CLINICAL CASE

Bulky kidney tumor management: a case report


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KEYWORDS
Kidney tumor; Bulky; Treatment; Radical nephrectomy

Abstract
The incidence of bulky kidney tumors has decreased thanks to the widespread use of radiographic studies that enable early diagnosis and treatment. However, there are still cases of giant tumors that are true surgical challenges.

A 47-year-old woman presented with right hemi-abdominal pain 3 years prior, along with increased abdominal circumference, fever, and poor general status. Tomography scan revealed a right kidney tumor (30×19×15 cm) occupying 80% of the abdominal cavity. Radical nephrectomy was performed at the midline with blood loss of 1,800 cc. The patient progressed favorably and was released 48 h after the procedure. The histopathologic study reported a stage III chromophobe carcinoma (pT3a) that measured 31×19×13 cm and weighed 4,630 g. There was successful oncologic control at 6 months.

Large-volume kidney tumors are advanced stage lesions associated with poor outcome. Preoperative embolization plays an important role in reducing intraoperative blood loss. If the tumor is considered resectable, the open approach is preferred over the laparoscopic one. Flank approaches (subcostal, supracostal, or transcostal), thoracoabdominal, lumbotomy, or anterior approaches (subcostal, Chevron, midline or paramedian) have been described. The best approach should match the anatomy of the patient and the characteristics of the tumor.

Bulky renal masses are a surgical challenge. Therapeutic success depends on adequate perioperative evaluation of the patient and the tumor, establishing the ideal approach.

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Introducción

Los tumores renales voluminosos han disminuido su incidencia por la difusión de estudios radiológicos que permiten un diagnóstico y tratamiento temprano, sin embargo, persisten casos de tumores gigantes que representan verdaderos retos quirúrgicos. Mujer de 47 años, inició 3 años previos con dolor en hemiabdomen derecho y aumento del perímetro abdominal, fiebre y ataque al estado general. Tomografía: tumor renal derecho (30×19×15 cm) que ocupa el 80% de la cavidad abdominal. Se realizó nefrectomía radical por línea media, sangrado de 1,800 cc y evolución favorable, egresando a las 48 h. Reporte histopatológico: carcinoma cromófobo (pT3a) de 31×19×13 cm, peso de 4,630 g, estadio III, sin actividad tumoral a los 6 meses. Los tumores renales voluminosos representan fases avanzadas, asociándose a mal pronóstico. La embolización prequirúrgica tiene un papel importante al disminuir el sangrado transoperatorio. Si se considera tumor resecable, se prefiere el abordaje abierto sobre el laparoscópico. Se han descrito abordajes por flanco (subcostal, supracostal o transcostal), toracoabdominales, lumbotomía o anteriores (subcostal, Chevron, medios o paramedios). El mejor abordaje debe ajustarse a la anatomía del paciente y las características del tumor. Las masas renales voluminosas constituyen un reta quirúrgico. El éxito terapéutico consiste en la adecuada evaluación perioperatoria del paciente y el tumor, estableciendo el abordaje idóneo.

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Introduction

Bulky kidney tumors are defined as those larger than 7 cm at their greatest diameter and that affect the venous system. Kidney cancer represents from 2-3% of all cancers and its greatest incidence is in the western countries. There is a generalized increase in incidence worldwide. With the technological advances made, minimally invasive approaches have earned an increasingly significant role, especially with small tumors. However, open radical nephrectomy continues to be a cornerstone of kidney tumor treatment, particularly for the largest lesions. Traditionally, kidney tumors with a diameter larger than 7 cm are considered bulky tumors (T2), but these tumors can progress to considerably larger sizes, representing a real challenge, even for the most experienced surgeon.

Case presentation

A 47-year old woman came to the emergency department with symptoms of generalized colicky persistent abdominal pain associated with occasional nausea and vomiting. She complained of the associated symptoms of asthenia, adynamia, increased abdominal circumference, and an approximate 10 kg weight loss in the last 3 years. She said she did not smoke and had no previous surgeries or other important history, such as urinary symptoms.

Physical examination revealed a patient with an ectomorphic constitution, with data of chronic fatigue and consumptive syndrome, but with good functional status. Her abdomen appeared bloated due to a fixed mass that moved very little and was adhered to the deep planes (fig. 1). The physical examination showed no pelvic member edema or other data of inferior vena cava compression.

