

New Modalities in Management of Small Renal Tumors

Essay

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

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Candidate

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List of Abbreviations

Abbr.	Full-term
AJCC	:American Joint Committee on Cancer
AS	: Active Surveillance
AUA SRM	: American Urological Association Small Renal Mass
AUA	:American Urological Association
CEUS	: Ultra Sonography Contrast agents
CKD	: Chronic Kidney Disease
CSS	: Cancer-Specific Survival
DFS	: Disease-Free Survival
DISSRM	: The Delayed Intervention and Surveillance for Small Renal Masses
EAU	: European Association of Urology
EBL	:Estimated Blood Loss
ECOG	:Eastern Cooperative Oncology Group
EORTC	: EuropeanOrganisation for Research and Treatment of Cancer
ESMO	:The European Society of Medical Oncology
FG	: Fuhrman Grade
HIFU	: High Intensity Focused Ultrasound
MRFS	: Metastatic Recurrence-Free Survival
MSKCC	:Memorial Sloan-Kettering Cancer Center
NCCN	:National Comprehensive Cancer Network
NSS	: Nephron-Sparing Surgery
OS	: Overall Survival
PCA	: Percutaneous Cryoablation

List of Abbreviations (Cont.)

Abbr.	Full-term
PFS	: Progression free survival
PRB	: Percutaneous renal biopsy
RAPN	: Robotic-Assisted Partial Nephrectomy
RCC	: Renal Cell Carcinoma
RFA	: Radiofrequency Ablation
SEER	: Surveillance Epidemiology and End Results Program
SRM	: Small Renal Masses
WIT	: Warm Ischemia Time

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Introduction

The incidence of renal cell carcinoma (RCC) has increased significantly in the past three decades with 54 000 new cases and 13 000 deaths estimated in the USA in 2008 (*Patard et al., 2009*).

With the universal availability of modern high-resolution imaging techniques has arisen the issue of the incidentally detected small renal masses. The "small renal mass" is defined by its size (≤ 4 cm) and solid, contrast-enhancing appearance on cross-sectional imaging modalities (*Hollingsworth et al., 2006; Nguyen et al., 2006*).

Overall, 80% of small renal masses are malignant, while the remainder are benign (*Campbell et al., 2009; Ljungberg et al., 2010*). The size of the mass is the primary factor in determining its nature and in counseling patients—the larger the tumor, the more likely it is to be both malignant (i.e., renal cell carcinoma) and higher grade (*Frank et al., 2003*).

Despite the localized, nonaggressive behavior of most small renal tumors, up to 5% of patients with masses 4 cm or smaller present with metastatic disease; each 1-cm increase in size is associated with a 3.5% increase in prevalence of synchronous metastases (*Nguyen et al., 2009*).

Surgical extirpation remains the gold-standard approach with respect to curative therapy for renal cell carcinoma.

noma. In the past, radical nephrectomy was often performed, even in cases where the tumor was small and suspected to be low stage. However, nephron-sparing surgery (NSS) is the current standard of care when technically feasible because of recurrence-free and long-term cancer-specific survival rates comparable with those of radical nephrectomy, in addition to the advantage of preservation of renal function (**Van Poeppelet et al., 2011**).

The primary alternative to surgical treatment of small renal masses is thermal ablation, most commonly either radiofrequency ablation or cryoablation. A significant benefit of ablation is the ability to perform these procedures percutaneously under image-guidance, potentially reducing morbidity, need of hospitalization, and major urologic complications (**Klatte et al., 2011**).

Interest has grown in active surveillance as a strategy for the management of small renal masses, based on indolent cancer behavior in many cases, as well as on an older patient population with comorbid medical conditions. Thus, the current indications for active surveillance of renal masses include patients who refuse or who are unfit for surgery with smaller lesions size and limited life expectancy, and requires a thorough discussion with the patient regarding the risks, benefits, and limitations of all management strategies (**Klatte et al., 2011**).

