

# THE STORM IN OBSTETRIC ANAESTHESIA: MANAGING UTERINE RUPTURE IN A PARTURIENT WITH CORRECTED VENTRICULAR SEPTAL DEFECT

ARUN PR<sup>1</sup> MANJUNATH C PATIL<sup>2</sup> KEDARESHVARA KS<sup>3</sup><sup>1</sup>Junior Resident, Department of Anaesthesiology and Critical Care, Jawaharlal Nehru Medical College and KLES Dr Prabhakar Kore Hospital & Medical Research Center, Belagavi<sup>2</sup>Professor & Consultant, Department of Anaesthesiology and Critical Care, Jawaharlal Nehru Medical College and KLES Dr Prabhakar Kore Hospital & Medical Research Centre, Belagavi<sup>3</sup>Professor, Department of Anaesthesiology and Critical Care, Jawaharlal Nehru Medical College and KLES Dr Prabhakar Kore Hospital & Medical Research Centre, Belagavi

\*Corresponding Author  
Dr. Manjunath C Patil

## Article History

Received: 03.10.2025

Revised: 18.10.2025

Accepted: 15.11.2025

Published: 19.11.2025

## Abstract:

**Background:** Managing anaesthesia in pregnant women with congenital heart disease (CHD) presents unique perioperative challenges, particularly during obstetric emergencies. Physiological changes of pregnancy can unmask residual cardiac limitations, and maintaining haemodynamic stability becomes crucial. This case highlights the anaesthetic considerations in a patient with corrected ventricular septal defect (VSD) who presented with hypovolemic shock due to an unexpected uterine rupture during emergency caesarean section.

**Case Report:** A 28-year-old gravida 2 para 1 woman at 38 weeks + 3 days gestation presented with giddiness, abdominal pain, and vaginal bleeding. She was in hypovolemic shock (BP 80/50 mmHg, pulse 140/min). Her history included a surgically corrected VSD and one prior LSCS. Following resuscitation and invasive monitoring, general anaesthesia was administered using thiopentone and succinylcholine. Upon laparotomy, a frank uterine rupture was found. A live 3 kg infant was delivered, and hysterectomy performed with an estimated 1500 mL blood loss. The patient received blood products and vasopressor support with noradrenaline. Postoperatively, she was extubated awake, observed in the obstetric ICU, and discharged uneventfully after four days. Pregnancy with CHD requires vigilant perioperative planning, judicious anaesthetic choice, and dynamic hemodynamic management. Early recognition of decompensation and multidisciplinary coordination are vital in achieving a favourable maternal outcome.

**Keywords:** Congenital heart disease, ventricular septal defect, uterine rupture, obstetric anaesthesia, hypovolemic shock, caesarean section.

## INTRODUCTION

Managing anaesthesia in parturient with congenital heart disease (CHD) remains one of the most demanding challenges in obstetric practice. Physiological adaptations during pregnancy, including increased blood volume, cardiac output, and oxygen demand, place significant stress on an already compromised cardiovascular system (1). Even in patients with surgically corrected lesions, the potential for residual shunts, arrhythmias, or impaired ventricular function persists, making anaesthetic management complex and high risk. The situation becomes even more critical in obstetric emergencies, where rapid decision-making and hemodynamic stability are crucial for maternal and foetal survival (2).

Ventricular septal defect (VSD) is among the most common congenital heart defects, accounting for nearly 20–30% of all congenital cardiac anomalies. Although many patients undergo surgical correction in childhood, they may still experience long-term cardiac consequences such as right ventricular volume overload, pulmonary hypertension, or reduced myocardial compliance (3). These residual effects can alter maternal cardiovascular responses during labour, delivery, and

anaesthesia. Moreover, physiological changes of pregnancy such as increased cardiac output by 30–50%, decreased systemic vascular resistance, and the hypercoagulable state can exacerbate underlying cardiovascular strain, particularly during episodes of acute blood loss or surgical stress (4).

