Technical aspects of laparoscopic adrenalectomy in pheochromocytoma

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ABSTRACT

Pheochromocytoma is a rare tumor made up of chromaffin cells that often secretes catecholamines. It presents in the adrenal medulla or extra adrenal tissue as paraganglioma. It causes high blood pressure in 0.1-0.6% of the population. Significant improvement has been made since the first adrenalectomies reported by Roux in Switzerland and Mayo in the United States. Laparoscopic techniques in suprarenal diseases were initially described by Gagner in 1992 as treatment for Cushing’s syndrome and pheochromocytoma and their indication has been controversial in regard to approach, maximum tumor size, cost-benefits and possible recurrence.

The case of a 66-year-old female patient with difficult-to-control hypertension of 18-year progression and right suprarenal mass diagnosed by computed axial tomography that was managed with laparoscopic adrenalectomy is presented.

Keywords: pheochromocytoma, laparoscopy, adrenalectomy.

RESUMEN

El feocromocitoma es un tumor raro de células cromafines que a menudo secreta catecolaminas. Se presenta en la médula suprarrenal o extra-adrenal en la forma de paraganglioma. Causa hipertensión arterial sistémica en 0.1 a 0.6% de la población. Desde las primeras adrenalectomías que notificaron Roux en Suiza y Mayo en Estados Unidos, el tratamiento de estas tumoralaciones ha mejorado en grado significativo. Con el advenimiento de las técnicas laparoscópicas en enfermedades suprarrenales que describió de manera inicial Gagner en 1992 como tratamiento del síndrome de Cushing y el feocromocitoma, han surgido múltiples controversias acerca de las indicaciones de tales técnicas respecto del abordaje, tamaño máximo de la malformación, relación costo-beneficio y posibilidad de recurrencia.

Se presenta el caso de un paciente femenino de 66 años de edad, con hipertensión arterial sistémica de control difícil de 18 años de evolución y presencia de masa suprarrenal de-recha diagnosticada por TAC que se manejó con adrenalectomía laparoscópica.

Palabras clave: feocromocitoma, laparoscopia, adrenalectomía.

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INTRODUCTION

Pheochromocytoma is a rare chromaffin cell tumor that frequently secretes catecholamines and develops in the adrenal medulla or extra adrenal chromaffin tissue as paraganglioma. It causes hypertension in 0.1-0.6% of the population. Diagnosis is made by identifying elevated catecholamine levels in blood and urine. A brilliant image in phase T2 magnetic resonance studies or radiopharmaceutical uptake in meta-iodobenzylguanidine (MIBG) scintiscan is observed.

Pheochromocytoma management has greatly improved since the first adrenalectomies reported by Roux in Switzerland and Mayo in the United States. Current anesthetic techniques as well as a more complete understanding of the anatomy and physiology of suprarenal tumors has provided better postoperative results and favorable prognosis. The refinement of laparoscopic techniques in suprarenal diseases since those initially described by Gagner and colleagues in 1992 as treatment for Cushing’s syndrome and pheochromocytoma has led to a revision of their indications in relation to approach (transperitoneal or retroperitoneal), maximum tumor size, the cost-benefit relation and possible recurrence. Principal indications for laparoscopic surgery are non-functioning tumors smaller than 6 cm, progressive growth, solitary masses with no signs of metastasis, aldosteronoma, pheochromocytoma and cortisol-producing tumors. Among the few absolute contraindications are primary adrenal carcinoma, contiguous organ invasion, and unresectable pheochromocytoma.

In cases of pheochromocytoma, the laparoscopic approach is presently considered to be the treatment gold standard because of reductions in time in surgery, postoperative pain, intestinal paresis and recovery time, especially in tumors smaller than 6 cm.

Optimum control of blood pressure with alpha blockers or calcium channel blockers, postoperative hypotension prevention through aggressive hydration protocol and strict monitoring of blood pressure are all of vital importance in this treatment. Laparoscopic adrenalectomy performed via transperitoneal approach provides a larger work space and better organ identification. Retroperitoneal approach results in a reduction of postoperative intestinal paresis, recovery time and hospital stay. The following case is of a patient diagnosed with pheochromocytoma that was managed with laparoscopic adrenalectomy.

