

Surgical Treatment for Renal Cell Carcinoma

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Despite recent advances in chemotherapy, radiation therapy and immunology, renal cell carcinoma can best be treated by early detection and radical surgery. Today, radical nephrectomy is the standard surgery of choice for removing malignant renal tumors. Of the surgical procedures that have been used in the past, the transabdominal incision offers the best exposure of retroperitoneal structures at the diaphragmatic level and the contralateral renal vasculature. Occasionally, supradical procedures are recommended if tumor size and location require this approach.

History

In spite of recent advances in chemotherapy, radiation therapy and immunology, surgery offers the only effective treatment for renal cell carcinoma known today. Historically, a little over 100 years have lapsed since Gustav Simon in 1869 performed the first planned nephrectomy for a persistent ureteral fistula.¹⁻³ One year later, in the United States, John Gilmore successfully removed an atrophic pyelonephritic kidney. Most early nephrectomies were performed through the flank, since resultant peritonitis made the transperitoneal approach uniformly fatal. As surgical skill increased, the flank nephrectomy was accepted as the operation of choice for any renal pathology. It was not until the advent of broad spectrum antibiotics in the 1940s and 1950s that transabdominal surgery became an accepted, and eventually the preferred method for removing malignant renal tumors.

In 1963 Robson⁴ in his classic series employed three techniques that have become the standard for renal cancer surgery: 1) early control of the vascular pedicle to minimize chances of tumor microemboli, 2) removal of the kidney within an intact Gerota's fascia to decrease the chances of local tumor seeding, and 3) removal of the lymphatic drainage system.⁴ Before this standard form of radical nephrectomy, the best survival statistics were 56% for three years and 48% for five years. Robson's series of 88 patients revealed a three-year survival of 88% and five-year survival of 66%, for stage I and II disease, statistics which are generally accepted today.⁴

The Department of Urology at Henry Ford Hospital has compiled a series of 113 patients operated on for renal carcinoma between 1968 and 1978. While precise survival statistics for this group of patients are not yet available, preliminary evaluation of those with stage I and II disease indicates three-year and five-year survival statistics of 71% and 60%, respectively, figures which compare favorably to those of Robson and other authors.

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Evaluation

Preoperative evaluation of renal mass lesions enables the urologic surgeon to plan radical cancer operations with great accuracy. Exploratory flank incisions are no longer necessary, nor are the resultant operative morbidity, tumor spread, and possible adjacent tissue injury. Following intravenous pyelogram, questionable renal mass lesions require that nephrotomography be performed. Once a renal mass has been diagnosed, renal echograms and cyst puncture or renal angiography, if the mass appears solid, are in order. During angiography, the contralateral kidney, as well as hepatic vasculature, can be examined for bilateral or metastatic tumor involvement. Concurrent inferior vena-cavography should also be performed to determine if tumor thrombus has occurred in the renal vein or vena cava. Preoperative metastatic evaluation, along with the previously mentioned studies, should include chest x-ray, bone scans, metastatic bone survey, liver scan, whole lung laminograms, and barium enema. Pedal lymphangiography is generally not felt to be useful in the staging of renal carcinoma. Depending on the tumor size and vasculature, arterial embolization may be employed preoperatively.

Technique

Numerous approaches have been proposed in the literature^{5,6} for removing renal cell carcinomas. The flank incision is mentioned for historical interest only and is to be condemned as an acceptable approach to renal cancer surgery.

Various abdominal incisions, both vertical and horizontal, are employed. Other factors to be considered include the surgeon's familiarity with the proposed incision, the patient's body configuration, and the size and extent of the renal tumor.

Generally, a transabdominal incision consisting of either a midline vertical or bilateral subcostal incision offers the best exposure of retroperitoneal structures at the diaphragmatic level and the contralateral renal vasculature. This combined incision offers excellent exposure in extremely large renal carcinomas where early pedicle control is often difficult or even impossible with conventional transabdominal incisions. Occasionally, thoracoabdominal incision may be necessary.

