

# Anesthetic challenges in bilateral pheochromocytoma with history of percutaneous transluminal coronary angioplasty (PTCA): A case report and literature review

### ABSTRACT

Pheochromocytoma are catecholamine-producing neuroendocrine tumors that can be adrenal or extra-adrenal (paraganglioma) in origin. The mainstay of definitive therapy is surgical resection, and successful management depends on careful preoperative optimization, meticulous intraoperative and postoperative hemodynamic management.

**Key words:** Adrenal tumor, anesthesia management, percutaneous transluminal coronary angioplasty, pheochromocytoma

### Introduction

Pheochromocytomas are rare catecholamine-secreting neuroendocrine tumors originating from chromaffin tissue of the adrenal medulla with an incidence of 2–8 cases per 1 million population.<sup>[1,2]</sup>

The classic triad of headaches, palpitations, and profuse sweating may be seen in 40% cases of pheochromocytoma while other non-specific symptoms like anxiety, lethargy, nausea, flank pain, weight loss, hyperglycemia, and visual disturbance are also found in some cases.<sup>[3]</sup> Successful management requires careful preoperative optimization, meticulous intraoperative planning, and hemodynamic management during the surgical resection. A detailed history and anesthetic challenges of pheochromocytoma are discussed along with literature review.

### Case Report


A 40-year-old male had history of uncontrolled hypertension, diabetes, excessive sweating, palpitations, and tiredness admitted for bilateral adrenalectomy. He had history of percutaneous transluminal coronary angioplasty (PTCA) with drug eluting stent in two vessels placed two months back and was on clopidogrel, aspirin, rosuvastatin and metoprolol.

Computed Tomography (CT) of abdomen showed a right adrenal mass sized  $5.4 \times 4.3 \times 6.3$  cm and left adrenal mass sized  $6.5 \times 5.4 \times 5.5$  cm. His serum metanephrine was 19.4 ng/L, serum calcium 10.56 mg/dl, parathormone 6.47 pg/ml, normetanephrine 7310 ng/L, and serum cortisol 19.49 mcg/dl. Others investigations were within normal limit. 2D echo showed left ventricular hypertrophy and ejection

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fraction of 60%. His pulse rate was 68 per minute, blood pressure recorded 170/110 mm Hg.

Antihypertensive drug prazosin 2 mg twice a day and metoprolol 50 mg once a day was started. Anticoagulant drug was stopped 7 days before surgery and the patient was started on low molecular weight heparin which was continued till 24 hours before surgery. Patients were also advised to increase oral intake of fluids, and an intravenous saline at 100 ml/h was given overnight before surgery.

In the operating room, non-invasive blood pressure, pulse oximeter and electrocardiogram were attached, and baseline vital signs were recorded. An 18-gauge intravenous cannula was secured and premedication was done with ondansetron, glycopyrrolate, fentanyl 2 µg/kg, midazolam 1cc, following which the right radial artery was cannulated using a 20-gauge cannula under local anesthesia for invasive blood pressure monitoring.

Epidural catheter was inserted with Touhy's needle at L1-L2 level in sitting position under aseptic conditions and 10 ml of 0.25% plain bupivacaine was given after a test dose.

Patient was preoxygenated with 100% oxygen for 3 minutes, then induced with injection of etomidate 0.2 mg/kg and vecuronium 0.1 mg/kg. Injection lignocaine 2% (preservative free) 75 mg was administered 90 seconds before intubation to attenuate the stress response of laryngoscopy and intubation.

Intubation was done with cuffed oral endotracheal tube of 8 mm internal diameter and patient was put on mechanical ventilator with tidal volume of 8 ml/kg and respiratory rate 12/min. Anesthesia was maintained with sevoflurane 1-2 MAC, oxygen and air (50-50%) along with vecuronium infusion 0.1 mg/kg/hr. A 7 Fr triple lumen catheter was inserted in the right internal jugular vein. Intraoperative hypertension was managed by injection esmolol 30 mg, nitroglycerine infusion and increasing the depth of anesthesia with inhalational agents. After tumor excision, hypotension occurred with a systolic blood pressure <20% of baseline which was managed by intravenous fluid replacement, bolus dose of 6 mg ephedrine and noradrenaline infusion.

