Anesthetic Management Of A Rare Case Of Extra Adrenal Pheochromocytoma- A Case Report

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Citation

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Abstract

Pheochromocytoma is rare, accounting for less than 0.1 % of hypertensive population. Extra-adrenal pheochromocytomas are rarer still. These gangliomas develop in the paraganglion chromaffin cells of the sympathetic nervous system. They account for 10% of all pheochromocytomas in adults and 30-40% in children. These tumors are usually larger than their adrenal counterpart. The most common site of extra-adrenal pheochromocytomas is the para adrenal area, but they also occur at the aortic bifurcation, chest, inferior mesenteric and iliac arteries, bladder, heart and brain. In this report, we describe a 30-year-old male with an extra adrenal pheochromocytoma in the right para aortic region. Clinical presentation, diagnosis, and treatment are similar to adrenal tumors. Few medical conditions pose such a severe but unpredictable threat to the patient's life and the perioperative management of such patients poses a significant challenge to the anesthesiologist.

CASE REPORT

A 30 year old male weighing 72 kg was diagnosed 1year back as a case of extra adrenal pheochromocytoma. He presented with headache, sweating and palpitation along with hypertension. He was on treatment for 1year with tablet prazosin 2.5 mg. twice daily and tablet atenolol 50 mg. once daily. He gives history of uneventful general anesthesia for tonsillectomy 15 years back. He was now posted for laparotomy and excision of the tumor. On examination, he was alert, cooperative, afebrile and short tempered. Pulse rate was 63/minute, regular and good volume. Blood pressure recording over right upper limb was 150/100 mm Hg in supine and 140/80 mm Hg in standing position. Systemic examination and airway assessment revealed no abnormality. Investigations revealed a Hb-14.1g% , PCV-41.6%, FBS-122mg/dl,Urinary VMA-9mg% (normal<8 mg%), S.Calcium, S.Electrolytes, Thyroid function, renal function, Bleeding profile and Chest radiograph were all normal. Electrocardiogram showed ST segment elevation in V1 – V3. Echocardiogram showed concentric Left ventricular hypertrophy with Ejection fraction of 60%. CT scan revealed a mixed density mass lesion in the right para aortic region, measuring 5.3 x 4.3 cms. Pre operative preparation with Alpha blocker prazosin and Beta blocker atenolol ensured adequate control of hemodynamic status. Tablet lorazepam 2mg was given the previous night and at 6 am on the day of surgery along with tablet ranitidine, prazosin and atenolol. He was kept fasting overnight and adequate blood was arranged. He was premedicated with morphine 16mg and promethazine 25 mg via intramuscular route. EMLA cream was applied over right forearm, left wrist and lumbar area 60 min before shifting to O.T. In the O.T, Pulse oximeter, ECG and NIBP were connected to the patient. 16G intravenous cannula was inserted over right forearm and 20G cannula over left radial artery for invasive monitoring. The patient was then positioned in left lateral position and 18G Epidural catheter inserted in T12- L1 space.10 cc of 2% plain xylocaine was injected. Ryles tube, Foley's urinary catheter, and nasopharyngeal temperature probe was inserted after induction. This was followed by cannulation of right internal jugular vein for CVP monitoring, fluid and drug administration. After pre oxygenation, the patient was induced with Thiopentone 375mg, Vecuronium 8mg, preservative free 2% lignocaine (xylocard) 100mg, Fentanyl 50 ug I.V with titrated infusion of Sodium nitroprusside(SNP). He was intubated with 8.5 mm cuffed oral endotracheal tube. Anesthesia was maintained with N_20 in 35% O_2, Vecuronium, I.V Fentanyl, Midazolam, Halothane, titrated doses of SNP and epidural top up with Bupivacaine. During intra operative handling of tumor, there was a sudden surge of blood pressure with tachycardia and ventricular ectopics. This was managed by stepping up the dose of SNP, I.V bolus of xylocard, I.V bolus of

Thiopentone and increasing the depth of anesthesia. Intra op blood sampling was done for ABG analysis and S.glucose which were both within normal limits. After ligation of the tumor, there was hypotension, which was managed by Volume loading and low dose of dopamine which was later stepped up. After the surgery the patient was reversed with 3.5 mg neostigmine and 0.6mg glycopyrrolate and extubated. In the post operative ward monitoring was continued and analgesia was maintained via epidural catheter with top up doses of fentanyl. During the immediate post operative period the patient developed Hypotension and Hypoglycemia (minimum of 40mg %), which was managed by adjusting dopamine infusion (later tapered and discontinued) and by infusing 10% dextrose solution. Patient was discharged home 10 days later. The biopsy report confirmed the diagnosis of pheochromocytoma.