As part of the diagnostic protocol for all abdominal masses, a contrast-enhanced abdominal tomography scan was ordered that identified a tumor dependent on the lower pole of the right kidney that measured approximately 30 x 19 x 15 cm and occupied more than 80% of the abdominal cavity. The tumor surpassed the midline, compressing and displacing the colon, pancreas, stomach, liver, small bowel,
bladder, and other abdominal viscera (fig. 2). The non-contrasted phase of the tomography scan verified multiple heterogeneous zones in relation to calcifications with areas of necrosis and bleeding. After contrast medium administration, the lesion was enhanced by 25 to 86 Hounsfield units from the non-contrasted phase to the venous phase.

Extension studies were carried out to define the clinical stage of the disease. Among the most relevant results were hemoglobin of 9.4 mg/dl, platelets of 453,000, glucose of 110 mg/dl, creatinine of 0.75 mg/dl, and normal coagulation times, serum electrolytes, and liver function tests, with the exception of lactate dehydrogenase that was 602. The diagnostic approach was completed with a chest x-ray that showed no evidence of tumor activity, clinically staging the tumor as cT2bN0M0.

After completing the preoperative studies, the best surgical approach was planned. Preoperative embolization was proposed to the patient and her family, but they could not afford it.

The decision was finally made for the patient to undergo right open radical nephrectomy with the open anterior approach along the supra and infraumbilical midline. A right kidney tumor of approximately 30 x 20 cm was observed with multiple neoformation vessels on its surface. There was no apparent macroscopic invasion to the adjacent structures (fig. 3).

The surgical procedure was finished with no remarkable injuries or incidents. Surgery duration was 115 min, with intraoperative blood loss of 1,800 ml that required 4 blood transfusions. An open Penrose drain was left at the surgical site with continuous monitoring. The patient tolerated an oral liquid diet the first 12 h and solid food at 24 h after surgery.

Pulmonary physiotherapy and early mobilization were insisted upon. The patient had satisfactory progression and was released to her home 72 h after surgery with no drain.

The histopathology report on the surgical specimen indicated a macroscopic specimen that measured 31 x 19 x 13 cm and weighed 4,630 g (fig. 4). The tumor measured 29 cm at its largest diameter.

**Figure 2.** Contrast-enhanced tomography scan of the abdomen. A) Axial view showing the tumor diameter. B) Coronal view showing retroperitoneal structure displacement. C) Sagittal view showing the tumor occupying the entire right anteroposterior space.

**Figure 3** Initial visualization and mobilization of the tumor.

**Figure 4** Macroscopic specimen and longitudinal sectioning after being fixed in formaldehyde.

Microscopic observation showed multiple neoplastic cells with loss of the nucleus-cytoplasm relationship. Additional findings were lymphovascular and renal sinus invasion, resulting in a pathologic stage of pT3aN0M0, clinical stage III, considered locally advanced disease.
Photomicrography with hematoxylin and eosin stain revealed a neoplastic lesion with clear foamy cytoplasm and hyperchromatic nuclei. Hale's colloidal iron stain showed variable diffuse cytoplasmic expression.

At the 6th month of oncologic follow-up, the patient was asymptomatic with no data of recurrence or tumor persistence in the follow-up studies. She showed clinical improvement in her general state of health and had weight gain.

**Discussion**

With the advent of high-quality imaging studies such as helical computerized tomography and magnetic resonance, and their wide availability for studying the numerous abdominal pathologies, early diagnosis has been possible, as well as the incidental diagnosis of renal tumors in early clinical stages before they become symptomatic. Nevertheless, even though kidney cancers are increasingly diagnosed in their incipient stages, there are still cases of renal tumors of long progression, very large tumors, or more clinically advanced tumors, especially in underdeveloped communities.

Currently, 30% of the patients with kidney cancer have locally advanced disease at the time of diagnosis. In those patients, tumor size has been widely correlated as a negative outcome factor when the tumor is > 8 cm, with a 3.65-times higher relation to cancer-specific death than tumors smaller than 8 cm (p < 0.001).

Beyond the surgical challenge involved in the approach to bulky tumors, their integrated and multidisciplinary evaluation and preoperative planning is essential. Because surgical treatment is the only option that has curative possibilities for renal cell carcinoma, sometimes extended operations with en-bloc resection of adjacent organs is indicated.

Preoperative kidney tumor embolization has been described as a useful procedure, especially in advanced disease stages. However, it could play an important role as neoadjuvant treatment prior to surgery. Since its introduction at the beginning of the 1970s, renal artery embolization has been employed for the palliative treatment of inoperable tumors, bleeding control, and as part of the multimodal treatment of metastatic disease.

