Surgical pathology of the adrenal gland: cases managed at the Dr. Manuel Gea González General Hospital over a period of 20 years


ABSTRACT

Objective: To present 20 years of experience in the surgical management of adrenal pathology at the Urology Service of the Dr. Manuel Gea González General Hospital.

Materials and methods: Case records of patients treated for suprarenal lesions at the urology service from 1988 to 2008 were reviewed. There were a total of nine cases: 1 simple adrenal cyst, 2 myelolipomas, 4 pheochromocytomas, 1 primary adrenal leiomyosarcoma and 1 adrenal adenoma.

Results: The nine cases included 4 men (35-63 year age range) and 5 women (30-65 year age range). There were 7 lesions in the right gland and 2 in the left. Five were functional tumors and 4 were non-functional. Four of the functional tumor cases were chromaffin tumors (pheochromocytomas) and 1 case was adrenal cortex tumor. Of the non-functional tumors 2 cases were incidentalomas (myelolipomas), 1 case was adrenal cyst and one was primary adrenal leiomyosarcoma. Of the nine cases open surgery was performed in 7 of them, one with the thoracoabdominal approach, and laparoscopic surgery was performed in 2 cases. Follow-up time ranged from 3 months to 12 years. No intra- or postoperative mortality was reported.

RESUMEN

Objetivo: Presentar la experiencia de 20 años en el manejo quirúrgico de la patología adrenal en el Servicio de Urología del Hospital General Dr. Manuel Gea González.


Resultados: El protocolo incluyó a cuatro varones (35-63 años) y cinco mujeres (30-65 años). Se identificaron siete lesiones en la glándula derecha y dos en la izquierda. Cinco fueron funcionales y cuatro no funcionales. De los tumores cromafines (feocromocitomas), cuatro casos tuvieron seguimiento (tres meses a 12 años). Una tumoración de la corteza adrenal tuvo seguimiento de cuatro años. Se identificaron dos incidentalomas (mielolipomas), un quiste suprarrenal y un leimiosarcoma adrenal primario. Se practicó una cirugía abierta en ocho pacientes, un caso con abordaje toracoabdominal y dos por vía laparoscópica. El tiempo de seguimiento fue variable, de tres meses a 14 años. No se informó mortalidad transoperatoria o postoperatoria.
Discussion and conclusions: Adrenal pathology incidence is low in the hospital population as can be seen by the fact that there were only 9 cases over a period of 20 years in a public institution providing general consultation. Chromaffin tumor pathology was the most frequent tumor type and histology was varied in the others. Multidisciplinary approach offered adequate management and prognosis.

Key words: adrenal tumor, pheochromocytoma, incidentaloma, adrenal adenoma, myelolipoma, Mexico.

INTRODUCTION
Adrenal tumor incidence is low in the general population, affecting 1 out of every 1.7 million inhabitants. It represents 0.02% of tumors and 0.2% of deaths from cancer. In Mexico in 2003, there were 23 new cases nationally (0.03% of cancers) resulting in a mortality rate of 0.12% of accumulated cases. In 1996 four cases were reported over a period of 8 years at the Dr. Manuel Gea González General Hospital. Clinical manifestations include a variety of physiological and hormonal alterations and some cases are associated with different genetic syndromes. Tumors in asymptomatic patients that have been diagnosed incidentally through imaging studies are called “incidentalomas”. Their frequency is elevated and ranges from 0.3-5% in all patients undergoing abdominal imaging studies. If patients presenting with primary concurrent extra-adrenal malignant lesions, adrenal hemorrhage and inflammatory adrenal lesions such as tuberculosis and mycosis are excluded, true incidentaloma frequency ranges from 0.6-1.4%.1,2

Differential diagnosis of adrenal tumor discovered incidentally in adults includes cortical adenoma, adrenocortical carcinoma, pheochromocytoma, hemorragheor organized fibroma, myelolipoma (well-differentiated tumor produced by adult adipose tissue mixed with hematopoietic elements of the 3 series), adenolipoma and metastasis. In addition to these pathologies, primary hyperaldosteronism and hyperadrenocorticism respond well to elective adrenalectomy.3 The current treatment of choice is laparoscopic surgery when all technological resources are available and the personnel is well-trained in the procedure.4

OBJECTIVE
The objective of this report was to present 20 years of experience in surgical management of adrenal pathology in the Urology Service of the Dr. Manuel Gea González General Hospital.

MATERIALS AND METHODS
Surgical registers and case records of patients from the urology service presenting with adrenal lesions between 1988 and 2008 were identified. Twelve cases were analyzed and 3 of them were excluded due to incomplete case records. Histopathological findings of the remaining 9 cases were registered. Sociodemographic data, clinical presentation, metabolic activity, laboratory and imaging data supporting the diagnosis, surgical treatment technique, complications and follow-up prognosis were all reviewed.

