



Laparoscopic management of giant adrenal cyst: a case report

Carlos Armando Navarro Castañeda¹^, Jorge Adrian Romero Sanchez¹^,
Carlos Emiliano Garcia Cordova¹^, Jorge Farell Rivas¹^, Gustavo Torres Iparrea²^,
Hortencia Yanet Valdez Mendieta²

¹Department of Surgery, Hospital Central Sur de Alta Especialidad, PEMEX, Mexico City, Mexico; ²Department of Pathology, Hospital Central Sur de Alta Especialidad, PEMEX, Mexico City, Mexico

Contributions: (I) Conception and design: CA Navarro Castañeda, JA Romero Sanchez, J Farell Rivas; (II) Administrative support: J Farell Rivas; (III) Provision of study materials or patients: J Farell Rivas; (IV) Collection and assembly of data: CE Garcia Cordova, CA Navarro Castañeda; (V) Data analysis and interpretation: CE Garcia Cordova, CA Navarro Castañeda, G Torres Iparrea, HY Valdez Mendieta; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Carlos Armando Navarro Castañeda, MD. Department of Surgery, Hospital Central Sur de Alta Especialidad, PEMEX, Anillo Periferico. #4091, Fuentes del Pedregal, Tlalpan, 14140 Mexico City, Mexico. Email: carlos.a.navarro.castaneda@gmail.com.

Background: Giant adrenal cysts represent a rare clinical condition. They are usually diagnosed incidentally. The treatment depends on the size, the associated symptoms, and whether it is a functional tumor or not. They are classified in order of frequency as vascular, pseudocyst, epithelial, and parasitic cysts.

Case Description: The case report describes a 47-year-old Mexican woman patient who presented to our department with nonspecific symptoms of discomfort and pain in the lumbar region. Preoperative studies were conducted, and laboratory results were within normal parameters. Abdominal ultrasonography showed a giant cyst in the left upper quadrant. Further evaluation with intravenous contrast-enhanced abdominal computed tomography confirmed the presence of a cystic mass originating from the adrenal gland, displacing the spleen, stomach, pancreas, and left kidney. A laparoscopic approach was chosen, and the cyst was carefully dissected from the surrounding structures using precise surgical maneuvers, and the origin of the left adrenal gland was confirmed. Follow-up at 3 weeks showed a favorable recovery, and the patient was discharged without complications.

Conclusions: Adrenal cysts should be included in the differential diagnosis of cystic abdominal masses. Laparoscopic surgery is feasible in the hands of experienced surgeons.

Keywords: Adrenal gland diseases; cyst; laparoscopy; case report

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Introduction

Background

The first adrenal cyst was described in 1670 (1). Adrenal cyst are rare lesions that normally are incidentally discovered on imaging examinations for another cause with very low prevalence <1% among all adrenal lesions.

Rationale and knowledge gap

Adrenal cysts often remain asymptomatic or with nonspecific symptoms, which contributes to the underdiagnosis of these lesions. Most cases are incidentally diagnosed (88%), with an average size of 48 mm upon diagnosis (2). Currently, there is no consensus regarding the

^ ORCID: Carlos Armando Navarro Castañeda, 0000-0003-2068-4430; Jorge Adrian Romero Sanchez, 0000-0002-3557-2186; Carlos Emiliano Garcia Cordova, 0000-0002-2092-0862; Jorge Farell Rivas, 0000-0002-3369-565X; Gustavo Torres Iparrea, 0000-0003-3787-5049.

management of such lesions due to their rarity.

Objective

The purpose of this case is to review the management and surgical approach of giant adrenal cyst. We present this case in accordance with the CARE reporting checklist (available at <https://ls.amegroups.com/article/view/10.21037/ls-23-12/rc>).

Case presentation

A 47-year-old female patient from Campeche, Mexico, is presented to the general surgery service. The patient denies allergies, tobacco, and alcohol consumption, with a surgical history of open cholecystectomy and lateral internal sphincterotomy.

In May 2021, she started with moderate and persistent pain in the left lumbar region, so an ultrasound was performed, which reported a left adrenal tumor. She was transfer to a tertiary health care center.