The incision is carried out according to the surgeon's expertise. After the abdominal cavity has been opened, careful exploration of all intra- and retroperitoneal structures is performed to examine for metastatic disease. At this time, positioning and patency of the naso-gastric suction and foley catheters can be examined. Before the malignant kidney itself is directly manipulated, the posterior peritoneum is incised overlying the aortic bifurcation

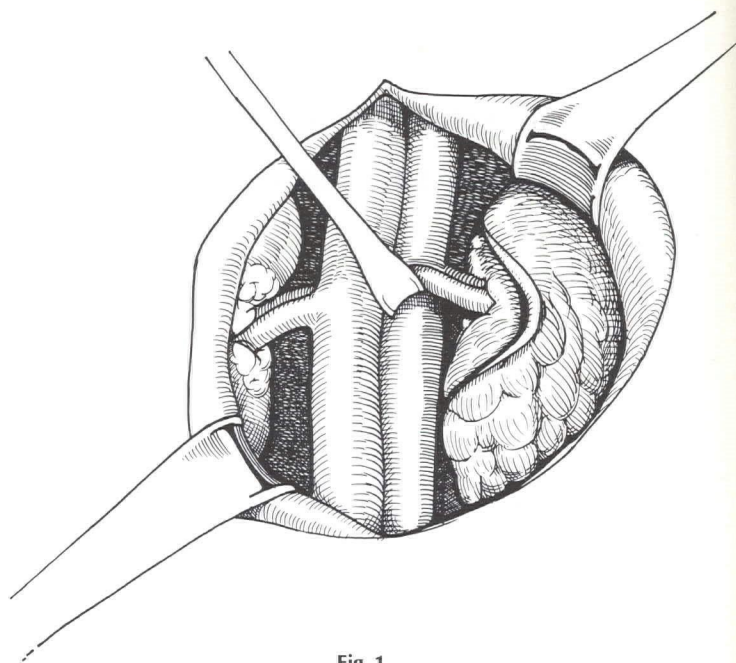


Fig. 1
Exposure of retroperitoneal structures following reflection of left colon and incision of posterior peritoneum.

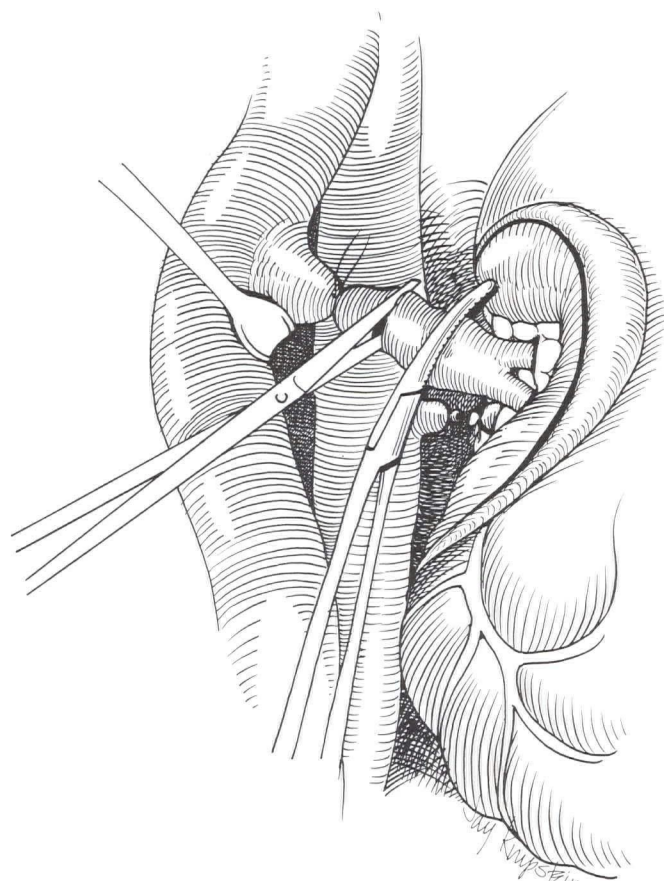


Fig. 2
Division and ligation of left artery and vein between hemostats with O tevdek sutures.

