

CASE REPORT

ANESTHETIC MANAGEMENT OF PHEOCHROMOCYTOMA: A CASE REPORT

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ABSTRACT: Pheochromocytomas are catecholamine-secreting tumours that arise from chromaffin cells of the sympatho-adrenal system. Although they are an uncommon cause of hypertension, their detection is imperative since they have lethal potential and are one of the few truly curable forms of hypertension. Uncontrolled catecholamine release can result in malignant hypertension, cerebrovascular accidents, and myocardial infarctions. Here we are describing a case of right adrenalectomy for a patient diagnosed to have pheochromocytoma.

KEYWORDS: Anesthesia, Pheochromocytoma, adrenalectomy.

CASE HISTORY: 21 year old male patient came with the history of fever since one week. Fever was intermittent in nature, more during evening hours, not associated with chills and rigors. He gave history of belching and loss of appetite. No history of body pain, no history of cough, cold, diarrhoea or burning micturition. Patient did not give any significant medical or surgical history in the past.

GENERAL EXAMINATION: An adult male patient who was moderately built and nourished, febrile (101 F⁰) and was having tachycardia of 102 beats per minute and blood pressure of 146/98 mm of Hg. Further clinical examination revealed no significant finding. Hematologic investigations revealed leukocytosis of 11200 cells per cubic millimeter with predominant neutrophilia. ECG showed sinus tachycardia. He was subjected for fever evaluation which also included chest X-Ray and ultra sound abdomen.

Chest X-Ray though it was normal, ultrasound abdomen revealed right supra renal mass of 8*8 cm. On suspicion of pheochromocytoma MRI was done and was reported that tumor was localized to right adrenal gland and measured 8*8 cm approximately and Urine VMA -83.31 mg per 24 hrs. (Normal-up to 15mg per 24 hours). Patient was diagnosed to have Right-Pheochromocytoma.

On further questioning the patient gave no history of head ache, palpitation, and skin discoloration, swelling in neck or any part of the body, no visual disturbances. Surgical referral was sought and was decided to undergo right adrenalectomy. Cardiologist and Ophthalmologist opinion revealed no end organ damage to heart and eye.

ANESTHETIST OPINION: Patient was put on the alpha blockers: Tablet Prazocine 2.5 mg BD for 5 days, later 5mg BD for 5 days and finally 7.5mg BD for 5 days. For beta blockade 8 days after the starting of alpha blocker, Tablet Atenolol 25 mg OD - 4 days later 50 mg OD for 4 days. Patient was advised to take Tablet Diazepam 10 mg HS daily. Patient was asked for review after 15 days.

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ON REVIEW:

- Patient was afebrile, no new symptoms.
- Pulse-66 bpm in sinus rhythm.
- BP -126/76 mm of Hg in supine position
- 110/70 mm of Hg in standing position
- ECG repeat showed no ST-T changes.

Allen`s test was done in both hands and the palmar arch was patent. Repeat Total Count, Differential Count, and ESR were normal. Patient was assessed under ASA physical status II. High risk informed consent was taken and surgical department was advised to keep 3 units of compatible whole blood ready. Pre-operative night Diazepam 10mg was given and all anti-hypertensive drugs were continued till the day of surgery.

Operative theatre was kept ready after routine pre anesthetic check. Antihypertensive drugs like Inj. Labetalol, Inj. Nitroglycerine, Inj. Sodium nitroprusside and pressor agents like Inj. Noradrenaline and Inj. Dopamine infusions were kept ready.

PREMEDICATION: Inj. Glycopyrrolate-0.2mg and Inj. Midazolam 2mg were given intramuscularly 30 minutes prior to surgery. Venous access was obtained with two 16G cannula.

