

## CASE REPORT

# Successful Management of Uncontrolled Hypertension with Peritumoral Infiltration of Lidocaine During Laparoscopic Resection of Pheochromocytoma: A New Approach

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The intraoperative care of pheochromocytomas can be difficult and lead to serious complications. We present a case of a 46 year-old female undergoing laparoscopic resection of pheochromocytoma, who was scheduled for surgery with phenoxybenzamine and amlodipin. Under general anesthesia cardiovascular stability was achieved by peritumoral infiltration of lidocaine during resection.

**Keywords:** pheochromocytoma; General anesthesia; local anesthetic infiltration

**P**heochromocytoma is a rare chromaffin tissue catecholamine secreting tumor arising commonly from adrenal medulla. Pheochromocytoma symptoms such as hypertension, headache and palpitation result from the uncontrolled release of catecholamines, norepinephrine (85%), epinephrine, and rarely dopamine [1]. It is a rare tumor, being responsible for less than 0.1% of all cases of hypertension. In adults, approximately 80% of pheochromocytomas are unilateral and solitary. Solitary lesions inexplicably favor the right side [2].

The only curative treatment for pheochromocytoma is complete surgical resection. Laparoscopic adrenalectomy has become the standard treatment for most patients [3]. Hemodynamic instability is common and happens suddenly during surgery that causes the anesthetic management difficult and challenging. Pharmacologic preparation before operation and different anesthetics techniques combined with modern monitoring improve outcome and decrease mortality [4].

## Case Description

A 46 year old female patient presented to the emergency department complaining of headache, palpitation and chest pain. On physical examination, she had a blood pressure of 188/110 mmHg, right sided intra-abdominal mass and T wave inversion in the anterior lead of electrocardiogram. She was admitted to Cardiac care unit. The cardiologist didn't find any significant coronary stenosis in coronary angiography. For control of blood pressure amlodipine 5mg and losartan 25mg twice daily were started. CT scan of the

abdomen showed heterogenic large rounded mass seen in the right suprarenal gland measuring around  $6.9 \times 7$  cm. Blood biochemistry, liver function and renal function tests were normal. Metanephrine 24-hr urine collection concentration was 2310 mcg/ day (normal 40-260  $\mu\text{g/day}$  enzyme-linked immunosorbent assay (ELISA) and vanil mandelic acid was 15mg/day (normal <13.6mg/day). The diagnosis of pheochromocytoma was made. Echocardiogram showed mild globular LV diastolic dysfunction.

Antihypertensive drugs were changed to oral phenoxybenzamine 10 mg twice daily and oral amlodipine 5 mg once daily. Ten days after starting the antihypertensive medications and control of blood pressure, the patient was scheduled to undergo laparoscopy adrenalectomy under general anesthesia.

The night before the surgery, the patient received chlordinapoxide 5mg, and fluid preloaded with ringer solution, as premedication. Before inducing anesthesia a bolus of fluid ringer's lactate solution 5ml/kg, was given and under invasive arterial pressure monitoring, the induction was done with midazolam(0.03mg/kg), fentanyl(3  $\mu\text{g/kg}$ ), propofol(2mg/kg), cisatracurium(0.2mg/kg) and lidocaine (1.5 mg/Kg) prior to intubation. Anesthesia was maintained with propofol and remifentanyl (0.1  $\mu\text{g}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ ).

After insufflations of CO<sub>2</sub> into abdomen, the blood pressure went up and at exploration reached 210/122 mmHg. At this time we asked the surgeon to insert a nylon catheter size 12 through trocar 5mm into abdomen and guided by grasper to tumor location, then 20ml lidocaine 1% was infiltrated around the mass. After 2 minutes the blood pressure came down to 134/86 mmHg. After 50 minutes, when the blood pressure again began to rise, we repeated this maneuver. During this period the vessel of the mass was clamped and hemodynamic was stable until the end of operation. Final pathology report confirmed that the right adrenal tumor was pheochromocytoma.

## Discussion

General anesthesia with or without epidural block is usually employed for pheochromocytoma resection [5]. Despite preoperative preparation of patients with alpha- blocker,

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dexmedetomidine, magnesium sulfate, clonidine, calcium channel blockers and angiotensin-converting-enzyme inhibitor, almost all patients demonstrate hemodynamic instability during direct tumors manipulation [6-7]. Intraoperative increase in arterial pressure is a complex process influenced by sympathetic nervous system, circulating catecholamine and other vasoactive agents such as neuropeptide Y [8]. Neuropeptide Y is a peptide that is increased in the plasma of patients with pheochromocytoma and causes small vessel vasoconstriction [9].

Therefore, during operation, meticulous attention of anesthesia team, careful surgical handling of tumor tissue, limited intraabdominal pressure, adequate depth of anesthesia and the use of short acting vasodilator agents are necessary in controlling intraoperative hypertension crisis and their consequences.

Our patient had a rise in blood pressure during the first manipulation and reached to 220/143 mmHg and heart rate because of reflex bradycardia came down to 52/min. During surgery, the best way to prevent the occurrence of hypertension crisis is to avoid or eliminate the noxious stimulus to tumor, but this procedure is inevitable therefore, the effective way to prevent this response is to anesthetize the sensory components of the tumor. Topical application of local anesthetics is an effective option that may be employed in areas that are highly innervated [10]. Local anesthetic injections into neural structures such as the carotid body using either lidocaine or bupivacaine have been employed to reduce hemodynamic variability with carotid endarterectomy and carotid body tumor excision. Carotid body tumor like pheochromocytoma is a rare non-chromaffin paraganglioma arising from chemoreceptor cells found at carotid bifurcation but constitute the majority of head and neck paragangliomas [11].

The behavior of this tumor during surgical manipulations is similar to pheochromocytoma. By this idea we used topical anesthesia in the hope to prevent hemodynamic

instability. Lidocaine infiltration desensitized nerve ending in these masses and blocked the neurohumoral activity of pheochromocytoma.

In conclusion, we justified that peritumoral infiltration of lidocaine during laparoscopic resection of pheochromocytoma was a very effective strategy in controlling of hypertensive crises.

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