Anaesthetic Management of Parturient with Wolff-Parkinson-White Syndrome for Emergency Cesarean Section under General Anaesthesia – A Case Report

Case Report

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ABSTRACT

Background: Wolff-Parkinson-White (WPW) syndrome is a congenital cardiac pre-excitation syndrome characterized by symptoms like palpitations, syncope, and life-threatening arrhythmia. Pregnancy further complicates the pathology of WPW syndrome, making the pregnant woman more susceptible to life-threatening arrhythmia.

Case presentation: A 29-year-old parturient with WPW syndrome presented for an emergency cesarean section at term given cord prolapse and fetal bradycardia, planned under general anesthesia. Perioperative management aimed to prevent tachyarrhythmia, and preparedness with appropriate drugs and equipment was kept on standby, ensuring we achieved a favorable outcome in this case.

Conclusions: WPW syndrome in pregnancy is a rare phenomenon, with very few case reports with general anaesthesia. This report helps in highlighting the important aspects of anesthetic management of WPW in pregnancy under general anesthesia, such as the perioperative risk of tachyarrhythmias and subsequent hemodynamic compromise, and limited resource management of such cases

Key Words: Cesarean section, general anesthesia, parturient, tachyarrhythmia, WPW syndrome.

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BACKGROUND

Wolff-Parkinson-White(WPW) syndrome is a congenital cardiac pre-excitation syndrome characterized by symptoms like palpitations, syncope, and life-threatening arrhythmia.[1] Pregnancy further complicates the pathology of WPW syndrome making the parturient more prone to life-threatening arrhythmia.[2] Anaesthetic management aims to avoid sympathetic stimulation due to pain, hypovolemia, and stress response to surgery, intubation, and extubation. Intense sympathetic block makes regional anesthesia the preferred option. Though most Anaesthetics and procedures during general Anaesthesia were potent triggers of arrhythmia, we weren't left with a choice and this article describes the management of the same with general Anaesthesia.

CASE PRESENTATION:

A 29-year-old female, G2P1L1, presented to casualty at 39 weeks, with a history of decreased perception of fetal movements. She had been incidentally diagnosed 2 years ago with WPW syndrome during the previous cesarean. Since she was asymptomatic, she was not started on any medications. Currently, blood investigations and serum electrolytes are within normal limits. The electrocardiogram showed a short PR interval (104 milliseconds) with a "delta wave" in chest leads as shown in (Fig 1). The cardiologist advised monitoring and follow-up with no active interventions at present. Cord prolapse and fetal bradycardia prompted an emergency cesarean under general anesthesia. The anti-arrhythmic drugs like Adenosine, Esmolol, and the defibrillator were kept ready. Being a case of cord prolapse with fetal distress, pre-oxygenation with 100% oxygen was carried out as soon as the patient was shifted on the operating table for 4 vital capacity breaths at the flow rate of 10L/min. Meanwhile, perioperative monitors which include a Pulse oximeter (SpO_2), 5-lead Electrocardiograph, and Non-invasive BP were connected and baseline values were recorded. Modified rapid sequence induction was performed with Inj. Thiopentone 250mg and Inj.Rocuronium 50mg with cricoid pressure. The laryngoscopic response was attenuated with a bolus of intravenous Esmolol 25mg and the airway was secured. Anaesthesia was maintained with Sevoflurane and nitrous oxide, with FiO_2 40% with vecuronium 1 mg, titrated to MAC of 0.7. The baby was delivered and cried immediately after birth. Due to limited

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resources and time constraints due to the emergency nature of the case, the fluid dynamics and administration were based on the Plethysmographic Variability Index (PVI). The uterus contracted adequately with a bolus of Oxytocin 2 IU slow intravenous over 2 minutes followed by infusion started at 20 IU /hour. Fentanyl 100µg and midazolam 1mg were administered. Phenylephrine i.v was kept for managing hypotension. The intraoperative course was uneventful. End-operatively, an Ultrasound-guided bilateral Transverse Abdominis Plane (TAP) block was given with 15 ml of 0.25% bupivacaine each. The patient was reversed with neostigmine and glycopyrrolate slowly. Intravenous lignocaine and a titrated dose of labetalol were administered to maintain stable hemodynamics during extubation. The patient was extubated, once she was awake, comfortable, and obeying commands. She was shifted to the intensive care unit for postoperative monitoring. Intravenous Paracetamol and Ketorolac were supplemented for postoperative analgesia. The remainder of the post-operative period was uneventful and was advised to cardiology follow-up in due course.