After the completion of surgery, the patient was extubated and shifted to the intensive care unit (ICU) for further management. Intravenous corticosteroids (hydrocortisone) followed by oral fludrocortisone and methyl prednisolone was started. Postoperative course was uneventful and the patient was discharged from the hospital without any complication on postoperative day 7.

## Discussion

Anesthetic management of pheochromocytoma is a major challenge for anesthesiologists due to major BP fluctuations, hyperglycemic changes, adrenal insufficiency, blood loss and fluid balance. Mortality (25–50%) has been reported at the time of induction.<sup>[4]</sup>

Preoperative alpha-adrenergic blockade may prevent or reduce hypertensive crises during surgery, allow intravascular volume expansion, and improve cardiac function in patients with catecholamine-induced myocarditis and cardiomyopathy. A high-sodium diet and increase in fluid intake is advised to expand the intravascular volume.<sup>[5]</sup> Beta adrenergic blockers are especially important for patients with tumors that secrete large amounts of epinephrine, with resultant tachycardia and arrhythmias.<sup>[6]</sup> Alpha blockade should be initiated first while beta blockade is added later because blockade of vasodilatory peripheral beta-adrenergic receptors with unopposed alpha-adrenergic stimulation can lead to a further elevation in BP.

Roizen's criteria were fulfilled in our case to effectively measure the adequacy of preoperative optimization. The criteria state the following: (1) blood pressure should be <160/80 mm Hg (2) absence of orthostatic hypotension <80/60 mm Hg (3) No ST-T changes in ECG over past 1 week (4) Not more than 5 ectopic beats per minute.<sup>[7]</sup>

General anesthesia with or without epidural anesthesia is commonly used for surgical resection of pheochromocytoma.<sup>[8]</sup> Propofol and etomidate are commonly used for the induction of anesthesia while ketamine should be avoided due to its sympathomimetic properties.<sup>[9]</sup> Drugs like thiopental sodium, atracurium, morphine, pethidine, which release histamine, should be avoided. The stress response during laryngoscopy and intubation should be attenuated by using fentanyl, lignocaine or esmolol. Sevoflurane and isoflurane are commonly used for maintenance of anesthesia while desflurane and halothane should be avoided due to its tendency to cause significant sympathetic stimulation.<sup>[10]</sup>

An arterial line should be placed for continuous BP monitoring and central venous catheter should be placed for effective administration of vasoactive drugs, rapid infusion of fluid and measurement of central venous pressure. Pulmonary artery catheterization and transesophageal echocardiography (TEE) may be indicated for patients with poor left ventricular function, pulmonary hypertension and significant myocardial disease.<sup>[11]</sup>

Intraoperative hypertension is managed by background infusion of nitroprusside or nitroglycerine and drugs such as esmolol (10–50 mg), labetalol (5–20 mg) or phentolamine (1–5 mg), magnesium sulfate (1–2 mg), dexmedetomidine and deeper plane of anesthesia by inhalational agent.<sup>[12]</sup> Hypotension after ligation occurs frequently and should be treated with fluid resuscitation and vasopressors (phenylephrine, norepinephrine, epinephrine and vasopressin).<sup>[13]</sup>

Postoperative monitoring should be done in the ICU due to hemodynamics instability and hypoglycemia. Steroid replacement is indicated if a bilateral adrenalectomy has been performed because they are at risk for acute postoperative adrenal insufficiency.

### Conclusion

Successful perioperative management of pheochromocytoma requires understanding of the pathophysiology of pheochromocytoma, adequate preoperative optimization, meticulous intraoperative and postoperative hemodynamic management.

### 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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