RESEARCH PAPER

Anaesthetic Considerations in Elective Cesarean Section for a Parturient with Unrepaired Truncus Arteriosus and Severe Pulmonary Hypertension: A Case report

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Abstract
Background: Persistent truncus arteriosus (TA) is a rare congenital heart defect in which a single arterial trunk overrides the ventricles, leading to systemic and pulmonary blood mixing. In uncorrected TA with severe pulmonary arterial hypertension (PAH), pregnancy is extremely high-risk; physiologic gestational changes (↑blood volume, ↓SVR) can worsen right-to-left shunting and precipitate decompensation.
Case: The patient underwent careful preoperative optimization by a multidisciplinary team. Invasive arterial monitoring and continuous SpO_2, ECG were instituted. A lumbar epidural was placed, and anaesthesia was achieved with incremental doses of 0.6% ropivacaine to achieve a T6 sensory level while avoiding abrupt sympathectomy. Vasopressor support (phenylephrine) and judicious fluids were ready to maintain systemic blood pressure.
Outcome: The patient's hemodynamics remained stable throughout the procedure, with only minor vasopressor support needed. Estimated blood loss was minimal. A healthy neonate (Apgar 8 and 9) was delivered. The patient was transferred to ICU for close monitoring; no complications occurred and she recovered uneventfully.
Conclusion: In this high-risk scenario, graded epidural anaesthesia allowed controlled sympathetic blockade and maintenance of SVR, avoiding the rapid hemodynamic changes that spinal anaesthesia or general anaesthesia might provoke . Our experience supports using regional anaesthesia with careful monitoring in pregnant patients with truncus arteriosus and pulmonary hypertension

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Introduction

Persistent truncus arteriosus (TA) is a rare conotruncal defect (~1–4% of CHD) in which a single great artery arises from the heart to supply both systemic and pulmonary circulations1 .In TA, a large VSD and common truncal valve cause complete mixing of oxygenated and deoxygenated blood, often leading to progressive pulmonary vascular disease and Eisenmenger physiology. Pregnancy compounds the risk because normal gestation causes systemic vasodilation, increased blood volume, and higher cardiac output1.

In women with uncorrected TA, these changes can dramatically worsen right-to-left shunting, hypoxemia, and heart failure. Indeed, TA patients who become pregnant have "high morbidity and mortality rates" due to such cardiopulmonary decompensation1 . Even in repaired TA, close preconception assessment and surveillance are required5 . Therefore, obstetric anaesthesia must prioritize maintaining systemic vascular resistance (SVR) and avoiding pulmonary vascular resistance (PVR) elevation. We report a case of successful cesarean delivery under graded epidural anaesthesia in an uncorrected TA parturient with severe PAH, highlighting the rationale and techniques for balancing SVR and PVR.

Case Presentation

A 27-year-old primigravida at 34+2 weeks of gestation was evaluated for cesarean delivery. She had a known congenital heart diagnosis of Collett–Edwards Type I persistent truncus arteriosus, unoperated. Echocardiography showed a common arterial trunk overriding both ventricles with a large subtruncal VSD, a trileaflet truncal valve with moderate regurgitation, severely elevated pulmonary artery pressures (Eisenmenger physiology), severe tricuspid regurgitation (grade 3), dilatation of the right atrium and inferior vena cava, and biventricular hypertrophy. Left ventricular systolic function was preserved (EF ~60%). Clinically, she had NYHA Class II symptoms with mild exertional dyspnea with mild central cyanosis (grade 2) , on room air SpO_2 ~70% (on supplemental O_2 by face mask to maintain 90–95% saturation). Hemoglobin was 12.7 g/dL (no polycythemia). A multidisciplinary team involving obstetrics, cardiology, and anaesthesia assessed her as very high-risk (effectively WHO Class IV–V). After intensive counseling, an elective cesarean

section was scheduled at 34+2 weeks for maternal cardiac indication (severe PAH, to avoid the hemodynamic stress of labor). Preoperative management included continuation of her pulmonary vasodilators and diuretics, and administration of corticosteroids for fetal lung maturation. Infective endocarditis prophylaxis was given. In the operation theatre, standard monitors were applied, and a left upper-arm arterial line was placed for continuous blood pressure monitoring, given her tenuous hemodynamics6.

Anaesthetic Management

In the operating room, standard monitors were placed along with an invasive radial arterial line for real time blood pressure monitoring. A 3-lead ECG and pulse oximeter (100% FiO_2 via face mask) were used continuously. A second IV line and resuscitation drugs (phenylephrine, ephedrine, vasopressin) were immediately available. Prior to dosing, baseline hemodynamics were blood pressure (BP) 128/78 mmHg, heart rate (HR) 88/min, SpO_2 80% on 8L O_2, and sinus rhythm. Under aseptic precautions, using 18G Tuohy's epidural needle L1-L2 epidural space identified using LORT, epidural needle threaded and fixed at 8cm from the skin. A test dose of 3ml of 2% lignocaine was given after confirming negative aspiration for blood and csf. An incremental dosing technique was used to minimize hemodynamic changes. First 5 mL of 0.6% was given, achieving a sensory level of ~T10. After confirming hemodynamic stability (BP within 10% of baseline), an additional 5 mL of 0.6% was given, raising the block to ~T6. Intraoperatively, mild hypotension (BP drop of 15% below baseline) was treated with small boluses of phenylephrine (50–100 µg) to support SVR3; no bradycardia occurred. Total phenylephrine administered was 100 µg in divided doses. Fluid administration was conservative: 500 mL crystalloid was given over the case, with careful attention to avoid volume overload that could precipitate right heart failure. Estimated blood loss was ~400 mL (mainly amniotic fluid). A slow oxytocin infusion (10 units over 30 minutes) was used postpartum instead of a bolus to minimize abrupt SVR changes. Her intraoperative SpO_2 remained 92- 94% on supplemental O_2 and BP ranged-138/74mmhg-154/76 mmhg ,PR-80-84bpm.

