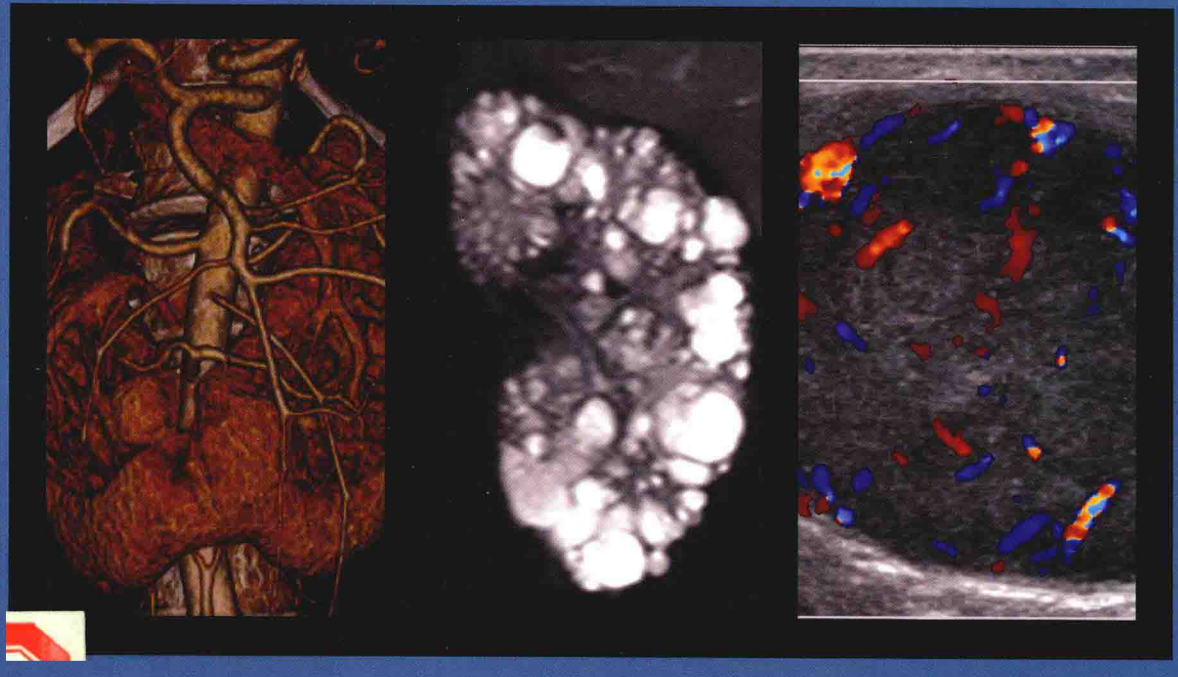
GENITOURINARY RADIOLOGY CASES

CASES IN RADIOLOGY



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Genitourinary Radiology Cases

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To my wife, Poonam, and my parents, for their love and support.

Rupan Sanyal

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Mark Lockhart

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Preface

Education comes in many forms, and no two people learn in exactly the same way. In the practice of medicine, physicians have long been trained by a combination of didactic teaching, case-based learning, and apprenticeship during the performance of clinical care. While didactic teaching promotes passive learning, a case-based approach is more interactive and promotes active learning.

This inaugural edition of *Genitourinary Cases* is a collection of 129 individual examples of disease processes that affect a wide range of systems, with a focus on genitourinary imaging findings. As imagers, we have all experienced the discomfort that can arise as we face a case that fills us with uncertainty. It is in these moments that a great deal of learning can occur. The variety of cases presented will endeavor to cover the essentials of genitourinary radiology from the kidneys, ureters, bladder, adrenals, and retroperitoneum to the reproductive structures in a systematic grouping of pathology by general location. We hope that this will allow the reader to easily return to cases in the future, rather than serving as a singular opportunity to learn. Similarly, a list of diagnoses is provided to allow the reader to later refer back directly to a case without a broad search through the book.

A subspecialty such as radiology, which primarily deals with images, is particularly conducive to case-based learning. In this image-rich book, we have focused on the radiologic features and have tried to emphasize the differential diagnosis and practical teaching points for each case. We hope that this book will help the reader to identify and differentiate between the imaging appearances of various genitourinary diagnoses.

