Case Report

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Anasthetic Management of a Case of Unilateral Adrenal Mass in Young Female for Adrenalectomy

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Abstract

Pheochromocytoma, tumours originating from chromaffin tissue and typically occurs in patients of 30-50 years of age,commonly present with symptoms and signs of catecholamine excess. A 22 year old female patient presented with right sided flank pain, palpitation and occasional giddiness scheduled for right adrenalectomy. Diagnosis was confirmed by CT scan abdomen and post operatively by histopathological examination.

Preoperatively patient's blood pressure was normal. Here we discuss her intraoperative management and post operative course in anaesthesia room as well as in surgical ICU, especially pulmonary oedema that occurred within 2 hours after resection. (Half life of cortisol is 80-110 minutes.)

The anaesthetic technique used was combined general and regional anaesthesia with control of blood pressure during operation and manipulation of tumor with nitroglycerine infusion.Post-operative concerns included acute adrenal insufficiency and pulmonary oedema which were successfully managed in anaesthesia room and surgical ICU.Epidural analgesia was used for post-operative pain relief.

One month later she was reassessed and was symptom free.

Keywords: Pheochromocytoma (adrenalectomy); Hypertension; Anaesthetic management; Pulmonary oedema.

Introduction

Pheochromocytoma is characterized by catecholamine secreting tumor that originates in adrenal medulla or in chromaffin tissue along the para vertebral sumpathetic chain extending from pelvis to the base of skull.[1] Typically present in 30-50 years of age group.Tumour had been recognized earlier by Von Frankel and the name 'dusky coloured tumour' was first used by Pick in 1912.[2,3] Successful surgery for excision of pheochromocytoma was first performed by Roux(1926) and Mayo(1927).[4]

More than 95% of Pheochromocytoma are found in abdominal cavity and about 90 % originates in adrenal medulla.[5] Approximately 15% of Pheochromocytoma are malignant, 18% extra – adrenal and 20% familial.[6] Clinically inapparent adrenal mass may be detected incidentally as part of Multiple endocrine neoplasia or during unrelated surgery.[7,8] Surgical excision is currently recommended for adrenal mass >5 cm as well as for all types of functioning tumours.

Case Report

A 22 year female patient named sangita ben weighing 35 kg was scheduled for adrenalectomy. She had right sided flank pain, palpitation and occasional

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giddiness for last 2 months. She had undergone for tuberculous cervical lymphnode excision under local anaesthesia 5 years back. Patient had no history of headache, nausea and vomiting.

Preoperatively when patient came for preanaesthetic fitness, she had pulse 100 min and BP 160/110 mm of Hg. After 10 min of rest BP was 150/100 mm of Hg. In systemic examination RS, CVS, CNS revealed no clinically detectable adnormality.

Investigation profile of this patient was Hb-11.7 gm%, PCV-36.8%, Random blood Sugar-96 mg%, Total billirubin-0.3 mg%, ALT-25 IU/L, Urinary VMA – 1.38 mg/day (normal up to 15 mg/day), USG abdomen shows isodense rounded lesion of 45×35 mm seen at upper pole fight kidney with calcification, possibility of right adrenal mass. CT abdomen-right adrenal mass suggestive of pheochromocytoma.

Patient was scheduled for surgery under ASA(American society of anaesthesiologists) class-3 anaesthesia risk and informed consent was obtained for the same. T. Alprazolam (0.5 mg) P.O. was given at night before operation.

On the day of surgery in preanaesthesia room BPL –Accura multipara monitor was attached. Pulse 112/min, BP 150/90 mm of Hg, SpO_2 99% with room air, Respiratory Rate 14/min and temperature was normal. After securing intravenous cannula, DNS and RL infusion was started.

Patient was premedicated with Glycopyrrolate (0.2 mg), Midazolam (1 mg), Fentanyl (100 µg), Ondansatron (4 mg) and Ranitidine (50 mg) intravenously.

Following drugs were arranged to combat any crisis intraoperatively.

- Sodium nitroprusside
- Nor adrenaline
- Nitroglycerine
- Dopamine
- Metoprolol
- Dobutamine

After 100% preoxygenation (8 Lt/min) for 5 min. Patient was induced with propofol 1% 100 mg intravenous and trachea was intubated with 7.00 mm I.D. cuffed endotracheal tube after achieving adequate relaxation with vecuronium bromide 3.5 mg. After intubation and before surgery CVP was inserted. After intubation heart rate increased upto 140/min and BP upto 160/110 mm of Hg.

