

## CASE REPORT

# Anesthetic Management of Pheochromocytoma

Waqas Ashraf Chaudhary, MD

*Kyrgyz National Hospital, Department of Anesthesiology, Pain Management & Intensive Care, Bishkek, (Kyrgyzstan).*

*Elective Student, Department of Anesthesiology & Pain Management, Shoukat Khanum Memorial Cancer Hospital & Research Centre, Lahore, (Pakistan).*

Correspondence: *Dr. Waqas Ashraf Chaudhary, Department of Anesthesiology & Pain Management, Shoukat Khanum Memorial Cancer Hospital & Research Centre, Lahore, (Pakistan). E-mail: dr\_waqasch@hotmail.com*

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## SUMMARY:

An unusual case of benign recurrent pheochromocytoma, admitted to the Shoukat Khanum Memorial Cancer Hospital and Research Centre (SKMCH&RC) for exploratory laparotomy and excision of tumor is presented.

**Key words:** Pheochromocytoma, Adrenal Medulla, Catecholamines.

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## INTRODUCTION

Pheochromocytoma is a catecholamine producing tumor of neuroectodermal origin that is made up of chromaffin cells. 90% of all cases arise from adrenal medulla where the biggest collection of chromaffin is found. Extra adrenal pheochromocytoma (also called paragangliomas) is usually encountered intra abdominally along the sympathetic chains. Other extra adrenal sites are pericardium, interatrial septum, prostate and urinary bladder. Extra-adrenal pheochromocytoma can be the cause of high blood pressure in about 0.1-1% of all patients with hypertension<sup>1</sup>.

The clinical syndrome is due to excess catecholamine secretion in a paroxysmal fashion. The most common symptoms are severe pounding headache, palpitations and inappropriate excessive perspiration. Other symptoms include anxiety, tremor, pallor, abdominal pain and weight loss. Hypertension is a common finding in these patients.

## CASE REPORT

A 48 year old man weighing 70kg, ASA physical status 2 was admitted for exploratory

laparotomy. He registered as a private patient with a recurrent mass in the lumbar region. He had a left adrenal mass excised five years back and the histopathology report of the excised mass suggested pheochromocytoma. He never had chemotherapy. Two years back he again developed a recurrent mass and got admitted at SKMCH&RC. Later on he had five doses of chemotherapy at Nishter Hospital Multan with about 40% disease regression. He revisited SKMCH&RC after one year and was operated for distal pancreatectomy, splenectomy, left nephrectomy, excision of part of diaphragm and left crus.

There was no history of hypertension, diabetes mellitus, asthma, dyspnea or any allergy. General physical signs were within normal limits with no significant findings. TMD 6cm, Malampatti 4 (suspected difficult intubation). Dentition was normal. BP was 140/90 mmHg and HR 70 beats/min. He had uneventful previous exposures to general anesthesia.

Investigations were carried out and the results were within normal limits. Venilylmandelic acid (VMA) levels in 24hr urine collection were measured. CT scan showed recurrence of disease (a solid

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looking mass in left paracolic gutter adjacent to descending colon). Bone scan was negative for signs of a metastatic disease.

The patient was explained about the benefits of epidural analgesia to which he consented. Pre-medication with Tab. Midazolam 15mg was ordered.

Patient was shifted to the operating room and his baseline BP at that time was recorded to be 130/85mmHg and HR was 86/min. He was placed in lateral position and local anesthetic solution was infiltrated in the desired interspinal space. The epidural space was located at L1/L2 inter space; we proceeded using a 16G Tuohy needle and 'loss of resistance' to air technique. A 20-gauge epidural catheter was advanced five cm into the epidural space and after negative aspiration 3ml of inj. lignocaine 2% with adrenaline was injected as epidural test dose. Five minutes later incremental doses of an additional 5ml of lignocaine 2% and bupivacaine 0.25% were administered. Then general anesthesia was induced with thiopental 350mg, morphine 7.5mg and maintained with 2% isoflurane in 60% nitrous oxide and 40% oxygen. Rocuronium bromide 40mg was administered for neuromuscular blockade and the patient was intubated using a cuffed ETT. Ventilation was done through anesthetic ventilator to ETT. The BP rose to 190/100mmHg at the time of intubation but later on settled at around 110/70 mmHg. Standard monitoring was done including arterial line for IBP, ECG, SpO<sub>2</sub>, EtCO<sub>2</sub>, HR, and RR.