Anaesthetic management in such patients requires balancing maternal and foetal oxygenation, avoiding myocardial depression, and preventing fluctuations in systemic and pulmonary pressures (5). The choice between general and regional anaesthesia must be individualized based on the patient's cardiac function, hemodynamic stability, and urgency of surgery. Regional anaesthesia, though preferred in stable patients, may lead to sudden decreases in venous return and systemic vascular resistance, resulting in hypotension poorly tolerated by patients with cardiac compromise. Conversely, general anaesthesia allows tighter hemodynamic control but may provoke arrhythmias and myocardial depression if not carefully titrated (6).

An unanticipated surgical event, such as uterine rupture, adds another layer of complexity. Uterine rupture, though rare, can occur in scarred uteri following previous lower segment caesarean section (LSCS) and presents as sudden abdominal pain, vaginal bleeding, and signs of hypovolemic shock (7). In such situations, rapid

assessment, aggressive resuscitation, and immediate surgical intervention are lifesaving. For patients with cardiac disease, these demands can lead to catastrophic decompensation if not expertly managed.

This case highlights the critical importance of comprehensive preoperative assessment, vigilant intraoperative monitoring, and multidisciplinary coordination among anaesthesiologists, obstetricians, and intensivists. It emphasizes the need for preparedness in managing haemodynamic instability, optimizing oxygen delivery, and anticipating unforeseen complications in high-risk obstetric patients with underlying cardiac conditions.

## CASE REPORT

**Patient Information:** A 28-year-old gravida 2 para 1 living 1 (G2P1L1) woman at 38 weeks and 3 days of gestation presented to the labour room with sudden-onset giddiness, severe lower abdominal pain, and per vaginal bleeding. She was fully conscious but appeared pale, anxious, and restless. Her past medical history revealed a congenital ventricular septal defect (VSD) that had been surgically corrected with a patch closure at five years of age. She had no history of hypertension, diabetes, or thyroid dysfunction. Her obstetric history included one previous lower segment caesarean section (LSCS) performed three years earlier for foetal distress.

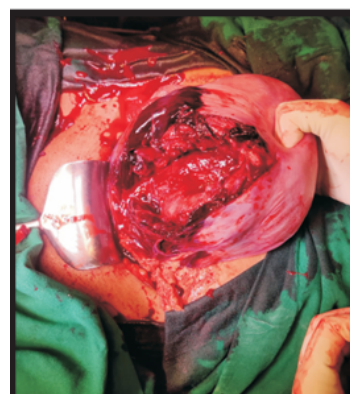
**Clinical Findings:** On initial examination, the patient was in hypovolemic shock. Her blood pressure was 80/50 mmHg, heart rate 140 beats per minute, and respiratory rate 30 breaths per minute with a rapid, thready pulse. Foetal heart sounds were localized but faint and tachycardic. Abdominal palpation revealed localized tenderness over the lower abdomen with a tense uterine contour. Vaginal examination confirmed minimal bleeding but no cervical dilatation.

**Diagnostic Assessment:** Initial laboratory evaluation showed haemoglobin of 8 g/dL, haematocrit 26%, and normal renal and liver function tests. Electrocardiography revealed sinus tachycardia without ischemic changes. Two-dimensional echocardiography done during antenatal care had shown no residual VSD or pulmonary hypertension. A provisional diagnosis of placental abruption with hypovolemic shock was made, and the patient was prepared for emergency LSCS.

**Therapeutic Interventions:** Two large-bore (18G) intravenous cannulas were secured, and rapid fluid resuscitation was initiated. A central venous line was inserted in the right internal jugular vein and an arterial line in the left radial artery for invasive monitoring. Given her hemodynamic instability, general anaesthesia was preferred over regional techniques. Induction was achieved with thiopentone 250 mg and succinylcholine 100 mg, and the patient was ventilated in volume-

controlled mode. Noradrenaline infusion at 0.1 µg/kg/min was initiated for persistent hypotension.

On opening the abdomen, a frank uterine rupture was identified extending through the previous LSCS scar. A live male infant weighing 3 kg was delivered, followed by an emergency hysterectomy. Approximately 1500 mL of blood was evacuated from the peritoneal cavity. The patient received 3 units of packed red blood cells, 2 units of cryoprecipitate, and 2 units of platelet concentrate intraoperatively.