Physical exploration

The patient presented with vital signs within normal range, with a body mass index of 33.7 kg/m² (Grade I obesity). Abdomen with a palpable tumor on the left flank of approximately 10 cm × 10 cm, poorly defined borders, fixed to deep planes, with pain on palpation 4/10 on the Visual Analogue Scale of pain. Laboratory test with

leukocytes of 4.07×10³/L [reference value (4.6–10.4)×10³/L], creatinine 0.74 mg/dL (reference value 0.50–1.20 mg/dL), dehydroepiandrosterone 73.7 mcg/dL (reference value 19–231 mcg/dL), serum metanephrines 134.6 pg/mL (reference value 33–190 pg/mL), morning cortisol 11.1 mcg/dL (reference value 3.7–19.4 mcg/dL), evening cortisol 3.35 mcg/dL (reference value 2.9–17.3 mcg/dL), testosterone 0.20 ng/mL (reference value 0.20–0.81 ng/mL). Serum electrolytes and coagulation times within normal parameters.

Abdominal computed tomography (CT) scan with intravenous contrast was performed, which reported a single and simple cystic lesion dependent on the left adrenal gland with thin walls, homogeneous, with a density of 11 Hounsfield units, measuring 152 mm × 145 mm × 122 mm, which generated extrinsic compression to adjacent structures (*Figure 1*).

Endocrinologic assessment ruled out a functional tumor—adrenal mass.

Preoperative evaluation by Internal Medicine and anesthesiology with Goldman risk index class I and American Society of Anesthesiologists score class II.

Surgical procedure

Prophylactic antibiotic according to local guidelines. With the patient under balanced general anesthesia, in a right lateral decubitus position, a 12-mm left paraumbilical trocar was placed. Under direct vision, three 5-mm trocars are placed, two in the left flank and one in the left subcostal region (*Video 1, Figure 2*). A Mattox maneuver was performed from the rectosigmoid junction to the splenic flexure, with bipolar energy (*Figure 3*), exposing the 15 cm × 14 cm × 11 cm adrenal cyst firmly adherent to the left adrenal gland. Adhesions were released from the cyst to the abdominal wall, ipsilateral kidney, tail of the pancreas, stomach, and spleen. Control of the adrenal vein was performed with metallic clips and control of the adrenal artery with bipolar energy (*Figure 4*). Before extraction, the cyst is drained obtaining approximately 1,200 mL of a viscous yellow liquid. The piece is removed in a bag through the paraumbilical 12 mm trocar. The procedure was performed under 245 minutes with bleeding of 30 mL.

Postoperative evolution and follow-up

Multimodal analgesia and antibiotic prophylaxis were continued for 24 hours after surgery. She tolerated orally with liquids 4 hours after surgery and progressed to a soft

Highlight box

Key findings

- A case of a patient with a giant adrenal cyst is reported, along with a detailed description of the laparoscopic management of the cyst. A video showcasing the technique employed is included. The patient exhibited a satisfactory evolution without complications.

What is known and what is new?

- Adrenal cysts are rare pathological entities (<1% of all adrenal lesions). The average size of adrenal cysts reported in the literature is 5 cm. There is no consensus regarding the treatment of such cysts.
- In patients with giant adrenal cysts (>10 cm), a proper diagnostic and therapeutic approach can lead to its resolution through Minimally Invasive Surgery.

What is the implication, and what should change now?

- Adrenal cysts larger than 10 cm can be safely resected through laparoscopic surgery for the patient's benefit.



Figure 1 Simple phase abdominal tomography, coronal section, showing left adrenal cyst (indicated with white asterisk) with homogeneous content, with thin and regular walls, without calcifications inside. There is evidence of displacement of spleen (indicated with black star), stomach (white star), pancreas (white triangle), and left kidney (black triangle).

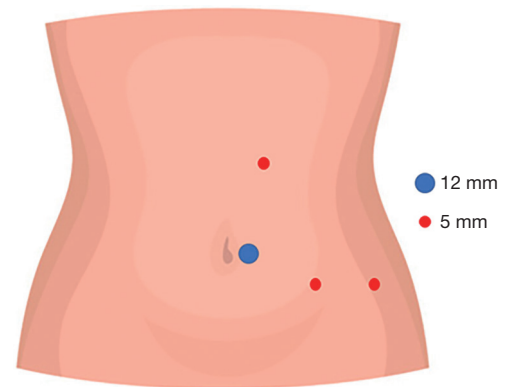


Figure 2 Trocar placement.

