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Case Report

Challenges and Success: General Anaesthesia for Re-Do Spine Surgery in an Elderly Woman With Sepsis, Pulmonary Hypertension, and Hemodynamic Instability on Positioning for Surgery: A Case Report

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Abstract: *Geriatric patients exhibit reduced physiological reserve due to age-related organ system changes, predisposing them to increased perioperative morbidity and mortality, particularly in the presence of multiple comorbidities and sepsis.* ***Objective:*** *To highlight perioperative anaesthetic challenges and management strategies in a high-risk geriatric patient with complex comorbidities undergoing surgery.* ***Methods:*** *This case report describes a 95-year-old female with hypothyroidism, rheumatoid arthritis, valvular heart disease, and pulmonary hypertension who developed myocardial infarction, urinary tract infection, and surgical site infection following microendoscopic spine surgery. She was planned for wound debridement after comprehensive preoperative optimisation. Detailed cardiovascular evaluation was performed, and invasive hemodynamic monitoring was instituted. Intraoperative anaesthetic management focused on maintaining hemodynamic stability, avoiding factors that increase pulmonary vascular resistance, and ensuring vigilant monitoring throughout the perioperative period.* ***Results:*** *During surgery, the patient developed complete heart block while positioned prone, necessitating immediate application of transcutaneous pacing pads and modification of surgical positioning. Prompt recognition and intervention prevented further hemodynamic deterioration. The procedure was completed safely under close monitoring without progression to cardiac arrest or severe instability.* ***Conclusion:*** *Careful preoperative optimisation, invasive monitoring, and prompt intraoperative decision making are crucial in elderly patients with severe comorbidities. Individualised anaesthetic planning and avoidance of precipitating factors for pulmonary vasoconstriction can significantly improve perioperative outcomes in this vulnerable population.*

Keywords: Aged; Anesthesia; Heart Block; Pulmonary Hypertension; Sepsis; Spine Surgery

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Case Description:

A 95-year-old female patient who weighed 60 kg underwent MED for severe lumbar stenosis. She was a known case of hypothyroidism and rheumatoid arthritis. She had an episode of myocardial infarction in the immediate postoperative period. She had received treatment according to ACS protocols as she had elevated levels of pro-BNP (900pg/ml) and Troponin I (14ng/ml). Her echocardiogram revealed age-related valvular abnormalities in the aortic valve (thickened, sclerotic), tricuspid valve (moderate to severe regurgitation), and mitral valve (degenerative changes with trace MR), as well as pulmonary hypertension (PASP 40 mmHg). She also developed a urinary tract infection in the immediate postoperative period, which led to sepsis (increased lactate and TLC count). She was managed with IV antibiotics and discharged home after 5 days.

Patient was readmitted to the hospital after three weeks with complaints of persistent backache limiting mobility, along with an infected and discharging surgical wound. She was scheduled for debridement of the wound under general anaesthesia. Preoperative labs showed unremarkable serum electrolytes, RFTs, and LFTs. Her HB was 7.6 mg/dl. Her Pro BNP levels and troponin I also normalised. Her leucocyte count and lactate levels showed a downward trend. The patient was using multiple analgesics (paracetamol, NSAID, morphine, oxycodone) along with aspirin, thyroid hormone replacement, and oral antibiotics. She received one unit of whole blood preoperatively, and the post-transfusion Hb was 9.9 mg/dl. A cardiology consultation was also done. The predicted mACE score was 8 (50-65% risk of major adverse cardiac event). The cardiologist advised proceeding with high-risk informed consent and invasive hemodynamic monitoring during the perioperative period.

The patient was classified as American Society of Anesthesiologists class 3, and the risks of surgery and anaesthesia were explained to the family. In the operating theatre, baseline monitors were applied, and right radial artery cannulization was done after local anaesthesia for invasive arterial BP monitoring. Slow IV induction was done with 70 mg of Propofol and 40 mg of Atracurium after preoxygenation. Endotracheal intubation was performed with an armoured ETT, size 7, confirmed by auscultation and ETCo2. With the aid of an agent analyser, a 50/50 mixture of oxygen, air, and isoflurane was used to maintain general anaesthesia at 1 MAC. A nasopharyngeal temperature probe was inserted to monitor temperature. The prone position was performed with all necessary precautions, and the breast, abdomen, and eyes were free from pressure. The head was in a neutral position without extension or flexion, and the arms were abducted less than 90 degrees, with the elbows flexed and palms down to maintain neutral alignment of the arms and wrists. The patient developed third-degree heart block a few minutes after turning to the prone position with a sudden fall in blood pressure, and she became hemodynamically unstable. She was given IV atropine 0.5 mg IV and was immediately shifted back to the supine position. The rhythm became normal immediately after turning to the supine position. Cardiac consultation was performed intraoperatively, and a transcutaneous pacemaker was

recommended as a precaution before proceeding. Transcutaneous pacemaker pads were attached, and after mutual discussion with the surgical team, surgery was planned in the right lateral position. The right lateral position was performed with all necessary precautions after the transcutaneous pacing pads were attached. Low-dose dobutamine infusion was also started to maintain hemodynamic stability. The patient was ventilated with low tidal volume (6ml/kg), and normothermia was maintained intraoperatively. Continuous monitoring of hemodynamics, ventilatory parameters, and intake and output was performed throughout the procedure. The patient was administered 5 mg of nalbuphine, 1 gram of paracetamol, and 15 mg of ketorolac for pain relief. The surgical procedure took one hour. She was reversed with neostigmine and pyridostigmine at the end of the procedure and extubated smoothly.

