

Anaesthetic Management of Pheochromocytoma with Atrial Fibrillation - A Case Report

Anjali Chandrasekharan¹, Thasreefa Vettuvanthodi², Priya Jayasree³, Suvarna Kaniyil⁴, Nanda Lakshmi Anitha⁵

^{1, 2, 3, 4, 5} Department of Anaesthesiology, Government Medical College, Kozhikode, Kerala, India.

PRESENTATION OF CASE

An elderly female aged 65 years weighing 69 Kgs presented to the Pre-Anaesthetic Clinic (PAC) for transurethral resection of bladder carcinoma. As part of the evaluation of bladder carcinoma, Contrast Enhanced Computed Tomography (CECT) abdomen done showed a left adrenal lesion. She was a known case of hypertension since the last 10 years and was on telmisartan tablets 40 mg once daily (OD) since then. She had a history of palpitations 3 years back, which when evaluated was diagnosed as atrial fibrillation. She was started on metoprolol tablets 25 mg OD and warfarin 2 mg OD. In view of her history and positive findings on CECT abdomen, it was decided in the PAC to screen her for pheochromocytoma. There was no definite history of classic triad of headache, palpitation and sweating. No history of headache, weight loss, fatigue, syncopal attacks, hypo / hyperthyroidism were reported. Physical examination showed Heart Rate (HR) of 96 beats per minute (bpm), irregular in rhythm, Respiratory Rate (RR) of 16 breaths per minute and Blood Pressures (BP) of 146 / 98 mmHg and 140 / 90 mmHg in the supine and sitting positions respectively. Biochemical test results showed 24-hour urine metanephrine 0.452 mg / l which is 1.45 mg / 24 hrs. (normally < 1 mg / 24 hrs.) and urine vanillylmandelic acid 8.1 mg / gm creatinine (2 – 7 mg / gm). Electrocardiography (ECG) showed right bundle branch block and AF (Atrial Fibrillation) with controlled ventricular rate. Echocardiography showed mild aortic stenosis, aortic regurgitation and ejection fraction of 68 % with no evidence of clots / thrombus. In terms of clinical imaging, the CECT showed a well-defined lesion in the left adrenal measuring 19 x 12 mm with a relative washout of 21 % and a faint subtle hyperdense lesion in the base of left lateral wall of the urinary bladder measuring approximately 20 x 19 mm. Other blood investigations like Hb, haematocrit, urea, creatinine and blood sugars were within normal limits.

DISCUSSION OF MANAGEMENT

The patient was started on prazosin tablets 5 mg OD 2 weeks prior to surgery. Warfarin was bridged to low molecular weight heparin for 2 weeks. No fresh ECG changes or any postural hypotension were noted preoperatively. Preoperative blood sugar (fasting and post prandial blood sugar were 92 and 106 mg / dl), serum electrolytes (Na + = 146 mmol / L, K + = 4.6 mmol / L) and haematocrit (33 %) were normal. On the day before surgery, pulse rate was 90 bpm, irregular in rhythm and blood pressure 122 / 86 mmHg. Metoprolol and prazosin were continued till morning of surgery. Tab. Alprazolam 0.5 mg was given the night before surgery. Low molecular weight heparin was changed to unfractionated heparin 24 hours prior to surgery and which in turn was withheld 6 hours before surgery. Written informed consent was taken. Blood and blood products were arranged.

Corresponding Author:

*Dr. Priya Jayasree,
Department of Anaesthesiology,
Government Medical College,
Kozhikode - 6730008,
Kerala, India.
E-mail: priya.krishnayanam@gmail.com*

DOI: 10.18410/jebmh/2020/590

How to Cite This Article:

Chandrasekharan A, Vettuvanthodi T, Jayasree P, et al. Anaesthetic management of pheochromocytoma with atrial fibrillation - a case report. J Evid Based Med Healthc 2020; 7(48), 2885-2887. DOI: 10.18410/jebmh/2020/590

Submission 18-08-2020,

Peer Review 24-08-2020,

Acceptance 13-10-2020,

Published 30-11-2020.

Copyright © 2020 Anjali Chandrasekharan et al. This is an open access article distributed under Creative Commons Attribution License [Attribution 4.0 International (CC BY 4.0)]

On the morning of surgery, the operating room was set with all requirements including anesthetic agents and other drugs like sodium nitroprusside, nitroglycerine phenylephrine, esmolol, metoprolol and amiodarone. Monitors including 5 lead ECG, Noninvasive Blood Pressure (NIBP) and pulse oximetry were attached, and baseline vitals recorded. Baseline HR and BP were 90 bpm with irregular rhythm and 130 / 92 mmHg respectively. An 18-gauge intravenous cannula was secured in the left forearm under Local Anesthesia (LA). The patient was then premedicated with intravenous (I.V.) glycopyrrolate 0.2 mg, and fentanyl 100 µg. Paracetamol 1 g infusion and dexmedetomidine 30 µg slow bolus over 10 minutes also given, following which the right radial artery was cannulated using a 20-gauge cannula under LA for Invasive Blood Pressure (IBP) monitoring.