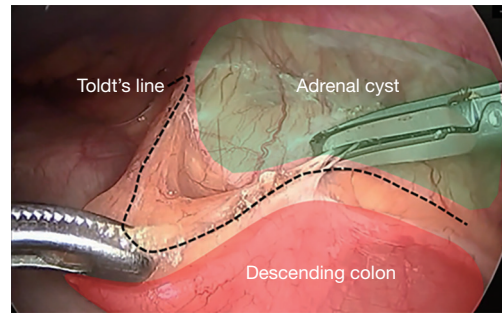
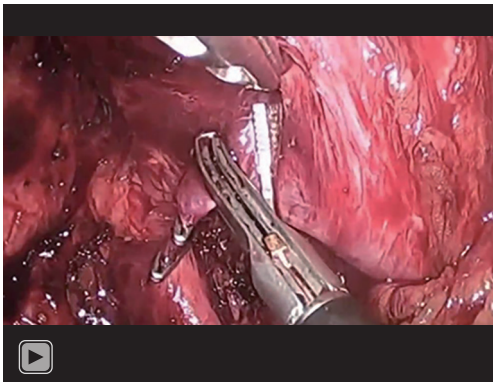


Figure 3 Mattox maneuver: release of the descending colon for its medialization by cutting Toldt's line, exposing the adrenal cyst.



Video 1 Surgical technique.

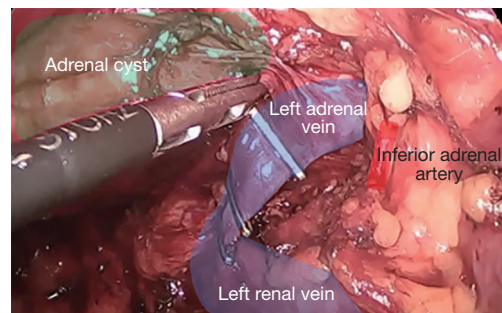


Figure 4 Vascular control. Blue: clipped left adrenal vein and left renal vein; red: inferior adrenal artery; green: mobilized adrenal cyst.

diet the next day. The patient was discharged 24 hours after the procedure with a double non-steroidal anti-inflammatory drug (NSAID). A follow up visit was scheduled at 7 and 21 days postoperative, without any complaints.

Histopathology

Pseudocyst wall with chronic reparative process and fibrosis, dystrophic calcification, and adrenal gland without significant histological alterations are reported. The cyst

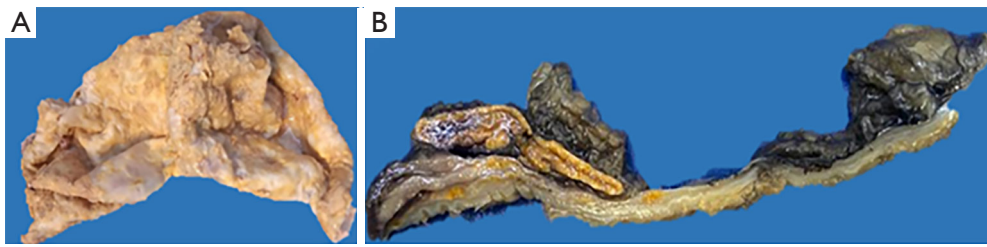


Figure 5 Macroscopic images of the adrenal cyst and the adrenal gland. (A) Gross image of adrenalectomy showing a capsule fixed on 10% formaldehyde with irregular surface containing 10 mL of yellowish liquid. (B) Cut surface shows the adrenal gland in close relation next to the cyst capsule.