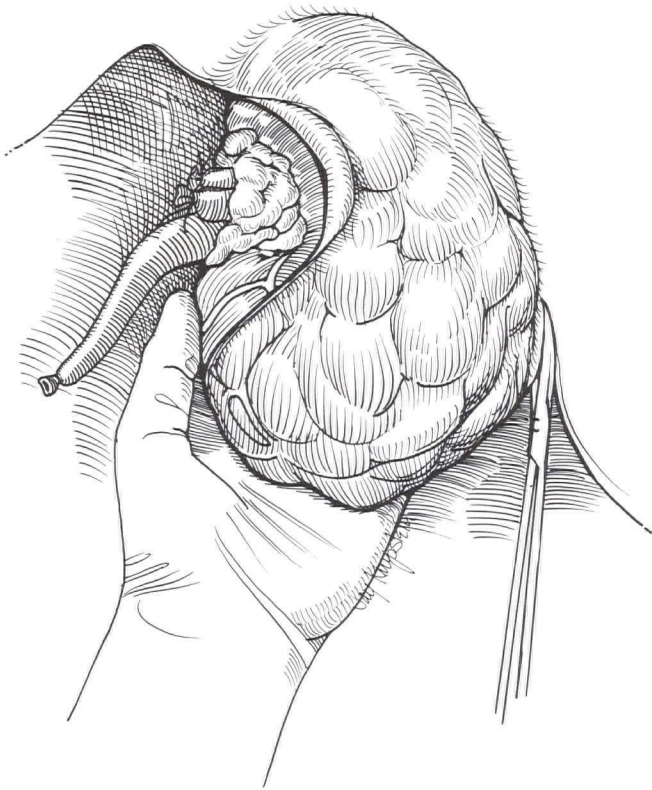


Fig. 3

Removal of renal cancer specimen within its intact Gerota's fascia.

cephalad to the level where the inferior mesenteric vein crosses anterior to the aorta (Figure 1). Careful blunt and sharp dissection allows the renal artery and renal vein to the affected kidney to be isolated and then ligated (Figure 2). Following control of the vascular pedicle and distal ureter, the peritoneum lateral to the colon on the appropriate side is incised and the colon reflected medially. With blunt and sharp dissection, the kidney within the intact, unopened Gerota's fascia is removed (Figure 3). A para-aortic lymphadenectomy, on the involved side, is then performed, extending from the level of the coeliac axis down to the inferior mesenteric artery. After determining that adequate hemostasis is present and that adjacent structures are intact, the wound is closed in layers.

Occasionally, one encounters tumor thrombus within the renal vein and vena cava, sometimes extending to the level of the right atrium. In these cases, a supradradical approach is often necessary requiring a median sternotomy with control of the inferior vena cava above the level of the diaphragm (Figure 4). A cavotomy can then safely be performed and the tumor thrombus extracted. Caval resection is employed only rarely.

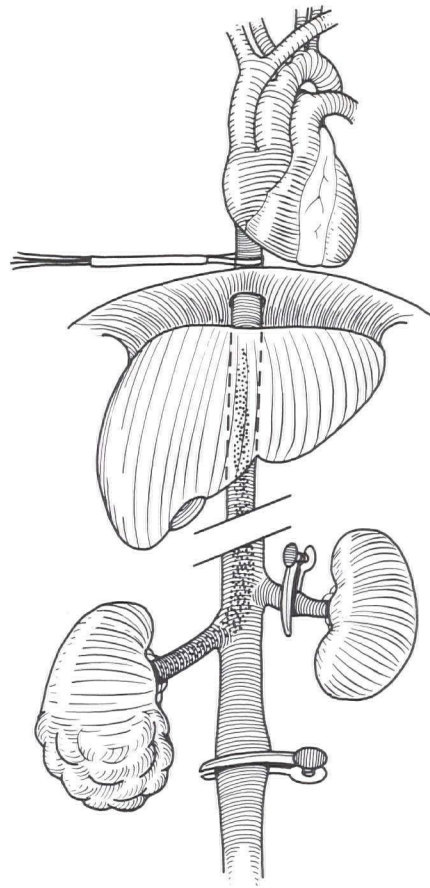


Fig. 4

Approach to right supradradical nephrectomy involving median sternotomy, control of supradiaphragmatic inferior vena cava, left renal vein and distal vena cava.

Summary

Renal carcinoma can best be treated by early detection and radical surgery. The presence of vascular tumor thrombi or extracapsular extension does not preclude a standard radical nephrectomy. Occasionally, supradradical procedures are recommended if tumor size and location warrant this approach.

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