Renal artery embolization is a procedure carried out through interventionist radiology in which the blood flow can be reduced or completely eliminated for the purpose of facilitating the surgical approach. Preoperative embolization makes dissection easier and reduces intraoperative blood loss. In addition, there is evidence suggesting that preoperative embolization is associated with improvement in the ranges of mortality. In a case-control study, preoperative embolization of the renal artery associated with radical nephrectomy was related to improved survival when compared with nephrectomy alone. And compared with the controls, the preoperative renal artery embolization group had a better overall 5-year survival rate (62% versus 35%, p = 0.01%) and 10-year survival rate (47% versus 23%, p = 0.01%). However, further studies are needed to strengthen this evidence.

Renal embolization has been described in numerous kidney tumors, particularly in angiomyolipomas, and its use for treatment of neoplastic disease, especially in nephron-sparing surgery, palliative treatment, and bulky renal tumors, is extremely useful. Other proposed embolization benefits include arterialized tumor thrombus retraction (when present), facilitating its surgical extirpation, as well as reducing the blood flow (especially in large arteriovenous malformations that have a negative hemodynamic impact), facilitating dissection due to tissue plane edema, making it possible to ligate the renal vein before the artery during nephrectomy, and modulating the immune response. In regard to the latter, there is no conclusive evidence that embolization has immunologic benefits, but it is possible that the angio-infarct stimulates the immune response mediated by cytokines, producing changes in the natural killer (NK) lymphocytes. Cases of metastatic regression after renal tumor angio-embolization have been reported.

The post-infarct syndrome is characterized by lumbar pain, nausea, and fever, and presents in 75% of the patients. Other complications are incomplete embolization, migration of the embolization material, and inguinal hematoma, and they occur in less than 5% of the patients.

Despite highly suggestive evidence of its usefulness, few surgeons employ routine preoperative angio-embolization, but it is recommended for large, hypervascular tumors or those with thrombus. The ideal time for radical nephrectomy after angio-infarct has not been established, but it is not recommended after the first 4 weeks.

The best approach for radical nephrectomy should be one of the primary aims of the preoperative protocol. Surgical management of bulky renal tumors is quite varied and ranges from the classic open approaches to the minimally invasive techniques. Open kidney surgery is safe and effective and enables excellent kidney exposure and optimum oncologic control and thus continues to be the criterion standard for bulky renal tumor management. The proximity of the kidney to the pancreas, liver, duodenum, spleen, etc., makes them potential sources of complications and impediments to adequate exposure. The surgeon must perform a planned out procedure, reducing the risk for injury to the surrounding structures and enabling the definitive treatment of intraoperative complications, such as vascular injury.

The ideal surgical approach is the one that not only is adapted to the planned-out operation, but also to the anatomy defined by the preoperative imaging studies, the patient’s past surgical history, body habitus, and limiting factors such as kyphoscoliosis or lung disease. There are several approaches to the kidney and the best are described in table 1.

Surgical conduct for radical nephrectomy is determined by tumor size and location, as well as the body habitus of the patient. As mentioned above, there is a prognostic correlation between tumor size and final disease outcome. Likewise, the largest bulky renal tumors have been shown to be clear cell tumors, representing more than 80% of the tumors larger than 7 cm.

**Conclusions**

Despite ever-increasing early tumor diagnosis thanks to the available imaging techniques, there are still cases of large renal tumors that represent a great challenge for the
surgeon. Preoperative embolization should be considered as a neoadjuvant therapeutic option that facilitates dissection during surgery, reducing intraoperative blood loss. The ideal approach should be individualized in accordance with the anatomic factors of the patient and the tumor and any special conditions. There is a correlation between large tumor size, histopathologic strain, and aggressive disease prognosis. Open surgical treatment continues to be the criterion standard in bulky renal tumor management.

**Ethical responsibilities**

**Protection of persons and animals.** The authors declare that the procedures followed conformed to the ethical standards of the responsible committee on human experimentation and were in accordance with the World Medical Association and the Declaration of Helsinki.

**Data confidentiality.** The authors declare that they have followed the protocols of their work center in relation to the publication of patient data.

**Right to privacy and informed consent.** The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the corresponding author.

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**Conflict of interest**

The authors declare that there is no conflict of interest.

**References**


**Table 1** Types of surgical approaches to the kidney.

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<th>Surgical approaches to the kidney</th>
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<th>Subcostal</th>
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