DISCUSSION

Extra adrenal pheochromocytomas develop in the paraganglion chromaffin cells of the sympathetic nervous system and account for 10% of pheochromocytomas in adults. They occur at the para adrenal area in over 37.5% of patients, in the organ of Zuckerkandel at the aortic bifurcation in 12.5%, in the chest 7.5%, 5% each in inferior mesenteric artery, over left common iliac artery, in the bladder wall, and 2.5% each in celiac plexus, superior mesenteric artery, renal vessels, over right iliac artery, beneath the diaphragm and around the left ureter. [1] They are usually sporadic in nature. In adults these tumors are malignant in approximately 30-40% of patients compared to less than 2% in children. Extra-adrenal pheochromocytomas tend to be larger than their adrenal counterpart at the time of detection. Symptoms of extra-adrenal pheochromocytoma can be divided into two categories. The first category includes symptoms that are due to an excess of catecholamine and are similar to their adrenal counterpart. The second category includes symptoms that are due to the specific location of the tumors and may help in localizing the tumors.

The presence of hypertension with symptoms of adren¬ergic excess should alert the clinician to the tumors of adrenal medulla as well as the extra-adrenal paraganglion system. [2] Most extra adrenal pheochromocytomas produce predominantly Norepinephrine. Patients with extra adrenal pheochromocytoma commonly present with the classic triad of headache, pal¬pitations and sweating. Sustained or paroxysmal hyper¬tension is present in 80-100% of these patients. Urinary estimation of catecholamines and their metabolites is a better biochemical investigation than plasma estimation for the diagnosis of this lesion. [2] CT scan is the imaging mo¬dality of choice for localization. [23] MIBG scan is indicated in extra adrenal tumors to rule out multicentricity and metasta¬sis. [23] In the extra-adrenal pheochromocytomas, traditional his¬tological markers of malignancy may not predict the malignant behavior. The diagnosis of malignancy can be made with con¬fidence only by demonstrating tumor cells at sites where para¬ganglion tissue is normally absent. [23] Surgery after adequate preoperative preparation remains the treatment of choice. [2] A lifelong follow-up is indicated, as the extra-adrenal pheochromocytomas are more likely to recur and to meta¬stasize. Annual determination of urinary catecholamines and their metabolites is recommended. Persistent hyper¬tension after successful removal of pheochromocytoma occurs in approximately 25% of cases. [2]

Once the diagnosis of pheochromocytoma is established, planning for surgical exploration of both adrenal glands and the para aortic sympathetic glands should be undertaken without delay. Surgical removal of pheochromocytoma usually normalizes blood pressure. However, resection has great potential for intraoperative hypertension during manipulation of the tumor. Adequate preoperative preparation includes controlling the hemodynamic status of the patient by employing alpha blockers. When -blockade is needed to control symptoms, prazosin, terazosin, or doxazosin (selective $_1$-receptor antagonists) can be used to circumvent some of the disadvantages of non selective blocker like phenoxybenzamine. Because they do not block presynaptic $_2$-receptors, this class of drugs does not enhance norepinephrine release and, therefore, does not produce reflex tachycardia. [4] They also have a shorter duration of action, permitting more rapid adjustment of dosage and a reduced duration of postoperative hypotension, which is usually seen with phenoxybenzamine. In addition, expansion of plasma volume, reduced because of chronic constriction, occurs if blocking agents are given 2-3 weeks preoperatively. Selective competitive $_1$-adrenoceptor blockade with prazosin in patients with pheochromocytoma was advocated by Wallace and Gill [5] and others in the Americas. [67]

There are two reasons for using ß-adrenoceptor antagonists in the preoperative treatment of patients with phaeochromocytoma. The first is to limit symptoms and signs referable to increased circulating epinephrine, mainly manifest as tachycardia with or without cardiac arrhythmias.

