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RESEARCH ARTICLE

ANESTHETIC MANAGEMENT OF RIGHT PHEOCHROMOCYTOMA ASSISTED BY ROBOT CASE REPORT

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ABSTRACT

Pheochromocytoma is a tumor that arises from the chromaffin cells of the adrenal medulla, which is histologically impossible to differentiate from paragangliomas that can arise outside the adrenal gland, in addition to the low incidence and high complexity in the differential diagnosis. It is a challenge for both the anesthesiologist and the surgical team, due to possible complications that could occur in the operating room. It should be rigorously evaluated and alpha and beta blockade must be started at least two weeks before the surgical procedure. Maintaining a good anesthetic plane and avoiding noxious stimuli wich may trigger sympathetic stimuli are the main objectives of this procedure. Due to the complexity of hemodynamics during surgery constant and open communication between the surgical team is essential.

INTRODUCTION

Pheochromocytoma is an unusual but potentially devastating tumor, they produce catecholamines that arise from the chromaffin cells of the adrenal medulla.[1]Its main characteristic such catecholamine production, the excess of these hormones is responsible for the clinical manifestations of the tumor which include palpitations, hypertension and potentially fatal complications, such as myocardial infarction or cerebrovascular accidents.[2] It is called pheochromocytoma when it arises from the adrenal medulla and paraganglioma when it is located outside of it, in any chromaffin tissue.[1,2]The incidence of PHE varies from 2 to 8 persons per million in the general population.[3] Its main age group of appearance is between the fourth and fifth decade of life without making distinction between sexes.[3] Their usual behavior in their hereditary form makes them being diagnosed during childhood, or young adulthood in most cases.[4] Unlikely, those that are sporadic tend to be diagnosed later, being 0.1% in older adults.[5] The classic pheochromocytoma triad occurs in 20 to 40% of patients, and consists of intermittent headache (80%), palpitations or tachycardia (64%), and diaphoresis (57%.)[3, 4, 5] The manifestation of symptoms can be attributed to changes in position, stress, emotions, skin incisions, pain, or some medications.[3, 6]

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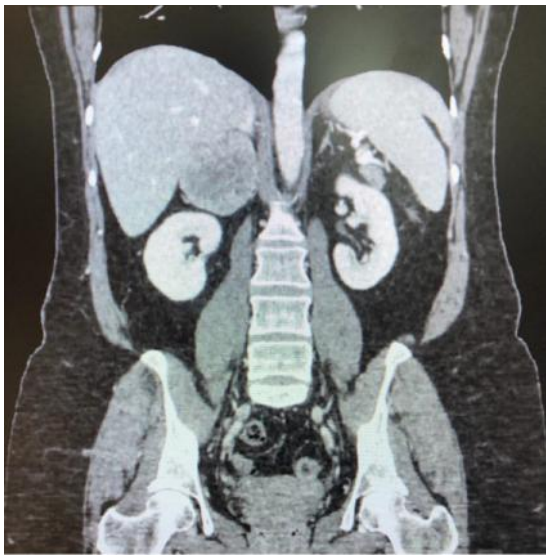
In the diagnosis of pheochromocytoma, the analysis of metanephrines is used. Methanephrines are metabolites of catecholamines and are released in a sustained manner, making them a sensitive marker with few false negatives in the study of pheochromocytomas.[7] The measurement of plasma metanephrines is preferred over urinary ones for diagnosis because of its high sensitivity, specificity and ease of collection.[7] The concentration of plasma metanephrines is related to the location and size of the tumor. The imaging study of choice is computed tomography.[3, 7] In the perioperative management of patients with pheochromocytoma should be maintained with an adequate adrenergic block initially alpha block 14 days prior to surgery and beta block 7 days prior.[2,5,6] In recent years, the mortality of adrenalectomy due to pheochromocytoma has decreased significantly, thanks to advances in management throughout the perioperative period. However, the risk remains latent, especially during endotracheal intubation, pneumoperitoneum in the case of laparoscopy or robotic surgery, and after manipulation of the tumor.[3,5,8]