An acute episode of raised blood pressure upto 200/120mmHg was noted during tumor manipulation, which was controlled by IV infusion of phentolamine (an  $\alpha$ -adrenergic blocker). IV fluids, Ringer's lactate solution, dextran and normal saline were used aggressively in anticipation of the hypotension and potential vasodilatation that developed during tumor removal. Four units of blood were kept ready. The course of the surgical procedure remained uneventful and lasted for about 3½ hours. Total fluid used was 4000ml, blood loss 450ml and urine output was 650ml.

After operation the patient was shifted to the

recovery room with endotracheal tube in. Half an hour later the patient was extubated under the supervision of consultant anesthesiologist. The patient was able to sustain head lift for 3 seconds, had adequate spontaneous ventilation, demonstrated adequate coordinated respiratory effort; and was fully awake, oriented and able to follow the verbal commands appropriately. For post-operative analgesia, epidural infusion (bupivacaine 300mg and morphine 15mg in 420ml of 5% dextrose water) was started at the rate of 5-15ml/hour.

The patient was discharged from the post anesthesia care unit on the 3rd postoperative hour and shifted to the ward. He was discharged from the hospital on 4th postoperative day. Follow-up was advised.

## DISCUSSION

In pheochromocytoma, hypertension of a sustained or paroxysmal nature remains the most consistence manifestation.

From an anesthesiologist's point of view, the pre operative control of hypertension, by phenoxybenzamine, a non competitive alpha-1 antagonist administered in carefully titrated and increasing doses are a choice. Propranolol, a beta blocker, in addition to phenoxybenzamine, can be used to control tachycardia and hypertension. The continued use of alpha blockers up to the pre medication time is vital to avoid severe rise in BP during induction of anesthesia. Blood sugar level needs also to be measured.<sup>2,5</sup>

There is a serious risk of hypertensive crisis during surgical manipulation of tumor due to excessive catecholamine release. On the contrary, severe hypotension can occur immediately after suprarenal vein ligation. The pre operative preparation with alpha adrenergic blockers<sup>3</sup>, adequate volume repletion, and careful intra operative cardiovascular monitoring can decrease the surgical morbidity. Muscle relaxants also should be used intra operatively with care. Rocuronium bromide is a good choice of muscle relaxant for intubation in this case<sup>5</sup>,

because succinylcholine-induced fasciculation of the abdominal musculature is known to increase intra abdominal pressure, which might cause release of catecholamines from the tumor. A major regional block, such as an epidural or spinal anesthetic could block sensory nerves and sympathetic discharge in the area of the surgical field. The catecholamines released from a pheochromocytoma during surgical manipulation would still be able to bind and activate adrenergic receptors through out the body, however. Therefore, these regional techniques could not block the sympathetic hyperactivity associated with manipulation of the tumour - pheochromocytoma. For post-operative pain control epidural analgesia remains a preferable choice. By this approach, the post operative outcome is improved, and there is less pain especially during respiration preventing the development of atelectasis. This approach also reduces the incidence of post operative ileus.

Laparoscopic adrenalectomy is emerging as a safe method for tumor removal. In more than 70-90 % cases BP come back to normal after surgery.<sup>6,9</sup>

Preoperative assessment should focus on the adequacy of adrenergic blockade and volume repletion. Special attention needs to be focused on resting arterial BP, heart rate, possibility of orthostatic hypotension, ventricular ectopy, and electrocardiographic evidence of ischemia. In doubtful cases echocardiography usually proves helpful.

Potentially life-threatening variations in the level of BP particularly during induction and manipulation of the tumor indicates the need for direct arterial pressure monitoring. Large intraoperative fluid volume shifts underscore the importance of good IV access and urinary output monitoring. Intubation should not be attempted until a deep level of anesthesia has been established. Intraoperative hypertension can be effectively treated with phentolamine, nitroprusside or nicardipine. Anesthetic drugs or techniques that stimulate the sympathetic nervous system e.g., ephedrine, ketamine, hypoventilation, potentiate the arrhythmic

effects of catecholamines, inhibit the parasympathetic nervous system (e.g., pancuronium), or release histamine (e.g., atracurium, morphine sulphate) may precipitate hypertension and are best avoided. Postoperative hypertension may indicate the presence of occult tumors or volume overload.<sup>10-12</sup>

## CONCLUSION

Pheochromocytoma resection poses many challenges to the anesthesiologist, however, a thorough understanding of the pathophysiology of the condition, a detailed pre-anesthesia assessment, full preparation and ensured availability of all potentially useful therapeutic agents as well as exhaustive intra operative monitoring will make the difference. It also requires a close collaboration between the surgical and anesthesia teams.

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