**Figure 1:** Intraoperative photograph showing a *frank uterine rupture* extending through the previous lower segment caesarean section (LSCS) scar. The ruptured uterine wall with extensive bleeding and exposed foetal membranes is visible, consistent with complete uterine rupture in a term pregnancy. Immediate surgical exploration and hysterectomy were performed under general anaesthesia following hemodynamic stabilization.



**Figure 2:** Surgically removed uterus and blood clots following emergency hysterectomy. Multiple large organized clots and blood-soaked surgical packs are shown after evacuation of approximately 1500 mL of hemoperitoneum. The specimen confirms complete uterine rupture extending through the lower uterine segment in a previously scarred uterus.

**Follow-Up:** Intraoperatively haemodynamic were closely monitored using pulse pressure variation index (maintained between 7–14%). Arterial blood gases

remained within acceptable limits. After stabilization, the patient was extubated awake and shifted to the obstetric intensive care unit (ICU) for observation. Postoperative recovery was uneventful. She maintained stable vitals, required no further vasopressor support, and was discharged in stable condition on the fourth postoperative day.

This case illustrates the complexity of managing obstetric emergencies in patients with repaired congenital heart disease. The presence of residual cardiovascular limitations and the physiological stress of pregnancy necessitate careful intraoperative management. Early recognition of hypovolemia, prompt anaesthetic decision-making, and continuous invasive monitoring were pivotal in ensuring a successful maternal outcome despite the compounded risks of uterine rupture and prior cardiac surgery.

## DISCUSSION

The anaesthetic management of parturient with congenital heart disease (CHD) presents significant physiological and clinical challenges, particularly during obstetric emergencies. The combination of pregnancy-induced cardiovascular changes and the unpredictable nature of conditions like uterine rupture demands prompt assessment, multidisciplinary coordination, and vigilant intraoperative monitoring (8). This case demonstrates the complexity of balancing haemodynamic stability in a patient with a surgically corrected ventricular septal defect (VSD) who presented in hypovolemic shock due to uterine rupture.

Ventricular septal defect is one of the most prevalent congenital cardiac anomalies, often repaired successfully in childhood. However, even after surgical correction, such patients may retain varying degrees of myocardial dysfunction, altered compliance, or a predisposition to arrhythmias (9). During pregnancy, the cardiovascular system undergoes profound changes: a 30–50% increase in blood volume and cardiac output, a 20% fall in systemic vascular resistance, and elevation in heart rate by 10–15 beats per minute (10). These adaptations, though physiological, can unmask subclinical myocardial limitations in women with repaired CHD, predisposing them to rapid decompensation under stress such as haemorrhage or anaesthesia (11).

In this patient, the sudden onset of hypovolemic shock was initially attributed to placental abruption, but laparotomy revealed a complete uterine rupture. Uterine rupture, though rare, remains a potentially fatal complication, particularly in women with previous caesarean scars. It can lead to massive intraperitoneal haemorrhage, maternal collapse, and foetal compromise. In patients with CHD, the physiological response to acute blood loss is poorly tolerated because their cardiovascular reserve is limited. Thus, the anaesthesiologist's role extends beyond maintaining

anaesthesia to orchestrating rapid resuscitation and haemodynamic optimization.

The choice of anaesthetic technique in such cases must be individualized. Regional anaesthesia is often favoured in stable cardiac patients because it avoids airway manipulation and maintains spontaneous ventilation. However, in the presence of shock or anticipated major blood loss, it may exacerbate hypotension due to sympathetic blockade. In contrast, general anaesthesia offers the advantage of airway control, titratable drug administration, and rapid haemodynamic manipulation. In this case, general anaesthesia was appropriately chosen due to severe hypovolemia and the need for immediate surgical intervention.

Induction agents such as thiopentone and succinylcholine were used safely, with careful titration and immediate availability of vasopressors. Noradrenaline infusion at low dose (0.1 µg/kg/min) was initiated early to support systemic vascular resistance without significantly increasing myocardial oxygen demand. Continuous invasive arterial pressure and central venous pressure monitoring guided fluid replacement and vasopressor titration. Maintenance of preload was essential, but overzealous fluid administration was avoided to prevent pulmonary congestion, a common concern in CHD patients.