Maintenance of anaesthesia was done by positive pressure ventilation with O_2 and N_2O as 50%-50% with sevoflurane (MAC 3 to 4 %) and inj. Vecuronium 1 mg IV and inj. Propofol 4-6mg/kg/hr through infusion pump (SP 102 L&T). Intraoperatively non invasive BP, Pulse, SpO_2, ECG, $EtCO_2$, CVP and Urine output were monitored.

Intraoperatively during handling and manipulation of mass, BP was raised up to 196/130 mm of Hg which was treated with inj. NTG 25 mg drip in 500ml of isotonic saline with the rate of 20 µdrops /min. After ligation of adrenal vein there was sudden fall in blood pressure to 70/50 mm of Hg and immediately inj. NTG and sevoflurane was stopped. HAES (hydroxyl ethyl starch) IV started and rate of RL was increased. BP rose up to 90/70 mm of Hg after 10 min.

Intraoperative fluid management included

Inj. DNS 500 ml IV

Inj. RL 2500 ml IV

Inj. HAES (hydroxyl ethyl starch) 250 ml IV

Inj. 25% dextrose 20cc IV

Urine output-650 ml throughout surgery.

Epidural catheter was inserted at L3-L4 intervertebral space under aseptic precautions.Patient was reversed with

inj.glycopyrrolate 0.01 mg/kg and inj. Neostigmine 0.05 mg/kg IV after adequate reflexes. The trachea was extubated after full recovery of counsciousness and spontaneous breathing.

Patient was conscious, oriented and fully responded to verbal commands and shifted to recovery room with Pulse 100/min, BP 100/70 mm of Hg, SpO_2-98% without O_2. Patient shifted to postanaesthesia room. Duration of surgery was 3 hrs.

Inj. Tramadol 75 mg (1.5ml) + Inj.NS 6.5 ml-Total volume of 8 ml supplemented through epidural catheter as a postoperative analgesia, when patient complained of pain (after 1 hr of surgery)

Patient kept on O_2 ventimask with O_2 4 Lt/min in postanaesthesia room. 2 hours postoperatively patient became tachypnoic, restless, desaturated, had tachycardia and bilateral crepitations. SpO_2 was 50% with O_2 (4 Lt/min) through venti mask and CVP-30 cm of water.

Patient was reintubated after sedation with IV 1 mg inj. Midazolam in postanaesthesia room, pinkish froth appeared in endotracheal tube. ABG showed respiratory and metabolic alkalosis. Patient was diagnosed as pulmonary ordema and treated with Inj. Furosemide 1 mg/kg IV and put on ventilator with SIMV mode with PSV + PEEP

Ventilatory Settings

Vt-500ml

RR-14min

Fi02-100%

PEEP-8 cm of water

Inj. Dopamine 10 µg/kg/min IV infusion

Inj. Dexamethasone 8 mg IV

Inj. Hydrocortisone 200 mg IV

Inj. Deriphylline 2ml IV and IV antibiotics

Initially overnight FiO_2 was 100%, every 4 hourly arterial blood gas estimation showed improved PaO_2 and $PaCO_2$. FiO_2 decreased to 60% and on next morning patient put on T-piece and was extubated in afternoon.

Patient was fully conscious, with pulse 116/min and BP 110/70 mm of Hg with Inj.Dopamine 10 µg/kg/min IV infusion and SpO_2 98% with O_2 4 Lt/min through ventimask.

Rate of infusion of inj. Dopamine drip was adjusted according to blood pressure.

Inj. Hydrocortisone 100 mg IV 8 hourly and inj. Dexamethasone 8 mg IV 12 hourly were tapered gradually and stopped after 3 days.

Patient kept in surgical ICU for 2 days and shifted to surgery ward for 8 days.

On 10th postoperative day, patient was discharged from surgical ward.

Histopathological examination confirmed the mass to be benign adrenal phreochromocytoma.

Discussion

A substantial proportion of pheochromcytoma secrets predominantly norepinephrine, sometimes paroxysmal but usually and often in huge quantities. Sustained severe hypertension is often the commonest presentation of pheochromcytoma[5],there is also vasoconstriction in arterial and venous sites due to released norepinephrine and there by decreasing the circulating blood volume.