These will be evident in patients with predominantly epinephrine- (and dopamine-) secreting tumors. As the prime objective is to limit excessive tachycardia with or without arrhythmias mediated through ß$_1$-adrenoceptors, it is logical to use selective ß$_1$-adrenoceptor antagonists such as atenolol or bisoprolol in order to minimize undesirable side-effects in the bronchi or peripheral vasculature. [8] The second reason is to block excessive cardiac sympathetic drive secondary to suppression of the presynaptic $_2$-regulating mechanism by drugs such as phenoxybenzamine. Suppression of ß-adrenoceptor-mediated cardiac sympathetic activity in the absence of adequate arteriolar dilation may precipitate acute pulmonary oedema. [9]

To help assess the adequacy of preoperative management of pheochromocytoma, the following Roizen criteria [10] should be met in order to reduce perioperative morbidity and mortality:

- No in-hospital blood pressure >160/90 mm Hg for 24 hours prior to surgery.
- No orthostatic hypotension with blood pressure <80/45 mm Hg.
- No ST or T wave changes for 1 week prior to surgery.
- No more than 5 premature ventricular contractions per minute.

In our case report, the patient was adequately prepared with prazosin and atenolol and he met all the parameters of Roizen criteria. He was premedicated with lorazepam and morphine before the surgery. There are reports suggesting the dangers of using drugs like morphine and atracurium which potentially release histamine because of the risk of provoking catecholamine release from chromaffin granules. [8] But Morphine has been used safely [11] and so we chose to give morphine as a premedicant without any facing any untoward effects.

The combination of adequate regional anesthesia with general anesthesia sufficient to prevent the patient coughing on the tracheal tube provides satisfactory conditions for the initial surgical incision and exposure of the tumor.

We chose to insert the epidural catheter also under local anesthesia with EMLA cream before induction to avoid the difficulty in positioning patient and to prevent bucking on the endotracheal tube. A segmental blockade was achieved at mid to low thoracic level.

Peripheral venous, arterial and central venous catheters were placed under local anesthesia and hemodynamic monitoring was established together with ECG and pulse oximeter. Extensive monitoring is required for such surgeries to monitor both the hypertensive crises and the post ligation hypotensive episodes. Manipulation of the tumor, however gently performed, usually causes a brisk hemodynamic response. Intraoperatively, intravenous phentolamine, nitroglycerin and sodium nitroprusside are most often used to control blood pressure swings. We decided to use SNP to manage the intraoperative hypertension as advocated by Hull even though Prys Roberts found Phentolamine to be a better alternative, as there was ample evidence that SNP has been successfully used. [12][13] [14] The most widely quoted alternative to SNP is phentolamine, a competitive $_1$- and weak $_2$-adrenoceptor antagonist, which can be given intravenously as an infusion or as incremental doses of 1–2 mg. Hull claimed that phentolamine is less satisfactory because tachycardia is an invariable problem. [9] Just prior to venous ligation of the tumor, anticipating hypotension, low dose dopamine was started along with volume loading and tapering of SNP.

The main postoperative complication of surgery for pheochromocytoma is persistent arterial hypotension which may be refractory to intravascular volume replacement and adrenoceptor agonists. Our patient responded to Dopamine infusion which was later tapered and finally weaned off after 2days. Our patient also developed hypoglycemia during the post operative period and had to be given dextrose infusions. This hypoglycemia is due to the excessive rebound secretion of insulin after the removal of catecholamine secreting pheochromocytoma. [15][16]

CONCLUSION

The management of patients with pheochromocytoma remains a challenge for the anesthesiologist despite the advent of new drugs and techniques. Our role in the successful outcome of such surgeries begins from adequate pre operative preparation, extensive intra operative monitoring and careful follow up during post operative period. Prognosis is usually good if the tumor is detected early to avoid major complications related to catecholamine excess.

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