Patient was then placed in the right lateral position and epidural catheter was inserted at T12 – L1 level. After preoxygenation with 100 % oxygen for 3 minutes, patient was induced with injection propofol and vecuronium. Lignocaine (preservative free 2 %) 100 mg was administered 90 seconds before intubation to attenuate the stress response of laryngoscopy and intubation. After ensuring adequate depth of anesthesia and muscle relaxation, direct laryngoscopy was performed and the patient intubated using a cuffed oral endotracheal tube of size 7.5 mm internal diameter. The NIBP rose to 146 / 98 mmHg and HR to 96 bpm during intubation. A 7 Fr triple lumen catheter was inserted in the right internal jugular vein for monitoring central venous pressure, fluid responsiveness and for administration of vasoactive drugs. Anaesthesia was maintained using a mixture of oxygen, nitrous oxide, isoflurane and vecuronium boluses. For analgesia 8 ml lignocaine (1.5 %) and 210 µg buprenorphine was given epidurally. This was later supplemented with 12 ml 0.125 % bupivacaine given in small boluses. There was minimum intraoperative fluctuation in BP. The surgical procedure lasted for 2 hours. After the completion of surgery, the neuromuscular blockade was reversed using neostigmine and glycopyrrolate and the patient extubated after becoming fully awake. She was then shifted to the postoperative intensive care unit for further monitoring.

Postoperative analgesia was maintained using epidural infusion of 0.125 % bupivacaine at the rate of 5 ml per hour. All vital signs were stable. On the second postoperative day the patient was shifted to the ward. Postoperative period was uneventful and she was discharged home on 7th day.

CLINICAL DIAGNOSIS

Bladder carcinoma with left adrenal lesion, possibly pheochromocytoma with chronic atrial fibrillation.

DIFFERENTIAL DIAGNOSIS

Adrenal adenoma, adrenocortical carcinoma, adrenal metastasis, neuronal tumour.

PATHOLOGICAL DISCUSSION

Pheochromocytoma is a rare catecholamine secreting tumour arising from chromaffin cells present in the adrenal gland and extra adrenal sites like organ of Zuckerkandl, sympathetic plexus of urinary bladder, kidney and heart.¹ The 'rule of 10' states that 10 % tumours are bilateral, 10 % extra adrenal and 10 % malignant. It is one of the causes of secondary hypertension. Norepinephrine (predominantly) and epinephrine are the catecholamines typically secreted and hence the symptoms. The most common presentation is as paroxysms of headache, palpitation and excessive sweating.² It is diagnosed by its classical symptoms, elevated plasma metanephrines or 24 hour urinary metanephrines and localisation of tumour by CECT or MRI.³ The annual incidence is 0.8 per 1 lakh person years.⁴ It is common during the 4th and 5th decades of life. Pheochromocytoma can occur sporadically or as part of a familial disorder.^{1,5} Most of the tumours being benign, surgical removal is the mainstay of treatment.^{6,7} Hence the anaesthesiologist plays a critical role in its management.

DISCUSSION

The diagnosis and perioperative management of pheochromocytoma remains an anaesthetic challenge. Measurement of normetanephrines and metanephrines is more reliable than the traditional biochemical evaluation of 24-hour urinary catecholamines and vanillylmandelic acid. There may be associated cardiovascular changes like tachyarrhythmia, systolic and diastolic hypertension (excess production of nor epinephrine) or systolic hypertension and diastolic hypotension (excess production of epinephrine). Long term exposure to catecholamines results in desensitisation of vascular system and down regulation of adrenergic receptors.^{8,9}

Preoperative optimisation to reduce peri operative morbidity and mortality is a must. The goals of preoperative optimisation are adequate control of blood pressure, correcting the intravascular volume status, controlling any arrhythmias or myocardial dysfunction and stabilising blood sugars and electrolytes. Alpha blockade remains the mainstay of this optimisation.¹⁰ We started prazosin tablets 2 weeks prior to surgery and our patient fulfilled Roizen criteria.¹¹ Short acting alpha blockers are continued till the morning and long acting drugs stopped the day before.¹² She was on metoprolol for rate control and warfarin for chronic atrial fibrillation. Warfarin was changed to LMWH 1 week before surgery.

Pre-operative anxiety causing catecholamine surge can be prevented by reassuring the patient and providing appropriate amount of sedation night before surgery and morning of surgery. Pre induction intra-arterial catheter for close haemodynamic monitoring is a prerequisite.^{13,14}

The main intra operative goal is to maintain haemodynamic stability especially during induction, intubation, tumour handling and after tumour resection. Choosing the right induction agent is of prime importance.