Results

The mother's vital signs remained stable throughout the 60-minute surgery (BP ranged 130–150/70–75 mmHg, HR 80–90 bpm). No arrhythmias or desaturation events occurred. Her postoperative hemoglobin was 11.2 g/dL.ABG was sent and found to be normal. The epidural catheter was left in place and low-dose (0.1%) bupivacaine infusions were used for postoperative analgesia without further hemodynamic compromise. She was admitted to the cardiac ICU for 24-hour observation given her high-risk status. There she received supplemental oxygen and cautious diuresis to maintain euvolemia. Serial arterial blood gases showed stable pH and CO_2 levels. The neonate stayed in NICU briefly for prematurity but required no respiratory support. . She was discharged from ICU to the step-down unit on postoperative day 2 and from the hospital on day 7 in stable condition. Both mother and newborn were well at follow-up two weeks later.

Discussion

This case illustrates the challenges and key management principles of anaesthesia for cesarean delivery in TA with Eisenmenger physiology. The overriding goal is to maintain VR (to encourage left-to-right flow through the VSD and maximize pulmonary perfusion) and to avoid increases in PVR (which would worsen right-to-left shunting and hypoxemia)2 Pregnancy-induced vasodilation inherently reduces SVR; if unchecked, this can dramatically increase right-to-left shunt and reduce pulmonary blood flow2. Spinal anaesthesia alone would have risked sudden hypotension and syncope. Epidural anaesthesia, carefully dosed, helps buffer the SNS response to surgery without the large hemodynamic changes of a spinal anaesthesia. Indeed, studies suggest that well-managed epidural anaesthesia in Eisenmenger patients causes minimal hemodynamic changes7 . We kept the block level at T6 to avoid sympathetic blockade to the cardiac accelerator fibers, as higher block (T4) could precipitate bradycardia and hypotension .

In contrast, general anaesthesia carries risks: positive-pressure ventilation can reduce venous return and further lower SVR, while anaesthetic agents can depress myocardial function9 . In reported cases, GA has been successfully used when neuraxial is contraindicated (e.g. severe thrombocytopenia)9 , but requires careful agent selection (e.g. etomidate induction, avoid N_2O) to minimize SVR drop and PVR rise. For our patient with a stable hematology and plenty of preparation time, epidural was preferred. A large review of Eisenmenger cases actually recommended regional anaesthesia when possible7. Notably, our patient's course was similar to that reported by others: for example, Abid et al. described an unrepaired TA patient who surprisingly completed a pregnancy uneventfully, underscoring that survival into adulthood with TA is rare but possible10. Multidisciplinary planning and monitoring were critical. Continuous arterial pressure monitoring allowed immediate detection of hypotension 6. CVP monitoring could also be considered to guide fluid therapy, though it was not placed in this case. Vigilant correction of even small blood pressure drops with phenylephrine helped maintain SVR. Avoidance of hypoxia, hypercarbia, acidosis and pain (all PVR-raising

factors) was stressed – oxygen therapy was continued throughout. Fluids were given slowly: while intravascular volume must be maintained to support preload, excessive fluid can overwhelm a failing right ventricle3 . Our successful outcome aligns with the notion that, although TA in pregnancy carries high risk, elective delivery with regional anaesthesia can be accomplished safely with meticulous care. Women with repaired TA have been shown to tolerate pregnancy fairly well with surveillance5 . Unrepaired TA, however, is often grouped with Eisenmenger's syndrome (suprasystemic PAH); maternal mortality in Eisenmenger's pregnancy remains reported as high as 30–50%.11, 2

Key Takeaway: In TA with severe PAH, the anaesthesia goal is to preserve SVR and avoid surges in PVR. A graded epidural provides effective analgesia while allowing careful titration of sympathetic blockade4,3 . Invasive arterial monitoring and readiness to treat hypotension are essential. Multidisciplinary management, including preoperative optimization and ICU postoperative care, is paramount. This approach may reduce the historically high morbidity of such cases and has been supported by case series and reviews7,5

Conclusion

Persistent truncus arteriosus in pregnancy poses enormous anesthetic challenges due to fixed pulmonary hypertension and mixing physiology. In this case of uncorrected TA with Eisenmenger syndrome, elective cesarean under carefully managed epidural anesthesia resulted in an excellent outcome. Incremental neuraxial blockade preserved systemic perfusion pressure and avoided exacerbating the right-to-left shunt2,4 . This case reinforces that, when managed by an experienced team with vigilant monitoring, regional techniques can be employed in even high-risk cardiac parturients, provided that SVR is supported and PVR is minimized. Such strategies should be integrated into multidisciplinary plans for similar cases.

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