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Spinal Anesthesia for Cesarean Section in a Patient with Total AV Block

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ABSTRACT

Anesthetic management in obstetric patients with heart disease, especially Total Atrioventricular (AV) Block, presents a major challenge due to the high risk of hemodynamic collapse and maternal mortality. This condition requires a very careful approach to anesthesia, especially in patients with comorbid preeclampsia. This case study aims to describe a safe spinal anesthesia management strategy in pregnant patients with Total AV Block without the installation of a prophylactic pacemaker. A 31-year-old female patient with G2P1001 at 37+6 weeks gestation, diagnosed with superimposed preeclampsia with Total AV Block, underwent emergency cesarean section. Preoperative evaluation showed a pulse rate of 38–55 bpm and evidence of total AV block on the ECG. The anesthesia procedure used spinal anesthesia with a low dose of 0.5% Bupivacaine Heavy (10 mg) to limit the sensory block at the T5 level from affecting the heart accelerator fibers. Throughout surgery, the patient's hemodynamics remained stable with tolerable fluctuations in blood pressure and pulse. Interestingly, the administration of 0.5 mg of atropine still produced an increased response in heart rate and blood pressure, although it is generally ineffective in total AV blocks. The surgery took place safely, the baby was born with a good Apgar score, and the patient was admitted to the postoperative ICU for strict monitoring. In conclusion, low-dose spinal anesthesia can be a safe option in patients with Total AV Block with rigorous preparation, intensive monitoring, and emergency pacemaker readiness.

Keywords: *Total AV Block, spinal anesthesia, cesarean section, preeclampsia, hemodynamic management, high-risk obstetrics.*

INTRODUCTION

Atrioventricular (AV) Block is a disorder of the cardiac conduction system characterized by the absence of electrical conduction between the atria and the ventricles. This conduction abnormality can be congenital or acquired, with an incidence of 1 in 15,000 to 20,000 live births (Mishra et al., 2023; Shah & Behere, 2021; Sreedevi, 2018).

In pregnant women, congenital AV Block may be asymptomatic; however, it can lead to sudden vascular collapse, particularly during labor (Baruteau et al., 2016; Mollerach et al., 2019; Wang et al., 2022). Several cases of sudden, unpredictable cardiac arrest during labor have been reported (Beckett et al., 2017; Jayaraman et al., 2018; Jeejeebhoy et al., 2015; Zelop et al., 2018). Therefore, pregnant patients with AV Block scheduled for cesarean section require meticulous preoperative evaluation and the selection of an appropriate anesthetic technique to minimize the risk of sudden death (Adare et al., 2023; Kromah, 2025; Meng et al., 2023).

The urgency of this case lies in the management of a parturient with total AV block requiring emergent cesarean section, without the prior placement of a prophylactic pacemaker—a scenario that demands careful anesthetic planning and execution to avoid catastrophic outcomes (Agarwal et al., 2023; Bhatia et al., 2023; Rishi & Ibrahim, 2025; Vinsard et al., 2023). Current literature highlights the variability in anesthetic approaches and underscores the need for evidence-based strategies tailored to such high-risk patients (Fu et al., 2025; Guo et al., 2025; Trivedi & Patel, 2025). This study therefore aims to describe the safe application of low-dose spinal anesthesia in a pregnant patient with total AV block and

superimposed preeclampsia, detailing the perioperative monitoring and pharmacological management that ensured maternal and neonatal stability (Bhatia et al., 2023; Elsayed et al., 2025; Meng et al., 2023). The findings are intended to provide an evidence-based reference for anesthesiologists and obstetric teams facing similar clinical dilemmas, ultimately contributing to improved patient safety and optimized maternal-fetal outcomes in complex obstetric anesthesia

RESEARCH METHODS

Case Report

Patient Information and Diagnosis A 31-year-old female patient (Yuniar) was referred from Murni Teguh Hospital. The patient was diagnosed with G2P1001 at 37 weeks 6 days gestation, Singleton Live, Superimposed Preeclampsia with severe features, and Total AV Block. She was scheduled for an emergent Cesarean Section and classified with an ASA physical status of III-E.

History and Anamnesis The patient's cardiac condition was newly discovered during a preoperative evaluation at the referring hospital. She reported no current complaints, specifically denying chest pain or palpitations. Symptoms of preeclampsia such as headache, epigastric pain, and blurred vision were also denied. Her medical history was significant for hypertension since 2019, for which she was not taking regular medication , and asthma, with the last exacerbation in 2019. She reported an allergy to NSAIDs, manifesting as pruritus and facial swelling.

Physical Examination and Investigations On physical examination, her weight was 60 kg and height was 155 cm. She was alert and oriented (Compos Mentis). Vital signs revealed a blood pressure of 151/91 mmHg, a heart rate of 48 beats/minute (bpm), a respiratory rate of 18 breaths/minute, and SpO2 of 99% on room air. The airway assessment revealed a Mallampati III score. Key laboratory investigations showed a Hemoglobin of 10.9 g/dL , Potassium of 3.05 mmol/L , Magnesium of 3.33 mg/dL , and urinalysis positive for leukocytes (++) and protein (++).