Ketamine should be avoided due to its sympathomimetic effect. Other agents with potential histamine releasing property like morphine, pethidine, thiopentone sodium, atracurium etc are also better avoided. The stress response during laryngoscopy and intubation should be prevented by performing a gentle laryngoscopy and maintaining an adequate anaesthetic depth. Lignocaine, esmolol, fentanyl are some of the adjuvants that can be used. The muscle relaxant to be used should be cardio stable, devoid of any vagolytic or histamine releasing properties, like vecuronium.¹⁵ The hypertensive crisis caused by catecholamine release during succinyl choline induced muscle fasciculations discourages its use.¹⁶ Anaesthesia is maintained using oxygen, nitrous oxide and sevoflurane / isoflurane. Desflurane and halothane are avoided.^{17,18}

A central venous catheter is secured for administration of vasoactive agents and as a guide for fluid management.¹⁴ Although literature doesn't support the routine use of cardiac output monitoring to guide fluid management in pheochromocytoma resection, use of transoesophageal echocardiography has been described as it offers real time volume assessment and early detection of myocardial dysfunction.¹⁹ The anticipated hypertensive crisis can be managed with infusions of sodium nitroprusside, nitroglycerine, esmolol, magnesium sulphate. The hypotension that follows tumour resection can be managed with intravenous fluid boluses, phenylephrine, nor epinephrine or vasopressin infusion. There was not much haemodynamic fluctuation in our case.

Post operatively, patients are managed in an ICU (Intensive Care Unit) due to anticipated haemodynamic instability. There may be hypotension or hypertension due to residual tumour or effect of circulating catecholamines.

To conclude, successful perioperative management of pheochromocytoma involves thorough understanding of pathophysiologic changes of pheochromocytoma, adequate preoperative optimisation and meticulous intraoperative and postoperative management.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.

REFERENCES

- [1] Manger WM. Diagnosis and management of pheochromocytoma – recent advances and current concepts. *Kidney International* 2006;70(Suppl 104):S30-S5.
- [2] Reisch N, Peczkowska M, Januszewicz A, et al. Pheochromocytoma: presentation, diagnosis and treatment. *J Hypertens* 2006;24(12):2331-2339.
- [3] Kudva YC, Sawka AM, Young WF Jr. Clinical review 164: the laboratory diagnosis of adrenal pheochromocytoma: the mayo clinic experience. *The Journal of Clinical Endocrinology & Metabolism* 2003;88(10):4533-4539.
- [4] Beard CM, Sheps SG, Kurland LT, et al. Occurrence of pheochromocytoma in Rochester, Minnesota, 1950 through 1979. *Mayo Clin Proc* 1983;58(12):802-804.
- [5] Lenders JWM, Duh QY, Eisenhofer G, et al. Pheochromocytoma and paraganglioma: an endocrine society clinical practice guideline. *J Clin Endocrinol Metab* 2014;99(6):1915-1942.
- [6] Pacak K, Linehan WM, Eisenhofer G, et al. Recent advances in genetics, diagnosis, localization and treatment of pheochromocytoma. *Ann Intern Med* 2001;134(4):315-329.
- [7] Staren ED, Prinz RA. Selection of patients with adrenal incidentalomas for operation. *Surg Clin North Am* 1995;75(3):499-509.
- [8] Galetta F, Franzoni F, Bernini G, et al. Cardiovascular complications in patients with pheochromocytoma: a mini-review. *Biomed Pharmacother* 2010;64(7):505-509.
- [9] Kassim TA, Clarke DD, Mai VQ, et al. Catecholamine-induced cardiomyopathy. *Endocr Pract* 2008;14(9):1137-1149.
- [10] Iseri LT, Henderson HW, Derr JW. Use of adrenergic drug, regitine, in pheochromocytoma. *Am Heart J* 1951;42(1):129-136.
- [11] Roizen MF, Horrigan RW, Koike M, et al. A prospective randomized trial of four anesthetic techniques for resection of pheochromocytoma. *Anesthesiology* 1982;57(3A):a43.
- [12] Subramaniam R. Pheochromocytoma - current concepts in diagnosis and management. *Trends in Anaesth & Crit Care* 2011;1(2):104-110.
- [13] Warner MA, vanHeerden JA. Pheochromocytoma: anesthetic and surgical management employed at the Mayo Clinic. In: Manger WM, Gifford RW Jr, eds. *Clinical and experimental pheochromocytoma*. Cambridge, MA: Blackwell Science 1996: p. 388-407.
- [14] Prys-Roberts C. Pheochromocytoma - recent progress in its management. *Br J Anaesth* 2000;85(1):44-57.
- [15] Kinney MA, Warner ME, van Heerden JA, et al. Perianesthetic risks and outcomes of pheochromocytoma and paraganglioma resection. *Anesth Analg* 2000;91(5):1118-1123.
- [16] Stoner TR Jr, Urbach KF. Cardiac arrhythmias associated with succinylcholine in a patient with pheochromocytoma. *Anesthesiology* 1968;29(6):1228-1229.
- [17] Maze M, Smith CM. Identification of receptor mechanism mediating epinephrine-induced arrhythmias during halothane anesthesia in the dog. *Anesthesiology* 1983;59(4):322-326.
- [18] Lippmann M, Ford M, Lee C, et al. Use of desflurane during anesthesia for resection of pheochromocytoma. *Br J Anaesth* 1994;72(6):707-709.
- [19] Matsuura T, Kashimoto S, Okuyama K, et al. Anesthesia with transesophageal echocardiography for removal of pheochromocytoma. *Masui* 1995;44(10):1388-1390.