CLINICAL CASE

The patient is a 66-year-old woman with an 18-year progression of high blood pressure initially managed with captopril and currently with prazosin and metoprolol.

Disease onset began 2 years previous to hospital admittance. She complained of insidious, oppressive right lumbar pain with a 7-10 intensity on the visual analog scale (VAS) that was intermittent without conditioning factors and decreased in the decubitus position. Pain extended to the ipsilateral scapular region and progressively increased and patient experienced vertigo.

Physical examination showed the patient to be conscious, oriented, fairly well hydrated, have good skin coloring, normal chest movements, normal vesicular murmur, normal heart rhythm and no accompanying anomalies.

Abdomen was soft, flat and depressible. There was pain upon deep palpation predominantly at the right suprarenal mass.
flank. No masses or enlarged organs were palpated, there were no signs of peritoneal irritation, peristalsis was normal and costovertebral angle percussion was negative. Blood pressure was 160/90 mmHg, heart rate 86/min, respiratory rate 14/min, and temperature 36.7°C.

Laboratory work-up was within normal ranges. Abdominal computed axial tomography (CAT) revealed 3.9 cm x 3.6 cm right suprarenal mass (Images 1A and 1B) suggestive of pheochromocytoma and was confirmed by nuclear magnetic resonance (NMR) that showed a 4 cm x 3.6 cm hyperintense image in T2 (Image 2). MIBG scintiscan showed radiopharmaceutical uptake in suprarenal mass consistent with chromaffin tissue (Image 3). Protocol was completed with kidney scintiscan with Tc99-DTPA and captopril that reported right glomerular function of 33.9 ml/min, left 29.3
ml/min, post-captopril 41.3 ml/min and 37.9 ml/min respectively, as well as metanephrine of 168 µg /24 hrs., normetanephrine in 873 µg /24 hrs, total metanephrine of 1041 µg /24 hrs. and vanillylmandelic acid of 4.6 µg /24 hrs.

Based on those findings laparoscopic adrenalectomy was performed.

**SURGICAL TECHNIQUE**

Patient was given general anesthesia and placed in 45° left dorsal decubitus. Pneumoperitoneum at 12 mmHg was created with Veress needle and 10 mm trocar was placed 2 cm above umbilical location at the midclavicular line. A 5 mm trocar was placed in the epigastrium for the liver retractor, a 10 mm trocar was placed at the subcostal plane 2 cm from the midclavicular line and a 5 mm trocar was placed at subcostal plane 2 cm from the anterior axillary line. Once the ports were in position the liver retractor was placed. A suprarenal mass was observed in Morrison’s space.

Kocher maneuver was performed until the duodenum was separated. The retroperitoneum was accessed using harmonic scalpel and Ligasure until the suprarenal vein was identified and clamped with titanium clips at the proximal and distal ends. Then with a minimum of tumor manipulation the suprarenal arteries were located and clamped with titanium staples and cut. The adrenal gland together with surrounding tissue was dissected with harmonic scalpel and completely detached.

A latex bag was used to extract the surgical specimen through the umbilical port. Hemostasis was verified and surgery was concluded with no serious complications. Pheochromocytoma diagnosis was histopathologically corroborated. The patient tolerated oral food ingestion the day after surgery and was released 36 hours later to continue follow-up care as an out-patient.

The patient is currently asymptomatic and her blood pressure is normal.

**CONCLUSIONS**

Laparoscopic adrenalectomy is a safe technique that offers good results in regard to recovery, return to normal daily activities, hospital stay duration and frequency of complications. However, pre- and intraoperative management is very important as well as adherence to the surgical indications of this pathology.

When performed by trained personnel, this technique is the gold standard for treating pheochromocytoma. Long-term studies are needed to monitor tumor recurrence and therefore it is important that these patients continue strict surveillance treatment.

**BIBLIOGRAPHY**