

Special Article - Surgical Case Reports

Tumor Enucleation of Renal Cell Carcinoma in a Solitary Kidney

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Abstract

We describe the case of a 57 year old man with a solitary kidney after undergoing resection of a Wilm's tumor as a child and a recent left partial colectomy who presents with an incidentally found clinical T1b renal mass. The patient underwent tumor enucleation and had no change in his renal function twelve days after surgery as compared to his preoperative baseline, highlighting the additional nephron-sparing associated with tumor enucleation as compared to partial nephrectomy that includes a gross margin of normal parenchyma.

Keywords: Renal cell carcinoma; Solitary kidney; Nephron-sparing surgery; Enucleation; Partial nephrectomy

Abbreviations

AUA: American Urologic Association; CKD: Chronic Kidney Disease; CT: Computed Tomography; PN: Partial Nephrectomy; RN: Radical Nephrectomy; TE: Tumor Enucleation

Introduction

Renal cell carcinoma is the third most common cancer of the genitourinary system and in 2014 accounted for an estimated 63,920 new cases and 13,860 deaths with a 2-4% annual increase in incidence over the past several decades [1]. With the ubiquity of abdominal imaging in modern medicine, many renal masses are detected incidentally and so the management of a clinical stage 1 renal mass (<7.0cm) is an important facet of urologic practice. Nephron-sparing surgery is the preferred approach to a clinical T1 mass, with partial nephrectomy the gold standard. However, Tumor Enucleation (TE) is an alternative approach to nephron-sparing surgery that spares additional nephrons over other methods.

Case Presentation

A 57 year-old man was referred to our Comprehensive Cancer Center for evaluation of an incidentally found left renal mass in a solitary kidney. The patient's past medical history included a right-sided nephroblastoma (Wilm's tumor) treated with right radical nephrectomy as a child and a recent diagnosis of colon cancer status-post left partial colectomy and primary anastomosis at the splenic flexure six weeks prior to his initial visit. His renal mass was found during staging for his colon cancer, which was identified during an evaluation for a 40-pound unintentional weight loss. His abdominal Computed Tomography (CT) scan showed an enhancing, 4.2cm upper pole left kidney mass, suspicious for renal cell carcinoma (Figures 1&2). After counseling, the patient elected to undergo surgical excision of the mass. An open surgical approach was recommended given his two prior open operations. Preoperative vital signs, basic metabolic panel, and complete blood count were within normal limits. Metastatic work-up was negative. Repeat imaging prior to open partial nephrectomy was obtained to evaluate for post-colectomy changes. His renal mass was stable in size and surgical clips

were noted between the posterior colonic mesentery and anterior Gerota's fascia.

The patient was then taken to the operating room for excision of the mass three months after his partial colectomy. As expected, lysis of adhesions was required and there was dense scarring in the area of his colon resection overlying the left kidney. The kidney was fully mobilized and the mass was identified by ultrasound as well as visually. The left upper pole renal mass was then successfully enucleated. We were not satisfied with hemostasis during the renorrhaphy, so the renal hilum was briefly clamped and the repair completed. Total

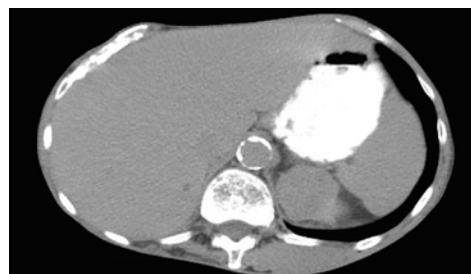


Figure 1: Axial view of a clinical T1b enhancing renal mass measuring 4.2cm in maximum diameter, suspicious for renal cell carcinoma in a solitary kidney.



Figure 2: Coronal view of a clinical T1b enhancing renal mass measuring 4.2cm in maximum diameter, suspicious for renal cell carcinoma in a solitary kidney.

clamp time was 22 minutes. His postoperative creatinine peak was 2.1 with a nadir of 0.9, which was identical to his pre-op creatinine.

Pathology revealed clear cell renal cell carcinoma with Fuhrman grade 3. The tumor measured 4.4x3.8x2.6cm and was confined to the kidney (pathologic stage T1b). The tumor was well encapsulated and a separate deep margin biopsy was negative for malignancy. The patient will be monitored in accordance with American Urologic Association (AUA) and National Comprehensive Cancer Network guidelines.

Discussion/Conclusion

The most recent AUA guidelines indicate that surgical excision is the gold standard for management of clinical T1 masses, with nephron-sparing approaches preferred whenever possible [2]. The rationale behind this guideline is related to the fact that patients undergoing Radical Nephrectomy (RN) as compared to Partial Nephrectomy (PN) are at increased risk for de novo Chronic Kidney Disease (CKD) with subsequent adverse cardiovascular outcomes and decreased survival [3]. Further, there is no additional oncologic benefit for RN over Partial Nephrectomy (PN) for T1 renal masses, as multiple studies at multiple centers have consistently demonstrated oncologic equivalence [4,5].