The intraoperative discovery of a complete uterine rupture necessitated an emergency hysterectomy, with estimated blood loss of 1500 ml. The timely administration of packed red cells, platelets, and cryoprecipitates restored circulating volume and corrected coagulopathy. Invasive monitoring using pulse pressure variation (PPV) between 7–14% allowed precise fluid management and prevented volume overload.

Postoperatively, early extubation, close haemodynamic monitoring, and observation in a high-dependency obstetric ICU were crucial. The patient's smooth recovery without cardiac or respiratory complications reflected the success of anticipatory planning and multidisciplinary teamwork involving obstetricians, anaesthesiologists, and intensivists.

This case reports the need for preoperative cardiac evaluation in all pregnant women with repaired CHD and emphasizes that even a structurally corrected heart may behave unpredictably under acute stress. The principles of management include maintaining adequate preload, avoiding tachycardia, preventing sudden changes in systemic and pulmonary vascular resistance, and ensuring timely blood transfusion and resuscitation. Meticulous haemodynamic monitoring, judicious anaesthetic selection, and coordinated multidisciplinary care are the cornerstones of successful management in obstetric emergencies involving women with congenital heart disease. Early anticipation, preparedness, and

prompt decision-making can significantly reduce morbidity and mortality in such high-risk patients.

## CONCLUSION

The successful management of this case highlights the importance of individualized anaesthetic planning and meticulous intraoperative monitoring in obstetric patients with congenital heart disease. Even after surgical correction, residual cardiac vulnerabilities may manifest during acute stress such as uterine rupture and hypovolemic shock. The decision to use general anaesthesia, early initiation of vasopressor support, and precise fluid management were pivotal in maintaining haemodynamic stability. Multidisciplinary collaboration among anaesthesiologists, obstetricians, and intensivists ensured a favourable maternal and neonatal outcome. This case reinforces the need for vigilance, preparedness, and coordinated teamwork in high-risk obstetric anaesthetic emergencies.

## REFERENCES

1. Ahmadzadeh S, Duplechin DP, Bailey PD, Duplechan DT, Enache AJ, Moore P, et al. Anesthetic management for delivery in parturients with heart disease: a narrative review. *Biomedicines.* 2025;13(7):1736.
2. Bhatia K, D'Souza R, Malhamé I, Thorne S. Anaesthetic considerations in pregnant patients with cardiac arrhythmia. *BJA Educ.* 2023;23(5):196–204.
3. Ünlütürk S, Kauling RM, Cuypers JAAE, van den Bosch AE, Hirsch A, Pelosi C, et al. Long-term outcome after surgical ventricular septal defect closure: longitudinal follow-up into the fifth decade. *Int J Cardiol Congenit Heart Dis.* 2025;22:100624.
4. Dong Z, Luo L, Zhuang X, Fu L, Yi S, Wang K, et al. Management of cardiopulmonary bypass in pregnancy: challenges and progress in maternal-fetal protection. *Front Cardiovasc Med.* 2025;12:1637826.
5. Reitman E, Flood P. Anaesthetic considerations for non-obstetric surgery during pregnancy. *Br J Anaesth.* 2011;107(Suppl 1):i72–8.
6. Theodoraki K. Regional anesthesia and cardiac disease. 2025;FT34:A403–4.
7. Agrawal S, Balara A, Kumar L. Uterine rupture: a case series from a tertiary care center in Northern India. *Cureus.* 2023;15(10):e47446.
8. Zaleski KL, Blazey MH, Carabuena JM, Economy KE, Valente AM, Nasr VG. Perioperative anesthetic management of the pregnant patient with congenital heart disease undergoing cardiac intervention: a systematic review. *J Cardiothorac Vasc Anesth.* 2022;36(12):4483–95.
9. Teets M, Adler AC. Ventricular septal defect. In: *Congenital Cardiac Anesthesia: A Case-Based Approach.* 2024;9–13.
10. Soma-Pillay P, Nelson-Piercy C, Tolppanen H, Mebazaa A. Physiological changes in pregnancy. *Cardiovasc J Afr.* 2016;27(2):89–94.
11. Das BB, Aggarwal V, Deshpande SR. Navigating women with congenital heart disease during pregnancy: management strategies and future directions. *World J Cardiol.* 2025;17(6):339–52.