The situation of the incidentally detected small renal mass is complex and the optimal treatment approach requires careful consideration of radiological findings, potential for disease progression

nandmetastasis,andspecificpatientpreferencesandoverallhealth.Excellentoutcomesshouldbeexpectedwithactivesurveillance,thermalablation,andNSSandresearchopportunitiesexistwithrespecttotumorbiology,molecularanalyses,imagingtechnologyandsurgicalandclinicalcare(*Portenet al., 2014*).

Aim of the Work

Aim of this essay is to discuss the new modalities in management and highlight areas of continued controversy and future investigation for patients with small renal tumors.

Chapter(1)

SurgicalAnatomyoftheKidney

Thekidneysarepairedretroperitonealstructures thatare normallylocatedbetweenthe transverse processes of T12-L3vertebrae,withtheleftkidney typicallysomewhat moresuperior inpositionthantheright. Theupperpoles arenormally orientedmoremediallyandposteriorlythan the lowerpoles(*Wein,etal.,2007*).

Thekidney anatomy is shown in the image below.

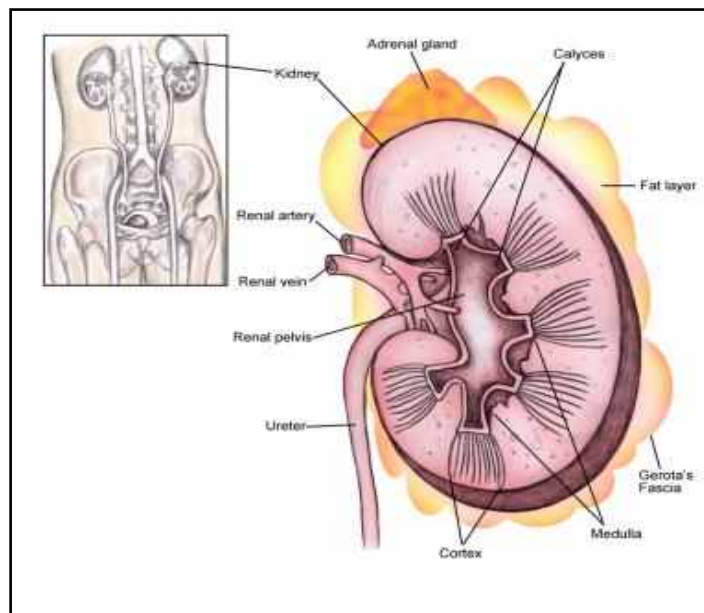


Figure (1): Renalanatomy,renalfascia(*Cheuck et al., 2013*).

The kidneys are bean-shaped structures and weigh about 150g in the male and about 135g in the female. They are typically 10-12cm in length, 5-7cm in width, and 2-3cm in thickness (*Wein et al., 2007*).

Anatomic Relationships

Anteriorly, the right kidney is bordered by a number of structures. Cranially, the upper pole lies against the liver and is separated from the liver by the peritoneum except for the liver's posterior bare spot. The hepatorenal ligament further attaches the right kidney to the liver because this extension of parietal peritoneum bridges the upper pole of the right kidney to the posterior liver. Also at the upper pole, the right adrenal gland is encountered. On the medial aspect, the descending duodenum is intimately related to the medial aspect of the kidney and hilum structures. Finally, on the anterior aspect of the lower pole lies the hepatic flexure of the colon (*Anderson et al., 2007*).

The left kidney is bordered superiorly by the tail of the pancreas with the splenic vessels adjacent to the hilum and upper pole of the left kidney. Also cranially to the upper pole is the left adrenal gland and further superolaterally we can find the spleen. The splenorenal ligament attaches the left kidney to the spleen. This attachment can lead to splenic capsular tears if excessive downward pressure is applied to the left kidney. Superior to the pancreatic tail, the posterior gastric wall can overlie the kidney. Caudally, the kidney is covered by the splenic flexure of the colon (*Anderson et al., 2007*).