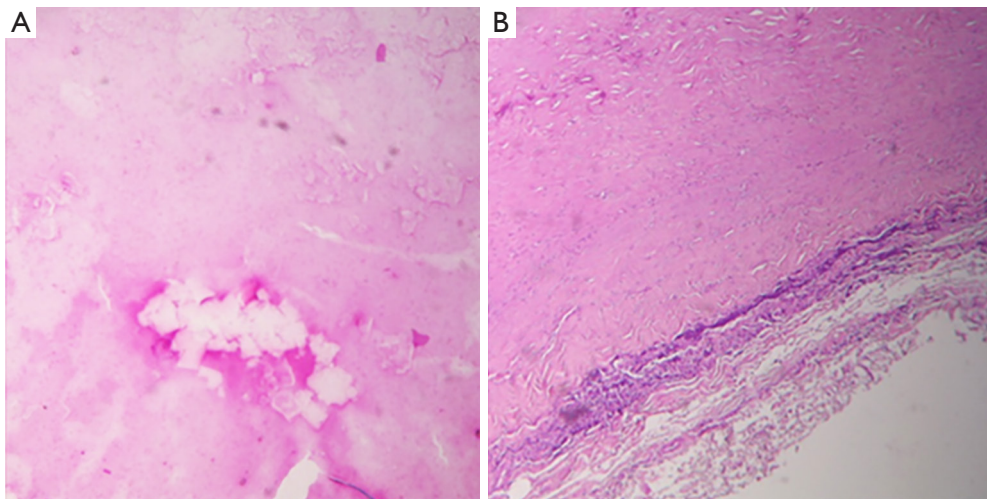


Figure 6 Microscopic images of the adrenal cyst and its contents. (A) Cytologic smear of cyst content with an acellular proteinaceous appearance (hematoxylin and eosin; 40 \times). (B) Image shows fibro collagenous cyst wall with no epithelial lining (hematoxylin and eosin; 40 \times).

contained a yellowish fluid corresponding to an acellular proteinaceous liquid. Histopathological images appear in *Figures 5,6*.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Discussion

Key findings

Adrenal cysts represent a rare disease, with a reported incidence of 0.06–0.18%. Generally, these cysts present

in the fourth/fifth decades of life (3-5). The clinical presentation can vary from being asymptomatic, subclinical symptoms or presenting complications such as bleeding, infection, or rupture. In the case of giant cysts (>10 cm), vague symptoms may occur due to mass effect towards neighboring organs (6).

Benign adrenal cysts are classified into four categories: vascular (45%), pseudocysts (39%), epithelial (9%), and parasitic (7%). Furthermore, adrenal cysts can be classified as functioning and non-functioning (3,7,8).

The differential diagnosis of retroperitoneal cysts may include lesions of neoplastic origin such as cystic lymphangioma, mucinous cystadenoma, cystic teratoma, cystic mesothelioma, Müllerian cyst, epidermoid cyst, bronchogenic cyst, cystic change in solid neoplasms, pseudomyxoma retroperitoneal and lesions of non-neoplastic origin such as pancreatic pseudocyst, non-

pancreatic pseudocyst, lymphocele, urinoma, hematoma (5). Adrenal hydatid cysts are infrequent (<1% of echinococcosis cases) and typically exhibit distinctive features on computed tomography, such as simple cysts with a double wall, multilocular cysts, the presence of the daughter cyst sign, calcifications in septa or capsule, and membrane detachment (9,10). The case presented did not show any past medical history or clinical manifestations, nor did the imaging data indicate any evidence suggestive of an *Echinococcus granulosus* infection.

CT scan is the study of choice for the approach to adrenal masses with a sensitivity of 85–95%. The characteristic findings of adrenal cysts are thin non-enhancing walls and fluid density content; higher density within the cyst suggests a complication such as hemorrhage (11).

The treatment depends on whether it is functional or not, the size and the symptoms. Therefore, the work-up should include: 24-h urinary metanephrines [or vanillylmandelic acid (VMA)], 17-hydroxycorticosteroids and 17-ketosteroids measurements. The low-dose dexamethasone test can evaluate the suppression rate of urinary steroids (11). The measurement of the aldosterone/renin ratio is warranted solely in patients exhibiting associated hypertension and/or hypokalemia; hence, there was no necessity to perform this assessment in the present case (12-14).

Indicators pointing towards a malignant adrenal tumor encompass age younger than 40 years, rapid symptom development, excessive production of adrenocortical hormones, and tomographic findings suggestive of malignancy (density >10–21 HU, heterogeneous appearance, size >4 cm) (15,16). In contrast, the patient under examination exhibited no abnormalities in adrenal hormones, and while the tumor size exceeded 4 cm, all other clinical, biochemical, and imaging characteristics pointed towards a benign tumor. When malignancy is suspected (which occurs in 7% of cases and it is the second most aggressive endocrine malignant disease after anaplastic thyroid carcinoma) the recommendation is to perform a surgical exploration (8). Other indications for surgery include cysts >4 cm, functional, parasitic, complicated cysts and those who present symptoms (11).

