

# Management of Cesarean Section in a Patient with History of Takotsubo Cardiomyopathy-A Case Report

## Abstract

Takotsubo cardiomyopathy (TTCM), also known as stress-induced cardiomyopathy or “broken heart syndrome,” is a clinical entity characterized by acute left ventricular dysfunction and reversible cardiac failure in the absence of coronary artery disease. Obstetric patients with a history of peripartum TTCM pose a unique challenge to the anesthesiologist. With a multiplicity of issues to be considered and no recommendations for best practice, the management plan needs to be tailored for each parturient to minimize the stress associated with labor and delivery. We present the case of an apparently healthy parturient with a history of peripartum TTCM presenting for a subsequent cesarean section and outline the various issues an anesthesiologist might encounter.

**Keywords:** Broken heart syndrome, caesarean section, takotsubo cardiomyopathy

## Introduction

Takotsubo cardiomyopathy (TTCM), also known as stress-induced cardiomyopathy or “broken heart syndrome,” is a clinical entity characterized by acute left ventricular dysfunction and reversible cardiac failure in the absence of coronary artery disease.<sup>[1,2]</sup> Although TTCM is often triggered by intense physical or emotional stress, the underlying etiology is unclear, with catecholamine-induced cardiotoxicity and coronary vasospasm suggested as possible mechanisms.<sup>[3]</sup>

Most cases of TTCM in pregnancy occur in the peripartum period.<sup>[4]</sup> There are very few reports in the current literature concerning a parturient with a history of peripartum TTCM due for a subsequent cesarean section.<sup>[5]</sup> The risk of recurrence of TTCM in such patients, and the lack of management guidelines to prevent and/or manage the recurrence makes their anesthetic management unique and challenging.

We describe the anesthetic management of a term parturient with a history of peripartum TTCM presenting for a cesarean section. A literature review of the anesthetic management for such cases is also presented.

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## Case History

A 40-year-old, 2<sup>nd</sup> gravida with previous LSCS with no relevant medical history apart from peripartum TTCM 5 years ago, presented for a cesarean section at 37 weeks of gestation. During her first pregnancy, she was admitted at 40 weeks of gestation for a spontaneous delivery. After a prolonged and painful labor, she underwent a cesarean section under spinal anesthesia for failure of induction. She delivered a healthy baby girl and the intraoperative course was uneventful. However, the following day, she experienced severe pain at the surgical site and complained of breathing difficulty, chest pain, and restlessness. She was subsequently shifted to the intensive care unit where she was managed with oxygen, diuretics, and inotropes. Echocardiography demonstrated apical ballooning and severely reduced left ventricular systolic function. She was discharged a week later with a diagnosis of peripartum TTCM. She was in good health between the two pregnancies and was not on any medications.

Her current antenatal period had been unremarkable with normal fetal growth and no cardiologic abnormalities. Owing to the history of TTCM, a multidisciplinary team consisting of a gynecologist, an anesthesiologist, and a cardiologist decided to plan an elective cesarean section at 37 weeks of gestation.

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On admission, she was clinically assessed and counseled extensively about the risk of recurrence of TTCM during the peripartum period. Her preoperative hemoglobin and coagulation parameters were normal. ECG and echocardiography revealed no abnormalities.

Intravenous access was established with a 16-gauge peripheral intravenous cannula under the cover of local anesthesia. Although spinal anesthesia is preferred for cesarean section, we chose to perform an epidural block for this patient. Standard monitoring with pulse oximetry, non-invasive blood pressure, and ECG was done during the surgery. Emergency drugs (including inotropes), resuscitation equipment, a CPAP mask, and invasive monitoring were kept on standby.

Under local anesthesia, the epidural space was identified at the L3-L4 space with an 18 G Tuohy needle and an epidural catheter was inserted in the sitting position under all aseptic precautions. 20 ml of 2% carbonated lignocaine plus 50 µg of fentanyl was given via the epidural route in small increments under strict hemodynamic monitoring, achieving a sensory block till T4. Oxygen supplementation was given via nasal prongs. The patient was constantly communicated with and counselled throughout the entire surgery. Soft music of her choice was allowed to be played using headphones. A term female infant weighing 3,430 g was delivered with an Apgar score of 10 at 1 and 5 min. Post-delivery, intravenous oxytocin (5 IU) was administered over 15 min followed by 10 IU slowly over the next 1 hour. Rapid IV bolus was avoided. 2 mg of midazolam was administered during hysterotomy closure. Her husband was allowed in the OT throughout the surgery. She was hemodynamically stable during the course of surgery and 1,700 ml of intravenous fluids were given. Blood loss was 700 ml and her urine output was 100 ml.

For postoperative pain relief, an epidural patient-controlled analgesia (PCA) pump was given with 0.1% bupivacaine + fentanyl (2 µg/ml) with a continuous rate of 6 ml/h, bolus doses of 4 ml with a lockout interval of 20 min. The epidural PCA pump was continued for 48 h. From the OT, after discussion with the cardiologist, she was shifted to her own room in view of her uneventful intraoperative course, as opposed to shifting her to the HDU. She was, however, strictly monitored in her room and was able to breast feed as per protocol. She was discharged on the 4<sup>th</sup> post-op day, with an uneventful stay.