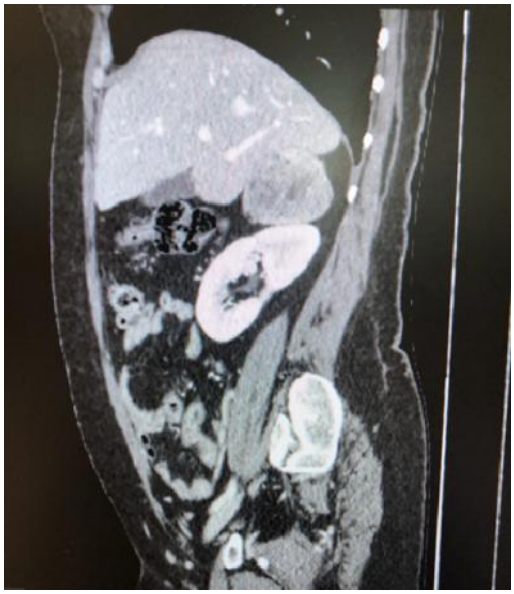
PRESENTATION OF THE CASE

Female patient, 50 years old, originally from Mexico City, resident of Los Cabos, Baja California Sur. Elective scheduled for right robot-assisted adrenalectomy (Figure 6), ASA III/VI, Caprini 3% moderate risk of deep vein thrombosis, Lee class II

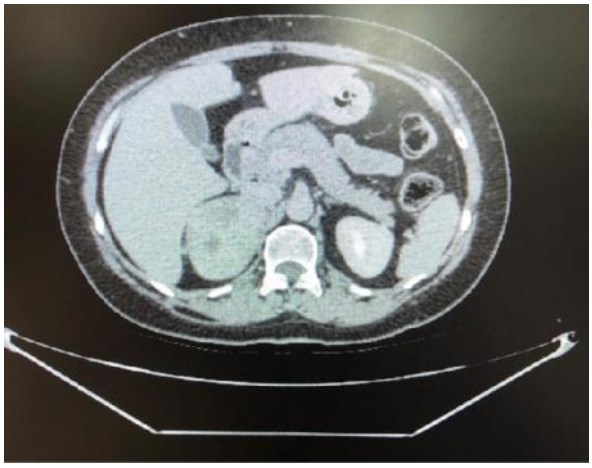
low risk 0.9% of complications, Goldman class I, Ariscat 13.3% intermediate risk of pulmonary complications.



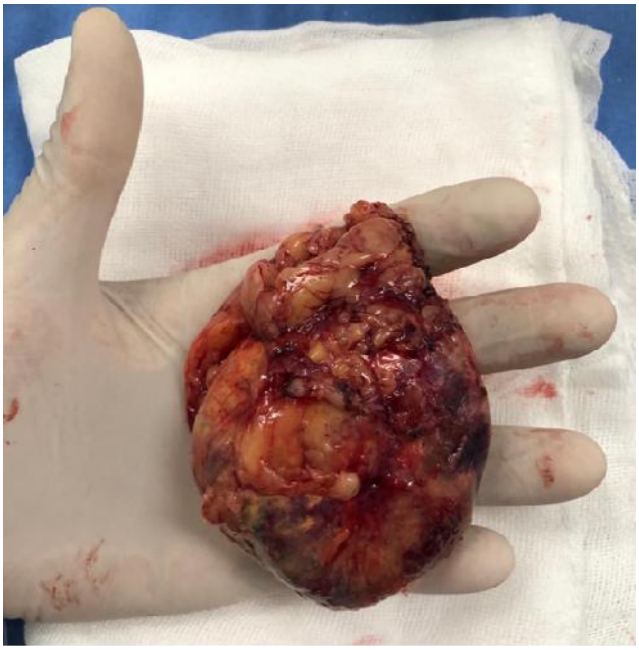
1. Coronal cut CT.



