one or more pulmonary veins drain into the right atrium or systemic veins instead of the left atrium, exacerbating the hemodynamic burden (2,3).

Pregnancy in women with ASD and PAPVD is associated with increased risk of arrhythmias, heart failure, and thromboembolic events (3,4). Delivery planning is crucial, as labor and delivery represent significant physiological stressors that can destabilize a precarious cardiac state (3,5). Anesthetic management in such cases is critical to minimizing maternal and fetal risks, particularly when surgical delivery is indicated (4,5).

Thiscaseemphasizestheimportanceofindividualizedanestheticstrategies,multidisciplinarycollaboration, and vigilant intraoperative monitoring in managing pregnant patients with congenital heart diseases. By detailing the anesthetic approach and perioperative considerations, this report aims to contribute to the growing body of evidence guiding the care of high-risk obstetric patients.

CaseDetails

A 24-year-old female, gravida 1 para 0 (G1P0), presented at 37 weeks and 4 days of gestation with a known history of atrial septal defect (ASD) and partial anomalous pulmonary venous drainage (PAPVD). This young expectant mother had received regular prenatal care, and her pregnancy had been uneventful until this presentation.Uponarrival,hervitalsignswerestable,withabloodpressureof130/80mmHg,heartrateof 78 beats per minute, and oxygen saturation at 100% on room air. Clinical evaluations of her cardiovascular and respiratory systems revealed no additional abnormalities, and she displayed no neurological deficits.

However, due to specific obstetric indications, the care team decided to proceed with an emergency lower segmentcesareansection(LSCS)toensurebothmaternalandfetalsafety.Preoperativeelectrocardiography (ECG) identified multiple ectopic beats, underscoring the importance of vigilant perioperative cardiac monitoring.

AnestheticManagement

Given the patient's underlying cardiac conditions, a tailored anesthetic plan was devised to optimize hemodynamic stability and minimize the risk of complications. A combination of spinal and epidural anesthesia was selected as the preferred technique, balancing effective pain control with minimal cardiovascular stress.

Spinal anesthesia was initiated using 1 mL of 0.5% hyperbaric bupivacaine combined with 0.5 mL of fentanyl. Following this, epidural anesthesia was carefully administered with 0.5% ropivacaine and lignocaine containing adrenaline as test doses. This approach ensured adequate anesthesia while allowing for flexibility in intraoperative pain control. Supplemental oxygen was provided via a Hudson mask throughout the procedure to maintain optimal oxygenation levels for both the mother and the fetus.

The patient was closely monitored throughout the surgery, with continuous assessment of her hemodynamic status. Her vital parameters remained stable, and there were no significant fluctuations in blood pressure, heart rate, or oxygen saturation. This meticulous monitoring was crucial, given her cardiac history and the physiological stressors associated with the surgical procedure.

IntraoperativeandPostoperativeCourse

Intraoperatively, the patient received 1 liter of intravenous fluids, with blood loss estimated at 300 mL—a level within acceptable limits for a cesarean section. Urine output was measured at 350 mL, reflecting adequaterenalperfusionandfluidbalance.Thebabywasdeliveredsuccessfullyandassessedtobehealthy, with no immediate concerns requiring additional intervention.

Postoperatively, the patient's pain was managed effectively using epidural anesthesia. The recovery period was uneventful, with no signs of postoperative complications. The patient demonstrated good mobility and hemodynamic stability in the hours following surgery, and her cardiac condition remained uncompromised throughout her stay in the hospital.

This case highlights the importance of a multidisciplinary approach, combining obstetric expertise with advanced anesthetic techniques, in managing high-risk pregnancies complicated by congenital heart anomalies. The successful outcome for both mother and baby underscores the value of individualized care and rigorous perioperative monitoring in such scenarios.

DISCUSSION

The management of a pregnant patient with congenital heart disease (CHD), such as atrial septal defect (ASD) and partial anomalous pulmonary venous drainage (PAPVD), requires careful planning and a multidisciplinary approach. This case exemplifies the complexity of balancing maternal and fetal safety in the context of obstetric and cardiac risks. The successful outcome highlights the importance of individualized anesthetic strategies and vigilant perioperative care.

