

Case Report

Severe Pulmonary Hypertension in Chronic Kidney Disease Patient with Ovarian Tumour: Use of Graded Epidural Anaesthesia for Laparotomy: A Case Report

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ABSTRACT

Pulmonary hypertension is a rare condition associated with high mortality and is recognized as a common complication secondary to chronic kidney disease (CKD). Alongside ventricular dysfunction, pulmonary hypertension with its associated anaesthetic difficulties may be encountered. We here-in report the case of a 56 year old woman with severe pulmonary hypertension and ventricular dysfunction who had a gynaecological surgical procedure using graded epidural anaesthesia

Keywords: Pulmonary hypertension, graded epidural anaesthesia, chronic kidney disease

INTRODUCTION

Pulmonary hypertension which may be severe occur frequently in patients with chronic kidney disease (CKD), this may be induced by left ventricular disorder, and risk factors typical of CKD including volume overload, an arteriovenous fistula, endothelial dysfunction, vascular calcification and severe anemia. The prevalence of pulmonary hypertension ranges from 9%-39% in individuals with stage 5 CKD.^[1]

Over time, a consistently elevated pulmonary pressure begins to increase the right ventricular afterload, leading to right ventricular hypertrophy and ultimately dysfunction. Patients with pulmonary hypertension with or without right ventricular heart failure have significantly increased morbidity and mortality when undergoing anaesthesia and surgery.^[2] The stress of

the surgery can exacerbate pulmonary hypertension and lead to potential complications, including arrhythmias, hemodynamic instability, congestive heart failure, myocardial ischemia and postoperative respiratory failure.^[3] We herein report a case of the successful anaesthetic management of a CKD patient with severe pulmonary hypertension and left ventricular dysfunction that had uterine tumour excision using graded epidural anaesthesia.

CASE REPORT

The patient is a 56 year old woman who presented to the gynaecology clinic of Aminu Kano Teaching Hospital as a referral from the hospital's nephrology unit with an abdominal ultrasound scan

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finding of multiple uterine masses. There was a history of abdominal swelling, loss of appetite and significant weight loss; there was associated history of difficulty with breathing and easy fatigability. Examination finding was that of a chronically ill woman who was pale, she had bilateral pedal edema.

A magnetic resonance immunoassay ordered suggested features of ovarian tumour, an endometrial biopsy taken also showed uterine tumour. She had been a known CKD patient secondary to hypertension and diabetes at the hospital with an average basal creatinine of $254\mu\text{mol/L}$, and was being managed conservatively. She had no uremic symptoms and no reduction in urinary output. The patient was admitted into the hospital for optimization and subsequent preparation for an exploratory laparotomy and tumour excision.

Her latest urea, electrolyte and creatinine during a preanaesthesia review showed a creatinine of $196\mu\text{mol/L}$ and urea of 19.5mmol/L . A chest X-ray done revealed cardiomegaly. An electrocardiogram showed a prolonged QT interval, an echocardiograph revealed severe left ventricular diastolic dysfunction with an ejection fraction of 31%, global hypokinesia with dilated left ventricular cavity. There was an associated severe pulmonary hypertension with a pulmonary artery systolic pressure of 94mmHg .

Despite medical therapies which include carvedilol and torsemide, her cardiopulmonary dysfunction persisted with the low ejection fraction and severe pulmonary hypertension, earlier experienced difficulty with breathing and easy fatigability had however subsided. She was then scheduled for an exploratory laparotomy.

In the operating suite, a cockpit drill was done to check for oxygen supply, anesthesia equipment, and resuscitative gadgets. Baseline vital signs taken with a multiparameter monitor were pulse rate of 87 per minute, non-invasive blood pressure

of $148/92\text{mmHg}$, and oxygen saturation (SpO_2) of 95% on room air. An intravenous access was secured with a 16-gauge cannula with 0.9% saline infusion running. An epidural catheter was inserted at the L3–L4 intervertebral space and she was then positioned supine. Epidural anaesthesia was induced using graded epidural technique in 5 ml aliquots of 0.125% plain bupivacaine with 5ug/ml of fentanyl until a total of 15 ml was given. Pulse rate, SpO_2 , and ECG were continuously monitored, and blood pressure was recorded every 5 minutes, blood pressure ranged from a systolic of 106 to 148 mmHg and a diastolic of 69 to 93mmHg throughout the surgery which lasted for 110 minutes.

We however, observed a drop in blood pressure 65 minutes after induction of anesthesia to $90/60\text{mmHg}$ for which a bolus of 5mg ephedrine was given to good effect. The patient had a hysterectomy with oophorectomy with minimal blood loss. She was monitored in the post anaesthesia care unit for 1 hour after which she was discharged to the ward; post operative analgesia was provided with doses of 0.1% bupivacaine with 5ug/ml of fentanyl at 5mls 4hrly, 1 gram intravenous paracetamol infusion 8 hourly and 75mg intramuscular diclofenac 12 hourly. Urinary output remained adequate in the postoperative period with a creatinine level of $198\mu\text{mol/L}$. The epidural catheter was removed on the second post operative day, she was discharged from the hospital 14 days after surgery.

DISCUSSION

Pulmonary hypertension refers to a persistent elevation of the mean pulmonary arterial pressure (mPAP) to a level greater than 25 mmHg at rest. An mPAP of 25–40 mmHg is classified as mild pulmonary arterial hypertension (PAH), 41–55 mmHg is moderate PAH and higher than 55 mmHg is severe PAH.^[4] The pulmonary vasculature is normally a low pressure, low resistant circuit and a patient with pulmonary hypertension presents a challenge to the anaesthesiologist, there must be an optimization of blood pressure, adequate

oxygenation and ventilation, and pain control throughout the procedure to help achieve the best perioperative outcomes.^[5]

Our patient had a severe PAH of 92mmHg thus making the patient prone to intraoperative complication. The most dangerous intraoperative complication from a pulmonary hypertension exacerbation is right ventricular failure causing persistent systemic hypotension.^[4] There was an associated ventricular dysfunction with an ejection fraction of 31%, a low ejection fraction often times results from long standing poorly controlled diabetes, hypertension and coronary artery disease; our patient has a long standing history of diabetes and hypertension. The anaesthetic technique of choice for patients with severe pulmonary hypertension is preferably regional anaesthesia wherever possible. Direct laryngoscopy during general anaesthesia results in an increased sympathetic outflow leading to increased pulmonary vascular resistance thus precipitating acute right heart failure,^[6] also in an attempt to control sympathetic response, an over use of opioids and inhalational agents may result in hemodynamic instability. A subarachnoid block may result in sudden hemodynamic compromises; this informed our choice of a graded epidural anaesthesia with a mixture of plain bupivacaine and fentanyl, this causes less cardiopulmonary compromise in patients with pulmonary hypertension than general or spinal anaesthesia. Ige et al^[7] similarly reported the successful use of graded epidural anaesthesia for cesarean section in a patient with severe left ventricular compromise. Chidananda et al^[6] employed epidural anaesthesia which wasn't graded for renal transplant in a patient with severe systolic pulmonary hypertension of 70mmHg; their patient unlike ours had a good ejection fraction of 55%.

Our patient received 5ug/ml of fentanyl in combination with 0.125% bupivacaine in graded doses, epidural administration of amide local anesthetics in combination with opioids is widely in use because of the dose minimizing effect of the adjunct addition thus reducing side effects like

hemodynamic instability.^[8] Our use of graded epidural anaesthesia avoided fluid overload, cardiac depressant anesthetic drugs, nephrotoxic drugs and respiratory depressant drugs which made the operative goal achievable.

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