2. Sagittal section CT.



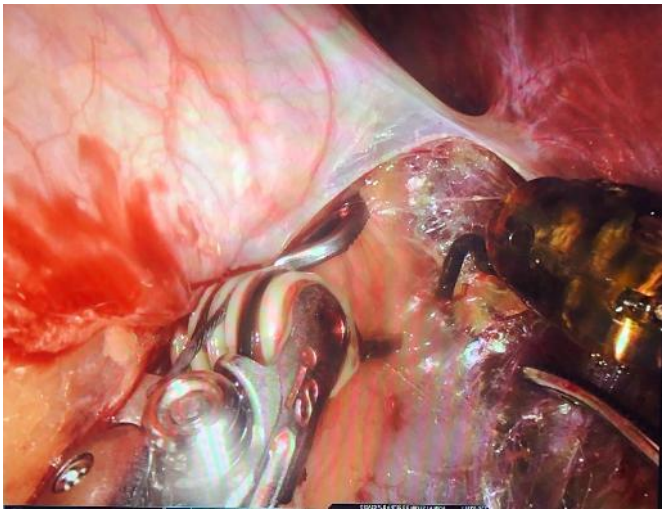
3. CT cross section.



4. 6x6 cm right adrenal tumor.

5. Monitor after suprarenal vein clamping and cutting

6. Da Vinci Robot Assisted Adrenalectomy



7. Dissection and clipping of the Adrenal Vein

The initial symptoms where fatigue, myalgia, headache, vertigo, skin rash, emotional lability, tachycardia and hyperglycemia >1000 mg/dl. History of arterial hypertension and diabetes mellitus secondary to tumor process in current medical treatment with telmisartan with hydrochlorothiazide 80 mg / 12.5 mg every 12 hours, metoprolol 50 mg every 12 hours and vildagliptin every 24 hours. Alpha-adrenergic blockade with Prazocin at 3mg - 2 mg - 2 mg oral route was initiated 14 days prior to surgical procedure with Ta 132/83 mmHg Fc 111 Lpm and Metoprolol 100 mg oral route 7 days prior to surgical procedure with Ta 136/90 mmHg FC 95 Lpm. Image studies reported the following: abdominal ultrasound with right adrenal gland 62x40mm, simple abdomen tomography: right adrenal mass (57x65x68) that due to its characteristics suggests as first possibility pheochromocytoma (Figure 1,2 and 3). Laboratory tests Hg 11.7 g/dL, Hto 34.3 %, platelets 248,000, TTP 26.90 sec, tp 14.3 sec, INR 1.068, BUN 10.31 mg/dL, creatinine 0.71, glucose 166.4 mg/dL. Total Methanephrines 3174 ug/24 hours, Methanephrines 1930 ug/24 hours, Urinary Methanephrines 1243 ug/24 hours, Methanephrine/Creatinine Ratio 2403 ug/g 24 hours, 24 hour urine Creatinine 1.32 g/24 hours. Diagnostic impression: Right adrenal tumor with catecholamine elevation.

The patient was received in central operating room awake, oriented, neurologically integrated, hemodynamically stable with beta previous alfa and beta blockade with metoprolol and prazocin, monitoring is placed and the following vital signs are obtained: TA 158/93 mmHg, PAM 93mmHg, Fc 90 Lpm, SO2 97 %, BIS 94, Temp 36C. Anesthesia technique: Premedication with Midazolam 2 mg IV and general anesthesia is performed intravenously with Fentanyl 4 mcg/kg IV, Propofol 3 mcg/dl in TCI, Rocuronium 50 mg IV. Endotracheal intubation with fibrobronchoscopy is performed, glottic ring is visualized and introduced 2 cm from the carina, TET #7.5 is slipped and pneumotamponed with 3 CC of air, and fixed at 22 cm from the dental arch with no change in blood pressure. It is connected to an anesthetic circuit in a volume-controlled mode with a VC 350 ml, PEEP 6, Fr 12-14 RPM, Ppico 20 mmHg, ETCO2 32-34 mmHg and FIO2 at 55% (Figure 5) An uncomplicated ultrasound-guided right jugular central venous catheter is placed. Anesthetic maintenance: Fentanyl 0.026-0.039 mcg/kg/min, Propofol 3-2 mcg/ml TCI, Smolol 50-100 mcg/kg/min, Nitroprusside 0.5-1.5 mcg/kg/min.

Complementary drugs: magnesium sulfate 1 gr IV, paracetamol 1 gr IV, ketorolac 60 mg IV, hydrocortisone 100mg IV, cephalotin 1 gr IV, ondasetron 8 mg IV, rapid action insulin 6 UI. Hemodynamic maintenance: with episodes of hypertension during tumor manipulation, with average vital signs MAP 89-123 mmHg, Fc 85-95 LPM, Fr 12-18 RP, Temperature 36-36.4C, BIS 44-56 and VPP 4-10.