## Discussion

TTCM is a transient apical ballooning of the heart that characteristically mimics acute coronary syndrome (ACS). Representing 0.7–2.5% of all cases of ACS, it typically affects women in the post-menopausal period.<sup>[6,7]</sup> Over the last decade, TTCM has increasingly been reported in young women especially after cesarean sections.<sup>[8]</sup>

Recurrence in TTCM is unpredictable, with rates varying from 5 to 6% to 11%. Recurrence is often linked to a stressful situation and may occur from 8 days to 10 years after the initial episode, despite medical treatment.<sup>[9,10]</sup>

Our report thus becomes unique as it centers on a parturient with a history of peripartum TTCM presenting for a subsequent cesarean section. To our knowledge, no specific guidelines/recommendations are available regarding the anesthetic management in such a situation, making the management of each case unique by itself.

Catecholamine excess is presumed to play a central role in TTCM. Pregnancy and labor, being particularly stressful situations may trigger TTCM.<sup>[11]</sup> Our management goal was hence entirely focused on keeping the patient's stress and anxiety levels to an utmost minimum and thereby prevent recurrence.

Our patient was counselled extensively preoperatively to allay her fears and distress from her previous experience. She was explained in detail about TTCM, the risk of recurrence, and the plan of action. A history of major domestic stress was found due to issues between the patient and her mother-in-law. With support from the husband, the mother-in-law was advised to not visit the hospital in order to keep the external stress triggers to a minimum. A cardiologist was continually involved during the perioperative assessment.

Although there is no consensus to favor regional or general anesthesia in TTCM, it is believed that regional anesthesia may cause less stress and anxiety while laryngoscopy and intubation may cause a catecholamine surge.<sup>[12]</sup> We discussed the choice of anesthesia with the patient, giving her the option to choose. She was very firm that she wanted to stay awake during the procedure and her primary concern was neonatal well-being. Spinal anesthesia, despite its obvious advantages in a healthy parturient, may induce significant hypotension. The choice of spinal anesthesia may be questionable in the setting of a 5–11% risk of recurrence of TTCM. To avoid this hemodynamic stress and to provide a more gradual sympathetic block, we preferred epidural anesthesia in this patient which could be extended for postoperative pain relief too. Keeping in mind that TTCM may be triggered intraoperatively, all resuscitative equipment and means for conversion to general anesthesia were kept on standby.

We conducted the case with a single large-bore peripheral venous line, opting to avoid the use of invasive monitoring with an arterial line or a central venous catheter. Although some authors do mandate their use, the procedure of placement of such invasive lines in an awake parturient may by itself induce stress. To avoid these triggers of stress, we decided to defer invasive monitoring in this parturient, unless clinically indicated. However, provisions for a central line and arterial line must be kept ready before surgery.

While pre-hospital TTCM presents like an acute coronary syndrome, perioperative TTCM is known to present with heart failure, arrhythmias, and cardiac arrest. It is important to consider TTCM when these signs and symptoms appear during the perioperative course, among other differential diagnoses

such as peripartum cardiomyopathy, viral myocarditis, acute coronary dissection, and pheochromocytoma.<sup>[13]</sup> The anesthesiologist must also be prepared to tackle intraoperative TTCM. Although the impact of sympathomimetics on TTCM remains to be established, keeping inotropes (dopamine, dobutamine), vasopressors (phenylephrine), and diuretics on standby is a prudent strategy.<sup>[14]</sup>

In order to avoid the potential hemodynamic effects of bolus doses of intravenous oxytocin, we decided to avoid our routine bolus administration and preferred using a slow IV infusion of oxytocin, while strictly monitoring for cardiovascular stability. Ergot alkaloids are associated with TTCM and they must be used judiciously.<sup>[15]</sup>

We preferred to use carbonated lignocaine for the epidural block owing to its quick onset, short duration of action and better motor block, as compared to other agents such as bupivacaine or ropivacaine. This allowed us to titrate the epidural block as per the hemodynamic stability and comfort of the mother, thus further reducing her stress and anxiety.

Counselling is of utmost importance in such patients. Our patient was communicated with throughout the intraoperative course, and was assured of no pain, keeping her calm and comfortable. Music therapy was used during the intraoperative period and the husband was allowed to be with her throughout the surgery. As she was very anxious about the wellbeing of the newborn, the neonate was immediately shown to her and was reassured about the same by the neonatologist. She was kept relaxed and sedated post-delivery with small doses of benzodiazepine intraoperatively during the closure.

Excellent analgesia and a stress-free environment remain the goal of postoperative management. We instituted an epidural patient-controlled analgesia pump in our patient. Some authors recommend following such patients in an HDU/ICU even in the absence of complications.<sup>[5]</sup> We however decided against this with an aim of avoiding the impact of an HDU/ICU's stress-filled environment and the separation of the neonate from the mother. We nursed our patient in the labor ward with continuous close monitoring and one to one nursing care for the first 48 hours to pick up any early warning signs.

## Conclusion

A successful management of a term parturient with a history of peripartum TTCM for cesarean section is described and the literature regarding the same is reviewed.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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