PRE INDUCTION MONITORS: 5 lead ECG, Noninvasive Blood Pressure monitor, Pulse oximeter and Invasive Blood Pressure monitor on left radial artery. Inj. Ranitidine 50mg intravenously and Inj. Ondansetran 4 mg intravenously were given as anti-aspiration prophylaxis. Under aseptic precautions epidural catheterization was done at T12-L1 space and epidural catheter was placed 5 cm inside epidural space presuming the catheter tip at T9, epidural test dose was given with 3ml of 1.5% lignocaine without Adrenaline. Inj. Fentanyl 150mcg intravenously was given. Patient was pre oxygenated with 100% oxygen for 3 minutes.

Anaesthesia was induced with Inj. Propofol-120 mg, and muscle relaxation was obtained with Inj. Vecuronium-6mg, intubation carried out with 8mm sized cuffed endotracheal tube. Inj. Xylocard 60mg was given intravenously 90 seconds prior to intubation. Post induction monitors: Central Venous Pressure monitoring by right internal jugular vein cannulation, EtCO2 monitoring, temperature monitoring and urine output were monitored. Maintenance: N2O 4litres/min, O2 2litres/min Desflurane 3%. Inj. Vecuronium was given intermittently for maintenance of muscle relaxation. Epidural analgesia with 10 ml of Inj. Bupivacaine 0.25% was given.

Hypertensive response was noted (to an extent of 256/120 mm of hg) when tumour was handled and it was treated by the titrated dose of Inj. Nitroglycerine, Inj. Sodium nitroprusside and Inj. MgSO4 1gm infusion intravenously and Inj. Dexmedetomidine was used to deepen the plane of anesthesia. After adrenal vein ligation severe hypotension (to an extent of 74/50 mm of hg) was noted and was managed with fluid boluses, Inj. Noradrenaline and Inj. Dopamine infusions in titrated doses. Total duration of surgery was 1 hour 20 minutes. Amount of fluids given totally was 2500 ml of crystalloids. Urine output was 300ml during the surgery. At the end of surgery patient was reversed with Inj. Neostigmine 2.5 mg and Inj. Glycopyrrolate 0.5 mg intravenously.

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Inj. Xylocard 60mg was given intravenously to reduce the extubation stress response. Patient recovered well, extubated and shifted to Post Anaesthesia intensive care unit for observation with minimal dose of Inj. Noradrenaline support. Analgesia was maintained with continuous infusion of Inj. Bupivacaine 0.0625% with fentanyl 1 microgram per ml epidurally. Postoperative period was uneventful.

DISCUSSION: Although uncommon pheochromocytomas present a great challenge to the anaesthesiologist since it has nonspecific clinical symptoms, complex and not widely available diagnostic testing and risk of critical events, including death if not diagnosed.

CLINICAL PRESENTATION: The clinical manifestation is variable, nonspecific and depends on the catecholamine production profile. The classic triad of headache, palpitation and diaphoresis is present in up to 70% of the cases and only 50% have sustained hypertension. Persistent, untreated hypertension in patients with Norepinephrine-secreting tumours may result in left ventricular failure with systemic arterial shutdown. Paroxysmal symptoms of epinephrine excess occurs only in few patients. Excessive circulating dopamine is hypothesized to cause vasodilation in gut and increase the outlet resistance of prostatic urethra.^[1]

DIAGNOSIS: Clinical signs and laboratory tests to measure free catecholamines in 24 hour urine collection.^[2] Plasma free normetanephrine greater than 400 pg/mL and/or metanephrine greater than 220 pg/mL is diagnostic of a pheochromocytoma. If normetanephrine is 112 to 400 pg/mL or metanephrine is 61 to 220 pg/mL, the diagnosis is equivocal. A pheochromocytoma is excluded if normetanephrine is less than 112 pg/mL and metanephrine is less than 61 pg/mL.^[3]

LOCALIZATION OF TUMOUR: CT, MRI can locate tumours of size 1 cm or more and tumors in supra-renal region easily.^[4] MIBG has been effective in identifying uncommon sites. A positron emission scan and selective venous catheterization with sampling of catecholamines from the adrenal vein and other sites are other useful tests.