Pregnancy imposes significant hemodynamic changes, including increased blood volume, cardiac output, and reduced systemic vascular resistance. These physiological adaptations can exacerbate the hemodynamic burden in patients with unrepaired or residual CHD, such as ASD and PAPVD (6,7). Although ASD is generally well-tolerated during pregnancy, complications such as arrhythmias, heart failure, and paradoxical embolism remain concerns, particularly in cases with associated anomalies like PAPVD (1,7). In this patient, preoperative findings of multiple ectopic beats emphasized the need for comprehensive cardiac monitoring during delivery.

Anestheticmanagementinthiscaseprioritizedmaintainghemodynamicstabilitywhileensuringadequate anesthesiaforthecesareansection.Spinal-epiduralanesthesiawaschosentoachievetheseobjectives.The spinal component provided rapid onset and reliable anesthesia, while the epidural catheter allowed for titratable dosing and postoperative pain management (1,5). This approach is often preferred in parturients with cardiac disease as it minimizes the risks associated with general anesthesia, such as hemodynamic lability and increased myocardial oxygen demand (5,8).

The selection of low-dose hyperbaric bupivacaine and fentanyl for the spinal anesthesia balanced effective anesthesia

with a reduced risk of hypotension. The use of ropivacaine and lignocaine with adrenaline for theepiduralensuredprolongedanesthesiawithoutsignificantsystemicabsorption,furthersupporting hemodynamic stability (5,9). Continuous supplemental oxygen was provided, given the potential for reduced oxygen delivery due to shunting in patients with CHD (9,10).

The favorable maternal and neonatal outcomes underscore the critical role of multidisciplinary collaboration. Obstetricians, anesthesiologists, and cardiologists worked together to assess risks, optimize perioperativecare,andmanagepotentialcomplications(8,10).Continuousintraoperativemonitoringofthe patient's vital signs and meticulous fluid management helped maintain hemodynamic stability.

The estimated blood loss of 300 mL and adequate urine output of 350 mL indicate effective intraoperative management, reflecting balanced fluid administration and avoidance of volume overload—a key consideration in patients with compromised cardiac function (5,10). The patient's stable postoperative coursehighlightsthesuccessofepiduralanesthesiainmanagingpainwhileavoidingsystemiccomplications (9).

This case emphasizes the importance of individualized care for pregnant patients with congenital heart disease. Preoperative assessment, including detailed cardiac evaluation and anesthetic planning, is crucial forminimizingperioperativerisks(1,8).Spinal-epiduralanesthesiaremainsavaluabletechniqueinhigh-risk obstetric patients, offering a favorable balance between maternal hemodynamic stability and effective anesthesia (5,9).

Future research should explore larger cohorts of pregnant patients with CHD to refine guidelines for anesthetic and perioperative management. Additionally, the role of advanced cardiac monitoring technologies, such as transesophageal echocardiography, in high-risk obstetric cases warrants further investigation (10).

CONCLUSION

This case underscores the critical importance of a multidisciplinary approach in managing high-risk pregnancies complicated by congenital heart diseases, such as atrial septal defect (ASD) and partial anomalous pulmonary venous drainage (PAPVD). The successful maternal and neonatal outcomes achieved highlightthesignificanceofthoroughpreoperativeassessment,meticulousanestheticplanning,andvigilant perioperative monitoring. The use of a combined spinal-epidural anesthetic technique in this patient allowed for effective pain management while minimizing hemodynamic instability, a key consideration in individuals with underlying cardiac anomalies. Close intraoperative monitoring and fluid balance management further contributed to the positive outcome, preventing complications commonly associated with increased cardiac burden. This case emphasizes the need for individualized care tailored to the patient's unique cardiovascular and obstetric needs. It also highlights the necessity of ongoing research, particularly in the Indian context, to refine guidelines and strategies for managing similar cases. By integrating evidence-based practices with collaborative care, clinicians can optimize outcomes for both mother and child in complex obstetric scenarios involving congenital heart disease.

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