In cases of patients with adrenal tumors exhibiting borderline features on imaging studies, functional imaging modalities like single photon emission tomography or positron emission tomography can be employed to assess laterality (unilateral or bilateral tumors) in functioning masses, as well as to differentiate between benign nodules and malignant adrenal disease in non-functioning

tumors (17).

Although minimally invasive adrenalectomy serves as the gold standard for managing most benign adrenal lesions, particularly tumors with a diameter of up to 6 cm, the definitive approach should be selected based on diagnostic suspicion, cyst characteristics, and the surgeon's experience. In instances where malignancy is suspected, open surgery represents the standard treatment, although tumors smaller than 6 cm lacking evidence of local invasion can be effectively resected laparoscopically, provided the procedure is performed by an experienced surgeon in this field (15). In the case of hydatid cysts, both laparoscopic and open surgical methods can be considered, with careful consideration of the risk of cyst rupture and the potential consequences of anaphylactic shock and cyst dissemination. In situations where surgical intervention is not feasible, the PAIR method (Puncture, Aspiration, Injection, and Re-aspiration) can be regarded as an alternative option (18). This technique entails image-guided puncture and aspiration of the cyst, followed by irrigation with a hypertonic solution or alcohol, and re-aspiration of the cyst's contents.

Strengths and limitations

The laparoscopic approach provides reduced surgical trauma, shorter recovery time, and improved aesthetic outcomes. Decreasing surgical trauma facilitates an early return to daily activities. The disadvantage of the minimally invasive approach in giant cysts is associated with the reduction of available space in the abdominal cavity due to the mass effect. This can be corrected through proper patient positioning and the appropriate distribution of trocars, enabling adequate manipulation of the cyst.

Comparison with similar researches

Therapeutic modalities available are open surgery with cyst enucleation (recommended for cysts densely adherent to adjacent organs), open surgery with *en bloc* adrenalectomy with cyst resection in cases of malignancy, or laparoscopic surgery with cyst decortication and partial or total adrenalectomy.

Robot-assisted approaches present a potential alternative for the management of adrenal cysts. Comparable outcomes have been documented when comparing laparoscopic adrenalectomy with robot-assisted adrenalectomy in terms of postoperative hospitalization, intraoperative complications, postoperative complications within 30 days,

and cost-effectiveness. Substantial benefits have been noted in high-volume medical centers, specifically among patients with functional tumors and/or those presenting tumors larger than 6 cm (19,20).

Laparoscopic partial adrenalectomy stands as the preferred procedure for the resection of adrenal cysts, since the adrenal gland is preserved (7,11). Nevertheless, a considerable number of giant adrenal cyst cases continue to be managed through open surgical procedures, even in specialized referral centers (4-6,8,11). The presented case exemplifies the viability of employing a laparoscopic approach for managing such lesions, complemented by a visual elucidation of the procedure.

Explanations of findings

In this patient, the dimensions of the cyst caused displacement of intra-abdominal organs. The appropriate positioning of the patient and working ports allowed for adequate exposure of the cyst boundaries. The lateral decubitus position provided gravitational traction, facilitating the exposure of dissection planes, and separating the organs adhered to the cyst. Once the lesion was dissected, controlled aspiration of its contents allowed for proper extraction without the need for additional incisions. The patient's prompt and satisfactory recovery is attributed to the utilization of a minimally invasive approach, which avoided the need for a large incision that would have been necessary for adequate cyst exposure in an open surgery.

Implications and actions needed

The description of cases involving successfully treated giant adrenal cysts using minimally invasive surgery promotes the application of this approach in these patients. The necessity for conducting studies that compare the outcomes of open and laparoscopic approaches is evident. However, conducting such studies is challenging due to the limited number of patients with this disease.

Conclusions

Adrenal cysts are uncommon lesions, with giant adrenal cysts being even rarer. Despite the most reported cases of giant adrenal cysts have been treated using open approaches, the appropriate diagnostic and therapeutic approach render laparoscopic resection safe and effective in these patients.

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Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at <https://ls.amegroups.com/article/view/10.21037/ls-23-12/rc>

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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