Baseline blood gas: Ph 7.28 pCO2 45.2 pO2 64.9 HCO3 21.5 Lac 0.9 BE eff -5.4 Gluc 307 mg/dl
Transanestheticgasometry: Ph 7.45 pCO2 30 pO2 84 HCO3 16 Lac 0.4 BE eff -7.9 Gluc 105 mg/dl
Gasometría final: Ph 7.36 pCO2 34.2 pO2 96.9 HCO3 19.9 Lac 2.0 BE efec -5.7 Gluc 185 mg/dl

During the first phase of the surgery, with manipulation we witnessed sustained arterial hypertension with MAP up to 100-110 mmHg so the following maneuvers were performed: sodium nitroprusside infusion at 0.5 to 1. 5 mg/kg/min which maintained adequate blood pressure during the clamping of the adrenal artery and vein (Figure 7) suddenly increased the MAP to 123 mmHg so we started Esmolol infusion at 50-150 mcg/kg/min and three boluses at 500 mcg/kg which normalized the MAP and was suspended. The dose of nitroprusside was reduced to 0.5 mcg/kg/min, however, a hypertensive peak secondary to the tissue and free liquid in the cavity was presented, so it was discussed with the surgical team and a washing of the abdominal cavity was performed, improving the average blood pressure by reducing the infusion of sodium nitroprusside (Figure 4). Water balance: perfusion based on crystalloids (Hartman solution and NaCl 0.9%) with an intake of 1060 ml, outflow of 1040 ml, bleeding of 30 ml, diuresis of 200 ml, urinary rate 0.8 ml/kg/hr, total positive balance 20 ml. The surgical procedure is completed and nitroprusside infusion is suspended, emersion is performed by metabolic lysis, endotracheal tube is removed under spontaneous ventilation with BIS 85 Ta 110/74 mmHg, Fc 70 LPM, Fr 14 Rpm, Temp 36.4ªC, without incidents or accidents and the patient is transferred to intensive care.

DISCUSSION

The treatment of pheochromocytoma is a challenge for both the anesthesiologist and the surgeon. There must be close communication throughout the perioperative period, since the management of this pathology must be dynamic, based on hemodynamic changes the patient undergoes, from anesthetic induction, through the pneumoperitoneum in the case of laparoscopic or robot-assisted surgery, to the manipulation and clamping of the suprarenal veins.[5, 6] During perioperative period, the patient must take a rigorous preoperative assessment, so that it should start with alpha blockade 14 days before the procedure and beta blockade 7 days before, so as to enter surgery in the best possible conditions to avoid possible complications.[2, 5, 6] In the present case, it was decided to manage the airway with fibrobronchoscopy to avoid the possible sympathetic response to laryngoscopy, which is where the most sudden increases in blood pressure, arrhythmias and infarction have been reported.[5] In addition, with general intravenous anesthesia titrated with a bispectral index, an adequate anesthetic plane was achieved, achieving timely titration of the active vessels.[5] It has been described that adrenalectomy for catecholamine-producing tumors is divided into two stages. The first stage begins with the induction of anesthesia and ends with the clamping of the suprarenal veins[9]

this should be handled based on short action beta-blockers such as Esmolol, which can be used in continuous infusion from 50 to 300 mcg/kg/min or in 500 mcg/kg boluses. Due to its short action properties, it is of choice during this phase of the surgery, the use of vasodilators such as sodium nitroprusside at a dose of is indicated 0.5 up to 5 mcg/kg/min adjusting it every 5 min according to the hemodynamic response, should not exceed 3 mcg/kg/min during 10 minutes due to possible thiocyanate intoxication.[10, 11] Second stage of surgery begins after the adrenal vein is clamped, a marked hypotension due to the fall of catecholamines is expected at this phase and it must be managed based on intravenous vasopressors such as phenylephrine, ephedrine, norepinephine and vasopressin.[9] The adequate and timely anesthesia management in the resection of a pheochromocytoma, as well as multidisciplinary management with an experience center and team are fundamental for successful pheochromocytoma removal.

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