RESULTS
Nine adrenal tumor cases were surgically treated. Four cases were men and 5 were women with an age range of 35-63 years in men and 30-65 years in women.

Seven tumors presented on the right adrenal gland and 2 on the left. According to clinical and metabolic characteristics, cases were subdivided into functioning adrenal tumors (n=5) and nonfunctioning adrenal tumors (n=4).

The functioning adrenal tumors included 4 cases of pheochromocytoma on the right adrenal gland in 2 men and 2 women. The four patients presented with clinically constant high blood pressure that was treatment
refractory to two antihypertensive drugs. Adrenergic crises were constant in 3 patients causing heavy sweating, dizziness and nervousness accompanied with changes in facial coloring. One of the cases was diagnosed as an incidental finding secondary to acute pancreatitis whose only manifestation was refractory high blood pressure. In the four cases metanephrines in urine and vanillylmandelic acid were positive for diagnosis. Meta-iodobenzylguanidine (MIBG) scintiscan done on 2 of them showed adrenal lesion with no chromaffin tissue at extra-adrenal sites. All patients received preoperative medical treatment with alpha and beta blockers and were hydrated before surgery. Open adrenalectomy was performed on 3 of the patients and laparoscopic adrenalectomy was performed on 1 patient. Two patients presented with intraoperative moderate adrenergic crises that were managed with no complications. Tumor size ranged from 4-8 cm with a mean 6.5 cm. Postoperative progress was good in all 4 cases and no malignant behavior presented in any of them. Follow-up time ranged from 3 months to 12 years and there was no mortality.

In addition, a 52-year-old woman with high blood pressure and clinical Cushing’s syndrome presented with adrenal cortex tumor. Functioning hormone profile was done in which cortisol values corroborated diagnosis. Malignancy was suspected due to clinical characteristics and tumor size (9 x 7 cm) and patient underwent laparoscopic left adrenal resection. Histopathological study reported functioning adrenal adenoma that was corroborated immunohistochemically. At four-year postoperative follow-up there have been no metabolic complications.

The four nonfunctioning adrenal tumors included 2 incidentalomas in two men. One man was 59 years old and the other 60 years old. Both diagnoses were made with abdominal ultrasound studies and adrenal mass was corroborated with computed axial tomography (CAT) scan and magnetic resonance imaging (MRI) (Images 1 and 2). The right adrenal gland was affected in both cases. Bosniak III complex cyst was found in the ipsilateral kidney in one of them and the patient underwent exploratory surgery resulting in cystic kidney mass resection and adrenalectomy, reporting a simple kidney cyst and 4 x 4 cm myelolipoma. There were no intraoperative complications and 6-month follow-up was asymptomatic. The second patient underwent open adrenalectomy reporting an 8 x 8 cm myelolipoma with no complications and 12-year asymptomatic follow-up.

A giant abdominal mass was found in a 30-year-old patient. CAT scan revealed a cystic tumor dependent on the right adrenal gland and patient underwent surgery by thoracoabdominal approach with no complications and asymptomatic 12-year follow-up (Image 3).

A 65-year-old female patient presented with primary adrenal leiomyosarcoma who began her illness with medical treatment refractory high blood pressure classified as renovascular hypertension with renal artery stricture of the left kidney. CAT and MRI studies revealed adrenal mass involving the retroperitoneum. Catecholamine and hormonal functioning studies were negative and patient underwent surgery, completely resecting a 5 x 5 cm tumor. However, postoperative histopathological study reported primary adrenal leiomyosarcoma with positive borders. The patient decided against a second surgical procedure and was treated with surveillance. During 3-year postoperative follow-up, patient required endovascular management of the left renal artery due to renovascular hypertension. Treatment was open surgery and there were no complications and no signs of tumor activity.
DISCUSSION

Adrenal gland tumors are not common, their incidence is low and there is a wide variety of histological types and clinical forms of presentation.

