



Abdominal Imaging / Imagerie abdominale

Magnetic Resonance Imaging of Perirenal Pathology

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Abstract

The perirenal space can be involved by a variety of neoplastic, inflammatory, infectious, and proliferative disorders. Magnetic resonance imaging is often an ideal technique for identification and staging of lesions arising within the perirenal space, with its superior soft tissue characterization as well as its ability to visualize extension into blood vessels and adjacent organs. This pictorial essay describes the magnetic resonance imaging appearance of a variety of pathologies which can arise from or involve the perirenal space, and provides a framework for categorization and differential diagnosis of these lesions.

Résumé

La région périrénale peut être le siège de diverses affections néoplastiques, inflammatoires, infectieuses et proliférantes. Souvent, l'imagerie par résonance magnétique est la technique idéale pour identifier et stadifier les lésions de la région périrénale, puisqu'elle offre pour les tissus mous une caractérisation de qualité supérieure et permet de percevoir les ramifications dans les vaisseaux sanguins et les organes adjacents. Notre essai descriptif présente les aspects d'imagerie d'une variété d'affections qui peuvent toucher la région périrénale à différents degrés et propose un cadre pour catégoriser ces lésions et établir un diagnostic différentiel.

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Key Words: Magnetic resonance imaging; Perirenal; Renal

The perirenal space is a retroperitoneal compartment lying between the anterior and posterior pararenal spaces and delineated anteriorly by the anterior renal fascia (Gerota fascia) and posteriorly by the posterior renal fascia (Zuckerkandl fascia) (Figure 1). The perirenal space contains the kidneys, proximal ureters, adrenal glands, fat, connective tissue, lymphatic tissue, and blood vessels [1]. The boundaries of the perinephric space generally limit the spread of disease arising from the kidneys or adrenal glands, but occasionally serve as conduits to and from other retroperitoneal compartments.

The perirenal space can be involved by a variety of neoplastic, inflammatory, infectious, and proliferative disorders (Table 1). Magnetic resonance imaging (MRI) is often an ideal technique for identification and staging of lesions arising within the perirenal space, with its superior soft tissue

characterization as well as its ability to visualize extension into blood vessels and adjacent organs. This pictorial essay describes the MRI appearance of the variety of pathologies that can arise from or involve the perirenal space, and provides a framework for categorization and differential diagnosis of these lesions.

Solitary Masses

Renal cell carcinoma (RCC) is the most common renal malignancy, and local invasion of the perinephric space by RCC represents the most common perirenal soft tissue mass (Figure 2). Clear cell RCC is the most common histologic variant, accounting for 75% of cases, and is also the most likely to show perinephric extension and venous invasion [2]. Accurate depiction of extracapsular extension of RCC is important for tumour staging, and is useful in deciding whether surgery is indicated as well as in determining the surgical approach.

Renal urothelial cell carcinoma (UCC) is less common than RCC (Figure 3); however, 5% of urothelial tumours arise from the ureter, renal pelvis, or calyces. Upper tract

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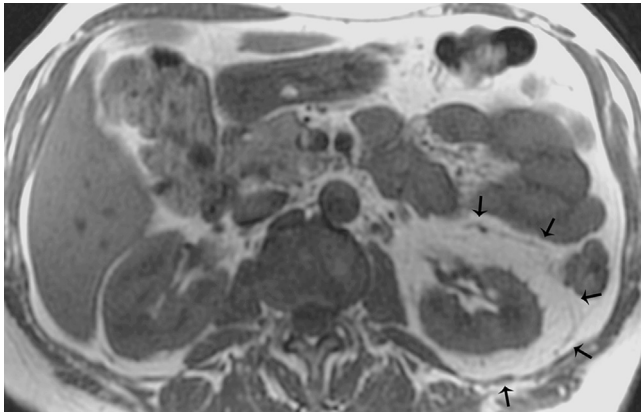


Figure 1. Axial T1-weighted fast spin-echo image shows the anterior, lateral, and posterior renal fascia (arrows) representing the borders of the perirenal space.

