

Open partial nephrectomy: an essential contemporary operation

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Over the last 15 years, we have learned that renal cortical tumors (RCTs) are members of a complex family of lesions with a specific histology, cytogenetic defects, and variable metastatic potential ranging from benign oncocytomas, to indolent papillary and chromophobe carcinomas, and the more malignant conventional clear-cell carcinomas.¹ Approximately 30% of patients with RCT present with large, symptomatic, locally advanced and/or metastatic tumors, and a guarded or poor prognosis. These patients require radical nephrectomy, regional lymphadenectomy, and adrenalectomy by open or laparoscopic surgery. The remaining 70% of RCTs are discovered incidentally. This has led to a tumor size and stage migration (median 4.5 cm, T1b), and a large pool of patients with an excellent prognosis (survival rates of >90%, depending on tumor histology). Despite modern imaging techniques, 20–30% of patients have a benign lesion or oncocytoma upon surgical resection.² Unfortunately, current percutaneous biopsy techniques are not sufficiently accurate (only 70%) to determine tumor histology, but more specific molecular and immunohistochemical probes are being developed.³

Recent trends in surgical oncology favor organ preservation, often with adjuvant therapies, to provide equivalent local tumor control and long-term survival to their more radical counterparts. Over the last decade, kidney-preserving partial nephrectomy, once restricted to tumors in patients with a solitary kidney or with renal insufficiency or disease, has become an accepted alternative to radical nephrectomy, even for patients with both kidneys intact. Studies have shown that partial nephrectomy for tumors of ≤ 4 cm provides equivalent tumor control to radical nephrectomy.⁴ Previous deterrents to partial nephrectomy, including proximity to the collecting system, endophytic tumor location, concern for tumor multifocality, and desire for a 1 cm surgical margin, have been addressed. Surgical entry into the collecting system with suture repair and adequate retroperitoneal drainage is not associated with excessive morbidity. With careful visual inspection and intraoperative ultrasound,

a previously unrecognized tumor satellite (<5% risk of occurrence) can be excised intraoperatively. Gross resection by tumor enucleation, even with only microscopically negative surgical margins, provides excellent local tumor control. When technically feasible, partial nephrectomy for tumors of ≤ 7 cm produces equivalent disease-free intervals to those achieved in similar patients treated with radical nephrectomy, across all histologic subtypes.⁵ Two important studies have demonstrated that long-term renal function is adversely affected by radical nephrectomy.^{6,7} Aging patients, and those with or who later develop common comorbid conditions such as hypertension and diabetes, especially benefit from kidney sparing. At our center, >65% of RCT patients undergo partial nephrectomy. After the procedure, patients remain under close surveillance for their 5% lifetime risk of ipsilateral and contralateral new tumor formation. The complication rate of open partial nephrectomy is 9%, the most bothersome adverse events being prolonged urinary fistula and delayed hemorrhage, which rarely require surgery.⁸

The development of minimally invasive laparoscopic renal tumor surgery and tumor-ablative techniques has been ongoing for 14 years. The advantages of cosmetic incisions, decreased perioperative analgesic requirements, and a more rapid return to normal activity were emphasized in early publications, and the short-term oncologic endpoints seemed equivalent to those of open surgery. Published experiences from centers with expertise in both open and minimally invasive approaches for RCTs, however, have revealed inconsistencies in the management of small RCTs, with surgeons more likely to perform partial nephrectomy during open surgery, and radical nephrectomy during laparoscopic surgery. These reports indicated that learning curves for minimally invasive surgery (MIS) were being conquered with relatively small renal tumors (<4 cm), despite clinical data showing this to be surgical 'overkill' and deleterious to overall renal function.⁹ Unique issues relating to MIS, such as the problem of tumor-bearing kidney retrieval,

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continue to be debated. MIS surgery is technically difficult, and the decision to perform open versus MIS kidney procedures often depends more upon the individual surgeon's level of expertise than on guidelines relating to tumor size. By 2000, because of the documented benefits of kidney sparing, several MIS groups had begun to develop laparoscopic partial nephrectomy techniques, initially for smaller, exophytic renal tumors, then for more complex, centrally located or cystic renal tumors. Valiant attempts to duplicate the renal-protective effects of cold ischemia, readily obtained in open partial nephrectomy, were reported.¹⁰ But laparoscopic partial nephrectomy is a lengthy operation, and is normally done with renal artery and vein clamping, and warm ischemia, in the hope that rapid completion will limit ischemic damage. Even for MIS experts, laparoscopic partial nephrectomy is described as a complex operation, with complication rates that are 3–4 times higher than with open procedures.¹¹ Interestingly, laparoscopic partial nephrectomy teams report similar rates of benign lesion resection, and similar benefits to overall renal function, to those described for open partial nephrectomy.¹² As mentioned above, percutaneous radiofrequency ablation and percutaneous and laparoscopic cryoablation are also under investigation for RCTs;¹³ however, short overall follow-up and lack of postablation resection mean the true effectiveness of these approaches is, as yet, unknown. To assess these modalities thoroughly, 'ablate and resect' protocols need to be designed, much like those established in the 1990s for cryotherapy for localized prostate cancer.

Urological meetings abound with industrial representatives of MIS, and medical centers and hospitals have invested substantial sums to equip operating rooms and train staff to incorporate MIS into daily surgical life. The impact of MIS on residency and fellow training is also a topic of major discussion for program directors. Yet, it is not known how many surgeons worldwide have the expertise to perform MIS partial nephrectomy—an extremely challenging operation. Also not fully understood is the effect of this ongoing learning curve on patient morbidity. Are unsuccessful laparoscopic partial nephrectomies for small RCTs converted to open partial nephrectomy, or is laparoscopic radical nephrectomy the default salvage strategy? Is a rapid return to normal activity a fair exchange for a functioning renal unit?

Using the SEER database, investigators from the University of Michigan found that <10% of kidney tumor operations performed in the past

5 years were partial nephrectomies. Similar data from Canada and England indicate that despite its obvious benefits, partial nephrectomy is underutilized. It is not clear whether this is due to a lack of training in open or laparoscopic partial nephrectomy, a commitment to conquering the laparoscopic radical nephrectomy learning curve, or an outdated understanding of RCTs. What is abundantly clear is that radical nephrectomy for small RCTs, by either technique, is overtreatment.

The shallow debates at many urology meetings, and pronouncements by academicians, without evidence-based studies, that one procedure or the other is the 'standard of care', tend to diminish the great advances that have been achieved in the field of renal tumors. The academic and community-based urologist must use a technique he or she is competent in, and base decisions on a contemporary view of RCTs and the interplay of oncologic goals and concerns for the patient's optimal renal health, overriding any urge to prove that one is living on the technological edge. In my opinion, open partial nephrectomy will remain an essential element of the treatment of RCTs of ≤ 7 cm for the foreseeable future.

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Competing interests

The author declared he has no competing interests.