Pheochromocytoma is a rare chromaffin cell tumor that commonly arises in the medulla of the adrenal gland. There are an estimated 800 cases in the United States per year. This tumor presents in patients between 30 and 50 years of age. Ten percent of tumors are bilateral and the most common is familial pheochromocytoma that presents in familial syndromes of type 2A and 2B multiple endocrine neoplasia (MEN). In the present report there was a predominance of right adrenal gland tumor regardless of sex and there were no associated alterations. In patients with type 2 MEN syndrome, the risk of developing contralateral tumor after unilateral adrenalectomy is close to 50%. Other syndromes associated with pheochromocytoma are neurofibromatosis, Hippel-Lindau disease, cerebellar hemangioblastoma, Sturge-Weber syndrome and tuberous sclerosis. Extra-adrenal pheochromocytoma or paraganglioma presents in 10-15% of cases and can arise in any extra-adrenal chromaffin tissue and frequently occurs in the sympathetic lymph nodes. Diagnosis is made by determining free catecholamines (norepinephrine and epinephrine) or metabolic catecholamines (vanillylmandelic acid and total metanephrines) in urine at 24 hours. Catecholamines in plasma may also have a diagnostic role, but their sensitivity and specificity are limited. Initial studies should include chest X-ray and abdominal CAT scan. MIBG scintiscan is useful for localizing the tumor and ruling out chromaffin tissue in other extra-adrenal sites. Indicated treatment is surgical carrying out preoperative conditioning with adrenergic alpha blockade (phentolamine, prazosin, terazosin, doxazosin, phenoxybenzamine) to control arterial blood pressure and expand extracellular volume in order to reduce any possible pressure variations or arrhythmias during anesthesia application or surgery. This treatment should be applied 2 or 3 weeks prior to surgery. After surgery, beta blockers may be indicated (propranolol, metoprolol, atenolol, esmolol) or an alpha blocker and labetalol-type beta adrenergic agent. The patients in the present report began treatment 2 and 3 weeks prior to surgery, with adequate response in 2 cases and moderate intraoperative adrenergic crises with no posterior consequences in the other 2 cases.

Primary tumors in the adrenal mesenchyme may be benign, as in the case of cavernous hemangioma, capillary hemangioblastoma, cerebellar hemangioblastoma, Sturge-Weber syndrome and tuberous sclerosis. Extra-adrenal pheochromocytoma or paraganglioma presents in 10-15% of cases and can arise in any extra-adrenal chromaffin tissue and frequently occurs in the sympathetic lymph nodes. Diagnosis is made by determining free catecholamines (norepinephrine and epinephrine) or metabolic catecholamines (vanillylmandelic acid and total metanephrines) in urine at 24 hours. Catecholamines in plasma may also have a diagnostic role, but their sensitivity and specificity are limited. Initial studies should include chest X-ray and abdominal CAT scan. MIBG scintiscan is useful for localizing the tumor and ruling out chromaffin tissue in other extra-adrenal sites. Indicated treatment is surgical carrying out preoperative conditioning with adrenergic alpha blockade (phentolamine, prazosin, terazosin, doxazosin, phenoxybenzamine) to control arterial blood pressure and expand extracellular volume in order to reduce any possible pressure variations or arrhythmias during anesthesia application or surgery. This treatment should be applied 2 or 3 weeks prior to surgery. After surgery, beta blockers may be indicated (propranolol, metoprolol, atenolol, esmolol) or an alpha blocker and labetalol-type beta adrenergic agent. The patients in the present report began treatment 2 and 3 weeks prior to surgery, with adequate response in 2 cases and moderate intraoperative adrenergic crises with no posterior consequences in the other 2 cases.

Primary tumors in the adrenal mesenchyme may be benign, as in the case of cavernous hemangioma, capillary hemangioblastoma, cerebellar hemangioblastoma, Sturge-Weber syndrome and tuberous sclerosis. Adrenal cysts are uncommon pathologies found only in a few case reports and series reviews. They tend to remain asymptomatic until their growth begins.
to produce symptoms. The most common clinical manifestation is abdominal pain. Size varies at the time of diagnosis and treatment is open or laparoscopic surgery. Cysts are generally from 5–10 cm in size, with a mean size of 9.6 cm. However, cysts larger than 50 cm have been reported. The size of the cyst in the present case was 20 cm and required thoracoabdominal approach. Cysts are unilateral in 80% of cases and only 7% are malignant or potentially malignant and 0.2% are metastatic in origin.

Adrenal myelolipoma is a rare, benign, hormonally inactive tumor made up of mature adipose tissue and hematopoietic tissue simulating bone medulla. It is usually asymptomatic and diagnosis tends to be incidental. It represents 11% of adrenal tumors and is commonly treated by means of open or laparoscopic surgery. Some cases have presented with spontaneous rupture causing severe hemorrhage, high blood pressure and nephroangiosclerosis. The cases presented here are lesions that were found incidentally and were surgically resolved with no complications.

### CONCLUSIONS

Adrenal pathology incidence is low in the patient population attended to by the authors, as demonstrated by 9 cases over a period of 20 years in a public general consultation institution. This incidence corroborates the fact that diagnosis has a low initial suspicion rate and disease is often discovered incidentally. Adrenal pathology is not exclusively managed by the urologist and cases are usually treated in general surgery and endocrine surgery services, making large series of cases difficult to find. Chromaffin tumor is the most frequent tumor type in the authors’ institution, but nevertheless the number of cases is low. The other tumor types are histologically varied and their progression usually leads to diagnosis. A multidisciplinary approach is necessary in order to offer adequate diagnosis, management and long-term prognosis. The urologist should be familiar with this type of disease and with current surgical techniques so that cases may be adequately resolved.

### BIBLIOGRAPHY