She was transferred to the Neuro ICU after the procedure and continues hemodynamic monitoring (invasive blood pressure monitoring), ECG monitoring, GCS monitoring, intake output monitoring, respiratory parameters, and pain scoring were advised during her stay in the ICU for the next 24 hours. Patient was discharged home on the 3rd postoperative day.

Discussion

Highly complex patients characterise geriatric anaesthesia due to physiologic and pathologic changes that occur with age. These patients are at higher risk of perioperative morbidity and mortality. The geriatric population has a higher prevalence of numerous medical conditions and comorbidities. A preoperative consultation is essential to evaluate perioperative risks and plan preventive measures. It is important to address all aspects of the elderly patient, including changes induced by the ageing process, the cumulative impact of coexisting diseases, the presence of polypharmacy, difficulties in communication and comprehension, such as reduced hearing or vision, compromised cognitive function, and assessment of the patient's ability to provide informed consent (1).

General anaesthesia is the method of choice for spinal surgeries due to its high patient acceptance and its ability to facilitate longer-duration procedures (2).

Geriatric patients with multiple comorbidities, particularly in the presence of infection and pulmonary hypertension, have been shown to be at increased risk of perioperative decompensation. Optimisation of such patients should be aggressive and include treatment of the underlying disease, maintenance of adequate right ventricular preload and afterload, and optimisation of right ventricular inotropy (3).

The gradual decline in central nervous system function with ageing makes older patients more sensitive to opioids, benzodiazepines, and general anaesthetic agents, leading to delayed emergence and recovery of consciousness after anaesthesia (3).

Diminished cardiac reserve in elderly patients often manifests as exaggerated hypotension during the induction of general anaesthesia. Therefore, geriatric patients should undergo appropriate cardiac evaluation and risk stratification, with application of evidence-based optimisation strategies prior to surgery. The web-based American College of Surgeons National Surgical Quality Improvement Program Risk Calculator is one of the recommended tools in the 2014 American College of Cardiology and American Heart Association guidelines for perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery (1).

Older patients are more vulnerable to perioperative cardiac adverse events. A 2018 retrospective study involving 8,441 adult patients undergoing general and vascular surgery identified age greater than 65 years as a significant predictor of postoperative cardiac events (4).

The prone position during surgery is associated with reduced stroke volume and cardiac index, elevated central venous pressure, and hypotension. When combined with other risk factors, this positioning increases the likelihood of cardiovascular collapse and cardiac arrest. High-risk patients should be identified preoperatively to allow optimisation of positioning, application of adhesive defibrillator pads prior to surgery, and placement of an arterial line for continuous blood pressure monitoring and rapid assessment of arterial blood gases and electrolytes (3).

Risk factors for intraoperative cardiac arrest in patients positioned prone include preexisting cardiac abnormalities during major spinal surgery, hypovolemia, air embolism, wound irrigation with hydrogen peroxide, poor positioning, and impaired venous return (4).

Identification of high-risk patients, meticulous positioning, use of invasive hemodynamic monitoring, and prophylactic placement of self-adhesive defibrillator pads may improve outcomes in cases of prone-position cardiac arrest.

Cardiac arrest during prone positioning, particularly in patients with underlying rhythm disturbances, remains a major concern (4). The prone position reduces venous return, thereby compromising cardiac output. Continuous vigilance, advanced monitoring, and the presence of trained medical personnel are essential to minimise risk and ensure prompt management of any cardiac event (5).

Heart block is defined as a transient or permanent disturbance in atrioventricular conduction that interrupts impulse transmission to the ventricles (1). This results in independent atrial and ventricular activity. The level of the block can often be inferred from the width of the QRS complex. In this case, the presence of wide QRS complexes, hemodynamic instability, and lack of response to atropine suggested an infranodal block. Such conduction disturbances are commonly associated with coronary artery disease, degenerative changes in the conduction system, electrolyte imbalances, or medications that impair atrioventricular conduction (6).

Management of third-degree heart block includes both pharmacological and electrical interventions. Atropine and/or isoprenaline may be used initially to temporarily increase heart rate. In refractory cases, electrical therapy, such as pacing, is indicated. Current guidelines recommend permanent pacemaker implantation in both symptomatic and asymptomatic patients with persistent complete heart block. However, temporary pacing, either transcutaneous or transvenous, may be appropriate when a reversible cause is identified. In the present case, transcutaneous pacing was initiated due to refractory bradycardia with hemodynamic instability. As the underlying cause was corrected and the patient reverted to sinus rhythm, permanent pacemaker implantation was not required (6).

Conclusion

This case highlights the challenges and successful management of a complex elderly patient undergoing surgery, emphasising the importance of meticulous preoperative assessment and multidisciplinary collaboration.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned.

Consent for publication

Approved

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The authors declared no conflict of interest.

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