UCCs are characterized by multiplicity and a high incidence of recurrent and metachronous lesions. Although most upper tract UCCs are low-stage, superficial neoplasms, 15% are infiltrating tumours, which frequently invade the kidney and appear as hypoenhancing ill-defined lesions [3]. Figure 3 also illustrates direct hepatic invasion through the bare area of the liver: the anterior pararenal

Table 1
Classification of perinephric pathology

Neoplastic	Proliferative	Inflammatory/ Infectious
Renal cell carcinoma	Retroperitoneal fibrosis	Abscess
Urothelial cell carcinoma	Erdheim-Chester disease	Urinoma
Lymphoma	Extramedullary hematopoiesis	Pancreatitis
Leukemia	Castleman's disease	
Metastasis		
Leiomyosarcoma		
Liposarcoma		
Paranglioma		
Solitary Masses	Multiple Masses	Fat-Containing Masses
Renal cell carcinoma	Metastases	Angiomyolipoma
Urothelial cell carcinoma	Lymphoma	Myelolipoma
Leiomyosarcoma	Abscesses	Liposarcoma
Liposarcoma		Extramedullary hematopoiesis
Paranglioma		
Angiomyolipoma		
Myelolipoma		
Soft Tissue Rind	Cystic Lesions	
Lymphoma/ leukemia	Abscesses	
Retroperitoneal fibrosis	Urinoma	
Erdheim-Chester disease	Hematoma	
Extramedullary hematopoiesis	Lymphangiomatosis	

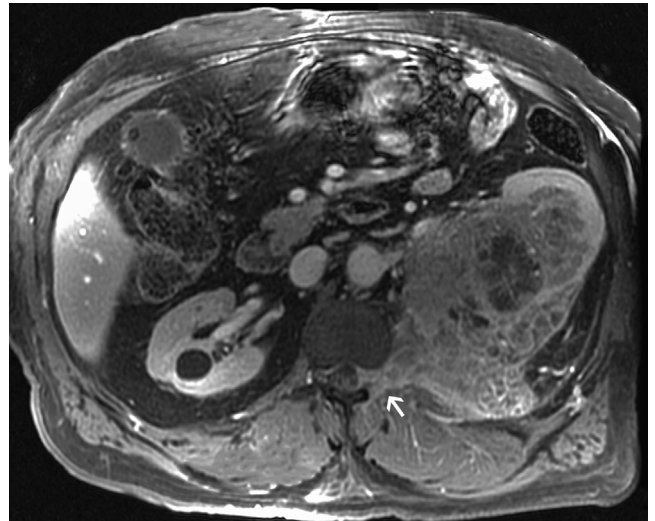


Figure 2. Axial postgadolinium 3D spoiled gradient recalled echo image demonstrates a large clear cell renal cell carcinoma in a 56-year-old man extending posteriorly through the perirenal space to invade the left psoas and paraspinous muscles and extend into the left L2-3 neuro foramen (arrow). Note also destruction of the left sided transverse process.

fascia may be deficient and allow communication of the perirenal space with the hepatic bare area, which is devoid of a peritoneal covering.

Renal leiomyosarcoma (Figure 4) is a rare neoplasm constituting 0.1% of renal malignancies and arising from the renal capsule, intrarenal blood vessels, or from smooth muscle fibers of the renal pelvis [4]. These are generally large lesions at diagnosis, and most cases show extension beyond the renal capsule into the perirenal space, often with

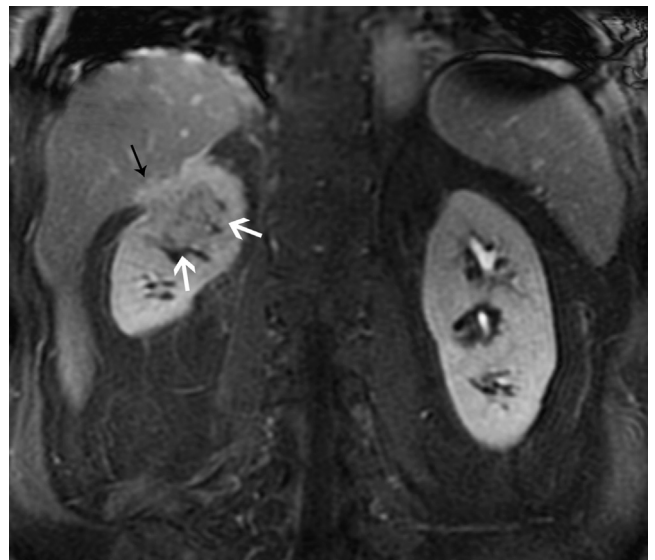


Figure 3. Urothelial carcinoma invading the liver in a 58-year-old man with gross hematuria. Coronal postgadolinium 3D spoiled gradient recalled echo image shows an ill-defined hypoenhancing mass in the upper pole right kidney (white arrows) extending superiorly through the perirenal space and across the bare area of the liver to invade the posterior right hepatic lobe (black arrow).

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