TREATMENT: Surgery is the only curative treatment, but it is essential to counteract the circulating excess catecholamines. Patients circulating volume, heart rate and blood pressure should be optimized preoperatively.

OPTIMISATION:

Drug	Dosage	Remarks
Phenoxybenzamine	<ul style="list-style-type: none">Started at 10-20 mg B.D and can go up to 60-250 mg/day	<ul style="list-style-type: none">Noncompetitive alpha 1 antagonist.Overdosing can lead to profound orthostatic hypotension.
Prazocin	<ul style="list-style-type: none">1 mg TIDCan be stepped up to 8-12 mg/day	<ul style="list-style-type: none">Selective and competitive alpha 1 antagonistEffects can be titratedLess tachycardia

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Alpha blockade is to be done before beta blockade if not unopposed action of catecholamines on alpha receptors will lead on to profound hypertension. The optimal duration of alpha-blockade therapy is may range from 3 days to 2 weeks or longer. Other alpha1-blockers include doxazosin and terazosin.

For appropriate alpha blockade and surgical optimization Roizen et al laid criteria as shown in the table below.^[5]

Roizen's criteria
No pre surgical blood pressure measuring higher than 165/90 mm of Hg 24 hours prior to surgery.
Blood pressure not lower than 80/45 mm of Hg during orthostatic testing
No ECG changes of ST-T changes 7 days prior to surgery.
Less than 1 premature ventricular contraction in 5 minutes

Beta blocking drugs are used after alpha blocking drugs if the heart rate is persistently high (> 120 beats / min) or if there is presence of any arrhythmias.^[3] Even though Propranolol is commonly used selective beta- 1 antagonists like Atenolol, Metoprolol are successfully used. Metyrosine inhibit the synthesis of catecholamines and is used at a dose of 250 mg twice a day up to 4 gram /day.

Anesthetic goals:
○ Avoid drugs and maneuvers that potentiate catecholamine release
○ Maintain cardiac stability by short acting drugs.

ANESTHETIC MANAGEMENT: Apart from standard monitoring, patient requires invasive blood pressure monitoring and central venous pressure monitoring. Pulmonary wedge pressure monitoring and trans-esophageal echocardiography are required in patients with compromised cardiac status or in cases with very active tumors.^[3] Because of altered pressure – volume relationship, large volume of fluids is required to maintain blood pressure and this becomes even more prominent after removal of tumour.

Combined mid or low thoracic epidural anesthesia with general anesthesia is preferred [2]. Histamine releasing drugs like morphine and atracurium; vagolytics like atropine, succinylcholine and pancuronium can trigger catecholamine release and hence to be avoided. Halothane is not preferred because; it sensitizes the heart to the circulating catecholamines and triggers arrhythmias.

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Sodium-nitroprusside, Nitroglycerine, Phentolamine and Labetalol can manage hypertensive episodes. Magnesium sulphate will reduce the release of catecholamines from tumour. Ventricular arrhythmia commonly occurs during tumour handling and is managed by Xylocaine, beta blockers or Amiodarone. Hypotension can be as dangerous as hypertensive episodes, and they can be minimized by volume replacement with Ringer Lactate prior to tumour vein ligation and dextrose containing fluids after tumour vein ligation. Often patients require vasopressors and inotropes.^[3]

POST-OPERATIVE CARE: In post-operative period hypotension and hypoglycemia are major concerns. The patients have to be put in ICU for a minimum period of 24 hrs. For patients undergoing bilateral adrenalectomy, steroid supplementation has to be done.

CONCLUSION: Patients with Pheochromocytoma have to be evaluated for the end organ damage. Adequate optimization should be done by alpha blockade followed by beta blockade. Invasive hemodynamic monitoring should be used which will help to manage hypertensive as well as hypotensive episodes. Team work of experienced physician, cardiologist, anesthetist and surgeon is essential for successful outcome.

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