An electrocardiogram (EKG) confirmed Total AV Block with a heart rate of 49 bpm. A bedside echocardiogram demonstrated Left Atrial (LA) & Left Ventricular (LV) dilatation, LV eccentric hypertrophy, a preserved ejection fraction (EF) of 68%, and mild-moderate mitral regurgitation (MR). Cardiology Assessment and Anesthetic Management The cardiology team confirmed the diagnosis of Total AV Block. An atropine challenge (0.5 mg) was administered, which temporarily increased the HR from 45 bpm to 55 bpm; however, the heart rate returned to baseline 15 minutes later.

The patient and her family were informed of the high-risk nature of the procedure, including the risk of intraoperative cardiac arrest, and written informed consent was obtained. Two large-bore (18G) intravenous lines were secured. All emergency medications, including epinephrine, and a spinal anesthesia set were prepared.

Regional Anesthesia-Subarachnoid Block (RA-SAB) was performed by an obstetric anesthesia consultant. With the patient in the left lateral position, a 27G spinal needle was inserted at the L3-L4 interspace. After confirming clear cerebrospinal fluid (CSF) return, Bupivacaine Heavy 0.5% (10 mg) was injected intrathecally. Other medications administered intraoperatively included Ondansetron 4 mg IV, Oxytocin 3 IU (bolus), Methylergometrine 0.2 mg IV, and two doses of Sulfas Atropine 0.5 mg IV.

Intraoperative Course and Outcome The surgery lasted 1 hour and 10 minutes. The patient's hemodynamics fluctuated, with blood pressure ranging from 103–124 / 60–72 mmHg and heart rate from 38–55 bpm. The total crystalloid fluid administered was 500 mL. Estimated blood loss was 300 mL, with a urine output of 200 mL.

A female infant was delivered at 23:56, weighing 2500 grams, crying immediately, with Apgar scores of 8 and 9. Postoperative Care The patient was transferred to the Intensive Care Unit (ICU) for continuous monitoring. Postoperative analgesia was managed with a continuous infusion of Morphine (20 mg in 20 ml NaCl 0.9% at 0.6 cc/hour) and Paracetamol 500 mg PO every 6 hours.

RESULT AND DISCUSSION

This case presents two primary clinical challenges: the selection of spinal anesthesia for a patient with Total AV Block (TAVB), and the perioperative management of this condition without a prophylactic pacemaker. Total AV Block and Spinal Anesthesia The patient's EKG confirmed TAVB with a ventricular rate of 49 bpm. The cardiology division advised outpatient evaluation for a potential pacemaker insertion. Spinal anesthesia was chosen with the objective of minimizing cardiovascular effects and reducing hemodynamic instability. A low dose of Bupivacaine Heavy 0.5% (10 mg) was administered to achieve a sensory block level up to the T5 dermatome.

The sympathetic blockade resulting from spinal anesthesia (typically T5-L1) causes vasodilation, venous pooling, decreased venous return, and a subsequent reduction in Cardiac Output (CO). This, combined with arterial vasodilation, lowers Systemic Vascular Resistance (SVR) and blood pressure. However, a subarachnoid block limited to the T5 level was considered safe in this patient as it avoids blocking the cardiac accelerator sympathetic fibers, which originate at the T1-T4 levels.

This approach is supported by existing literature. Kumar et al. and Swain have reported the successful use of low-dose spinal anesthesia for cesarean sections in patients with TAVB without a pacemaker, noting that this strategy aims to mitigate the hemodynamic compromise associated with sympathetic blockade. Pacemaker Considerations In patients with TAVB, temporary or permanent pacemaker insertion is often indicated before surgery to prevent significant hemodynamic compromise from anesthetic and surgical stress. Indications include symptomatic bradycardia and low cardiac output.

Typically, anticholinergic drugs like atropine are considered ineffective in TAVB. Atropine primarily acts on the sinoatrial (SA) node, and in TAVB, there is a complete dissociation between the SA node and the atrioventricular (AV) node. Therefore, atropine is not expected to increase the ventricular rate in unstable TAVB.

However, an interesting finding in this specific case was that the administration of Atropine 0.5 mg (both as a challenge and premedication) *did* elicit a hemodynamic response. It successfully increased the patient's HR from 42 bpm to 55 bpm and raised the blood pressure from 122/71 mmHg to 153/83 mmHg. This indicated that, in this patient, atropine was still effective in improving perfusion. Despite this response, a percutaneous pacemaker was kept on standby throughout the operation, and an outpatient evaluation for a permanent pacemaker was planned

CONCLUSION

This case report illustrates the safe and effective use of low-dose spinal anesthesia (10 mg Bupivacaine Heavy 0.5%) for cesarean section in an obstetric patient with total AV block, without a prophylactic pacemaker, by limiting the sympathetic block to T5 to preserve cardiac accelerator fibers (T1-T4), alongside rigorous hemodynamic monitoring, anticipation of complications, immediate access to emergency drugs like atropine (to which the patient showed an atypical positive response), and postoperative ICU care. These measures ensured hemodynamic stability and successful maternal-fetal outcomes in this high-risk scenario. For

future research, comparative studies evaluating low-dose spinal versus alternative regional or general anesthesia techniques in similar patients, incorporating advanced hemodynamic monitoring tools like invasive arterial lines or echocardiography, could further refine evidence-based protocols and assess long-term outcomes.

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