Diagnosis can be a problem in pheochromcytoma since it has a great numbers of variations in clinical findings and biological activities. Paroxysmal hypertension is not a specific finding and not present generally. Diagnosis is

usually confirmed by raised urinary catecholamines and VMA in 24 hrs urine, localization of tumour is accurately done by CT scan, MRI, MIBG scan.[6]

Main aim is resolution of symptoms in the preoperative period, so that wide variation in arterial blood pressure does not take place during operation.This is achieved by anti adrenergic drugs i.e. alpha(α) and beta (β) blockers,but in our case this drugs are not required as patient was normotensive preoperatively.

Our goals of anaesthetic management should be to suppress haemodynamic responses during laryngoscopy and intubation and catecholamine release during handling of adrenal mass.

Premedication should be according to choice of anaesthesiologists but drug causing histamine release should be avoided.We used benzodiazepines to reduce anxiety induced activation of sympathetic nervous system.According to Hull's , a rational anaesthetic technique should be based on sound pharmacological principles rather than an 'idiosyncratic fondness for particular drugs or methods'! We differ from Hull only in preferring a combined general and regional anaesthetic technique.[1]

In our case we used propofol 1% as induction agent and fentanyl, a potent short acting opiod as analgesic and of them to attenuate the haemodynamic effect of laryngoscopy and intubation.

Vecuronium was used for intubation instead of suxamethonium because latter may causes histamine release and compression of abdominal tumour during fasciculation.[9] Vecuronium was used due to its cardiovascular stability and inability to release histamine.

Sevoflurane reduces mean arterial pressure by peripheral vasodilatation and decreases sympathetic nervous system activity[10]. Sevoflurane depresses sympathetic neurotransmission in omental vessels by reducing neuronal norepinephrine (NE) release and NE sensitivity in arteries and by releasing NE release in veins.[11] It relaxes vascular smooth muscles in the presence of the sympathetic neurotransmitter norepinephrine in the mesenteric artery of rabbit and rat.[12] The low solubility of sevoflurane in blood and fat indicate that it is an anaesthetic agent with which anaesthetic level may be rapidly altered and controlled.[13,14]

Nitroglycerine infusion was used to control the blood pressure during handling of tumour.[1] After removal of tumour blood pressure was maintained with crystalloids and colloids.

Post operatively in a patient of pheochromocytoma, cardiogenic and non cardiogenic pulmonary oedema may be present.[15] Cardiogenic pulmonary oedema resulted from pheochromcytoma is a well known phenomena. This finding develops as consequence of late diastolic pressure increase of the left ventricle due to paroxysmal elevations in arterial blood pressure.The same finding may also be caused by myocarditis due to the high levels of catecholamines. Echocardiographic findings in cardiopathy caused by the elevated levels of catecholamines include either dilated or hypertrophic cardiomyopathy sometimes obstructive type findings.[16]

Non cardiogenic pulmonary oedema is very rare. The mechanism of the development of non cardiogenic pulmonary oedema in pheochromcytoma cases is not clearly understood yet. An immediate beginning without cardiac dysfunction findings implicates a pathogenesis alike neurogenic pulmonary oedema. Theoretical mechanism explaining the appearance of neurogenic pulmonary oedema is a formation of immediate and transient vasoconstriction resulted from intensive α-adrenergic stimulation due to sympathetic activity. As this condition affects the extravascular fluid clearance

and causes to:

(a) Shift of blood from the systemic circulation to lung circulation

(b) vasoconstriction in the lung

(c) Lympathetic obstruction

These factors result in edema due to the increase in hydrostatic pressure. Additionally, pulmonary hypertension may lead to capillary permeability alterations and pulmonary haemorrhage. Neurogenic pulmonary oedema may be prevented by early treatment with adrenergic blockers.

Conclusion

Proper diagnosis and management is required. When the patients condition is identified and treated pharmacologically to control responses to catecholamine release, management of anaesthesia can be highly stressful for the inexperienced anaesthetist. So early involvement of anaesthesiologists is essential along with proper monitoring, adequate fluid replacement and also availability of drugs which can alter blood pressure. Finally, advent of laparoscopic and robotic adrenal-sparing adrenalectomy have resulted in reduced hospital stay, earlier oral intake and resumption of normal activity. Patients with pheochromcytoma ideally be managed by an experienced team of anaesthetists,endocrinologists and endocrine surgeons.

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