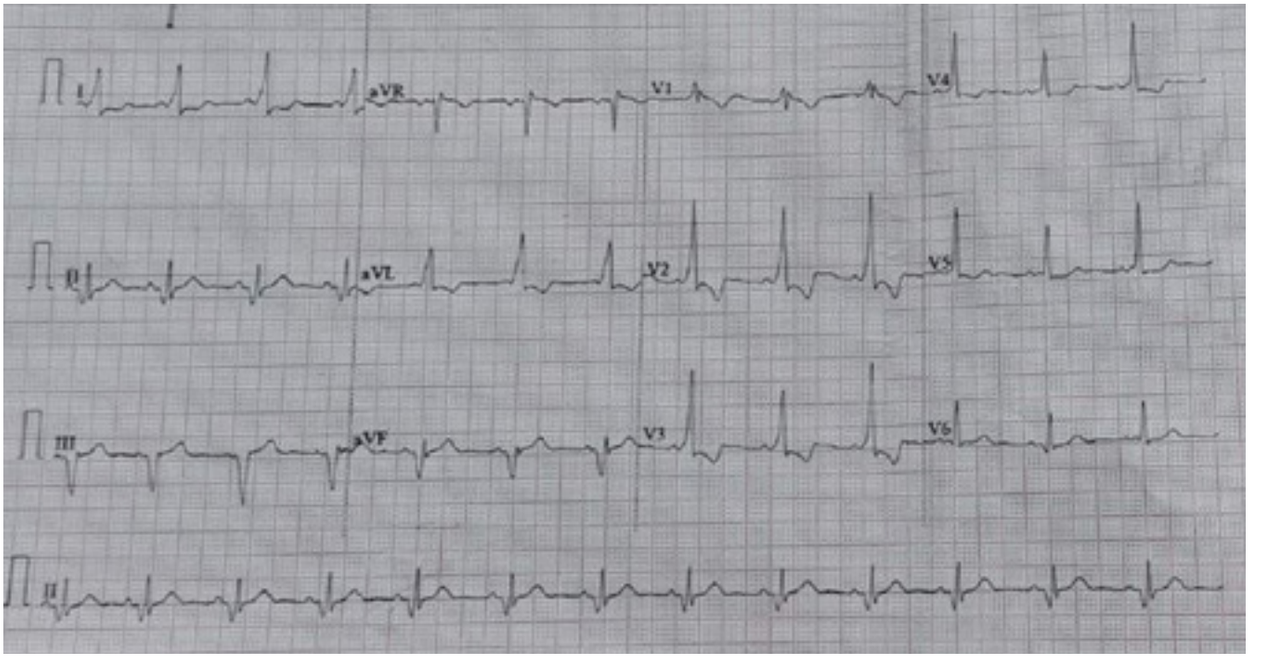

Fig. 1: Pre-operative ECG showing Short PR interval (104ms), QRS prolongation (144ms), Delta wave, Pseudo- Q waves in leads II, III, and aVF, and prominent R wave in V1-3

DISCUSSION

WPW syndrome is the presence of one or more accessory conducting pathways (bundle of Kent) bypassing the normal conduction system of the heart. The atrioventricular node utilizes a calcium-dependent slow inward current, while the accessory pathway utilizes a sodium-dependent fast inward current for electrical impulse transmission. The lack of physiological delay in transmission of the sinus impulse via the abnormal path results in a short PR interval, and ventricular excitation being a composite of the two impulses results in a fusion beat seen as a "delta wave" and short PR interval with prolonged QRS complex. It leads to the creation of a re-entrant circuit between the normal and accessory pathways, increasing the risk of ventricular arrhythmias.[3] The physiological changes of pregnancy such as tachycardia result in a shorter refractory period and elevated estrogen alters the actomyosin-ATPase relationships and thereby increases myocardial sensitivity to catecholamines thus aggravating the risk of supraventricular tachyarrhythmias, and ventricular fibrillation and compromising maternal and fetal well-being.[4] Anaesthetic management aims to avoid sympathetic stimulation due to pain, hypovolemia, and stress response to surgery, intubation, and extubation. Amongst the available management options, regional anesthesia is a safe option in such types of cases. Intense sympathetic blockade associated with subarachnoid block reduces the release of catecholamines making it a safer option. But hypotension associated with subarachnoid block can also trigger tachyarrhythmias.[5] Epidural Anaesthesia is another option where profound and segmental sympathetic block with better hemodynamic stability.[6] In our case, cord prolapse left us with the only option of general anesthesia.

Most general Anaesthetic drugs can trigger arrhythmias. Anesthetic drugs like Thiopentone and Propofol are safe. Thiopentone was preferred to facilitate modified rapid sequence induction despite propofol causing less impact on the refractory period of the accessory pathway only to reduce the chances of hypotension. Ketamine can precipitate tachyarrhythmias and is better avoided for induction. Opioids like fentanyl provide analgesia thus preventing exacerbation. Atrioventricular node conduction is least affected by isoflurane and sevoflurane, hence fewer chances for triggering arrhythmias. Depolarizing muscle relaxant like succinylcholine acts on the muscarinic receptor of the sinoatrial node, causing bradycardia. Non-depolarizing muscle relaxants such as Vecuronium and rocuronium are cardio-stable drugs and hence preferred over atracurium due to the risk of histamine release.[3] Neostigmine was administered slowly as it prolongs atrioventricular conduction hence may facilitate through the accessory pathway. Atropine is best avoided as it triggers tachyarrhythmia. Oxytocin can cause tachycardia, precipitating arrhythmia, hence recommended bolus dose of Oxytocin can be up to a maximum of 5 units and should be administered slowly or as an infusion of 0.001-0.2 units/min.[7] Adequate filling of the heart like co-loading is primary to avoid hypotension. Intraoperative hypotension can be managed with phenylephrine since it doesn't cause an increase in heart rate.[8] Extubation response can be prevented by fentanyl, lignocaine, and cardio-selective beta blockers like Metoprolol.

CONCLUSION

The perioperative risk of tachyarrhythmias and subsequent hemodynamic compromise can endanger the lives of the mother and fetus. Prevention of triggering factors like pain, anxiety, surgical stress response, hypovolemia, and responses to intubation and extubation are of utmost importance in the management of these cases. General Anaesthesia though infrequent in these cases, is inevitable in some scenarios and hence utmost precautions are to be exercised to prevent the triggers. Further, a multidisciplinary approach involving anesthesiologists, obstetricians, and cardiologists should be involved in the planning and management for a better future outcome and to prevent any further complications.

ABBREVIATIONS

WPW - Wolff Parkinson White syndrome

GPL - Gravida Para Live

NIBP - Non-Invasive Blood Pressure

ATP - Adenosine Triphosphate

CONFLICT OF INTEREST

There are no conflicts of interest.

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