Given the established importance of renal conservation, TE is a method of nephron-sparing surgery that even further preserves normal renal parenchyma. In tumor enucleation, the renal mass is excised by blunt dissection along the natural tissue plane between the tumor pseudocapsule and the normal renal parenchyma, avoiding the typical wide surgical margin of healthy renal tissue removed during a standard partial nephrectomy [5,6]. The result is the maximal conservation of nephrons.

The obvious concern with this approach is that no deliberate margin would lead to inadequate tumor removal and tumor recurrence, yet a growing body of evidence suggests that tumor enucleation and partial nephrectomy have no difference in oncologic outcomes [7-9]. Moreover, one retrospective study found that TE actually had a lower incidence of positive surgical margins versus PN in a matched-pair comparison [9]. Another benefit of tumor enucleation is that it affords a faster, less-morbid operation compared to PN, as TE is associated with shorter mean ischemia and operative times, less frequent entry into the renal sinus or collecting system, and reduced need for tumor bed suturing [8]. Thus, the ideal candidate for tumor enucleation is a patient with baseline renal insufficiency, a solitary kidney, or other comorbidities that would make the preservation of all available nephrons of great importance.

Our case highlights various aspects of the current literature consensus on tumor enucleation. First, our patient had a clinical stage T1b renal mass for which the standard of care is nephron-sparing surgical excision via partial nephrectomy or tumor enucleation. Next, the patient had a solitary kidney secondary to his history of Wilm's tumor and prior radical nephrectomy, so renal conservation was paramount. The additional nephron preservation afforded by tumor

enucleation had a favorable outcome in this case, as the patient's discharge creatinine and baseline creatinine were identical. Our case is consistent with a case series of patients with a remnant kidney undergoing tumor enucleation, which showed tumor enucleation did not cause significant renal injury to the solitary kidney [10]. Finally, our patient had previous left partial colectomy creating a hostile abdomen with respect to the dissection and tissue planes. As indicated above, tumor enucleation has been associated with shorter operative times and other operative parameters by virtue of its simpler dissection and operative technique [8].

In conclusion, tumor enucleation is a safe and oncologically sound nephron-sparing alternative to partial nephrectomy that includes a margin of healthy renal parenchyma. Tumor enucleation is part of the treatment armamentarium for small renal masses and should be considered in select patients for whom nephron conservation is particularly important, such as in the case of a solitary kidney or baseline renal insufficiency.

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References

1. Siegel R, Ma J, Zou Z, Jemal A. Cancer statistics, 2014. *CA Cancer J Clin.* 2014; 64: 9-29.
2. Campbell SC, Novick AC, Belldgrun A, Blute ML, Chow GK, Derweesh IH, et al. Guideline for management of the clinical T1 renal mass. *J Urol.* 2009; 182: 1271-1279.
3. Huang WC, Elkin EB, Levey AS, Jang TL, Russo P. Partial nephrectomy versus radical nephrectomy in patients with small renal tumors--is there a difference in mortality and cardiovascular outcomes? *J Urol.* 2009; 181: 55-61.
4. Patard JJ, Shvarts O, Lam JS, Pantuck AJ, Kim HL, Ficarra V, et al. Safety and efficacy of partial nephrectomy for all T1 tumors based on an international multicenter experience. *J Urol.* 2004; 171: 2181-2185, quiz 2435.
5. Gupta GN, Singer EA, Pinto PA. Partial Nephrectomy for Kidney Cancer. In: DeVita VT Jr, Lawrence TS, Rosenberg SA, editors. *Principles & Practice of Oncology Updates.* Lippincott, Williams, and Wilkins. 2010; 4: 24.
6. Shuch B, Singer EA, Bratslavsky G. The surgical approach to multifocal renal cancers: hereditary syndromes, ipsilateral multifocality, and bilateral tumors. *Urol Clin North Am.* 2012; 39: 133-148, v.
7. Minervini A, Ficarra V, Rocco F, Antonelli A, Bertini R, Carmignani G, et al. Simple enucleation is equivalent to traditional partial nephrectomy for renal cell carcinoma: results of a nonrandomized, retrospective, comparative study. *J Urol.* 2011; 185: 1604-1610.
8. Mulkamala A, Allam CL, Ellison JS, Hafez KS, Miller DC, Montgomery JS, et al. Tumor enucleation vs. sharp excision in minimally invasive partial nephrectomy: technical benefit without impact on functional or oncologic outcomes. *Urology.* 2014; 83: 1294-1299.
9. Longo N, Minervini A, Antonelli A, Bianchi G, Bocciardi AM, Cunico SC, et al. Simple enucleation versus standard partial nephrectomy for clinical T1 renal masses: perioperative outcomes based on a matched-pair comparison of 396 patients (RECORD project). *Eur J Surg Oncol.* 2014; 40: 762-768.
10. Lhotta K, Eberle H, Konig P, Dittrich P. Renal function after tumor enucleation in a solitary kidney. *Am J Kidney Dis.* 1991; 17: 266-270.