Contents

Section I Kidney

History

- 63-year-old man with weight loss

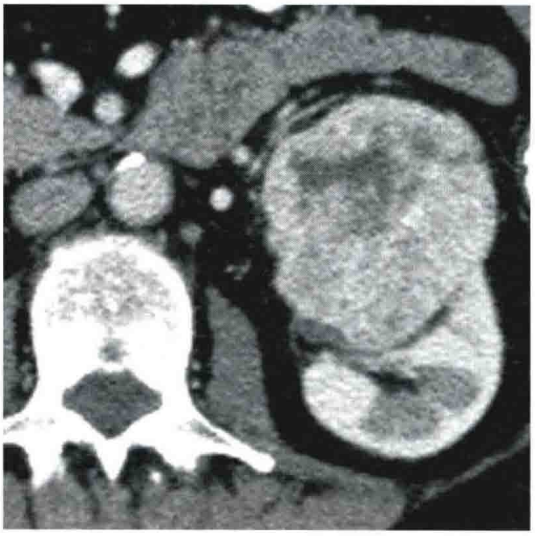

Figure 1.1

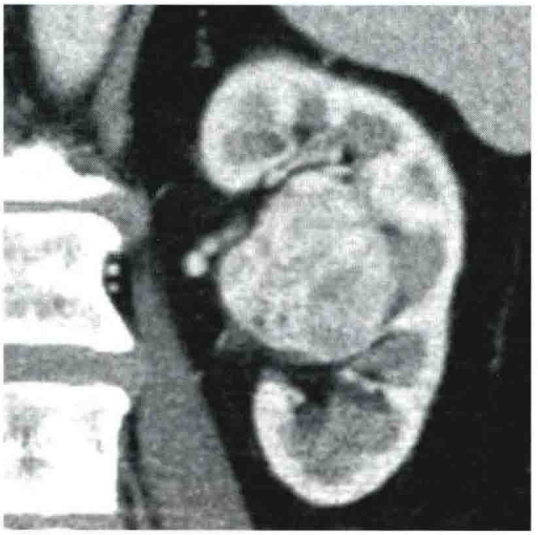

Figure 1.2

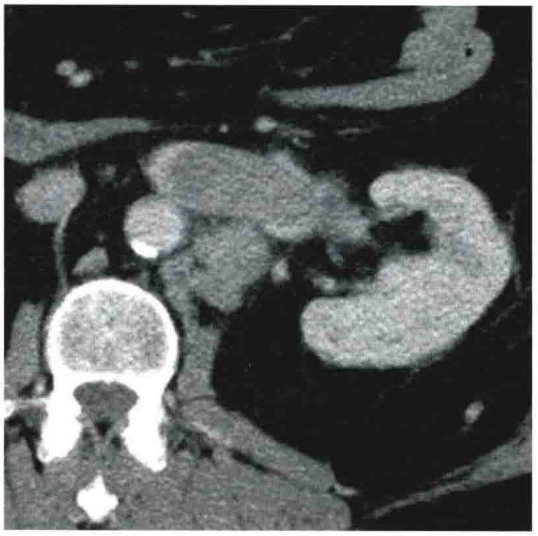

Figure 1.3

Case 1 Renal Cell Carcinoma: Clear Cell Subtype

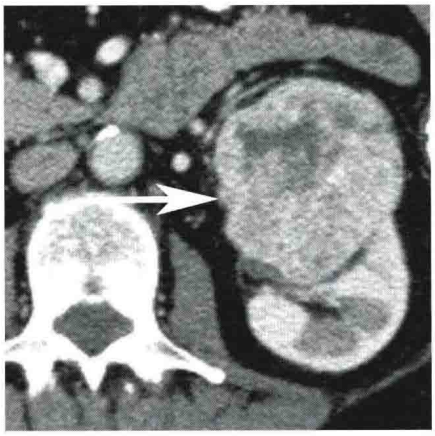

Figure 1.4

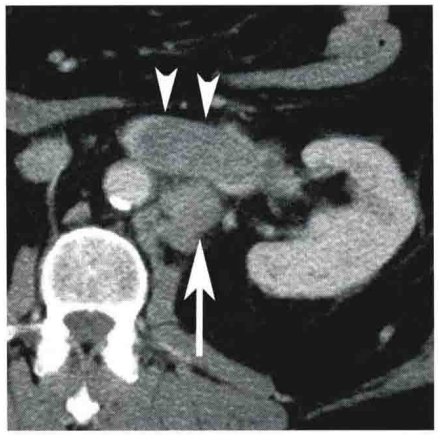

Figure 1.5

Findings

- Arterial-phase axial and coronal CT images (Figures 1.1 and 1.2) show a well-demarcated, avidly enhancing, heterogeneous, exophytic, cortical left renal mass (arrow in Figure 1.4).
- Portal venous-phase CT image (Figure 1.3) shows filling defect in the left renal vein (arrowheads in Figure 1.5); periaortic lymphadenopathy is present (arrow in Figure 1.5)

Differential Diagnosis

- Differential diagnosis of a renal mass includes renal cell carcinoma (RCC), transitional cell carcinoma (TCC), lymphoma, and oncocytoma. Renal TCCs are infiltrative, hypoenhancing, centrally located, noncontour-deforming masses and can be excluded. Renal lymphoma can present as a solitary renal mass but are hypoenhancing lesions. Oncocytomas are benign, well-demarcated, cortical lesions often indistinguishable from RCCs. Vascular invasion and adenopathy exclude oncocytoma. The well-defined, hyperenhancing, heterogeneous, exophytic cortical lesion seen here is consistent with RCC. The heterogeneous hyperenhancement favors clear cell subtype. Filling defect in the renal vein represents tumor thrombus, and the periaortic lymphadenopathy is consistent with nodal metastasis (stage T3a, N1, see below).

Teaching Points

- Histologic subtypes of RCC include clear cell or conventional carcinoma (80%), papillary carcinoma (15%), chromophobe carcinoma (5%), collecting duct carcinoma (1%), and unclassified (4%).
- Clear cell RCC has more avid and heterogeneous enhancement compared with papillary and chromophobe subtypes.
- According to the American Joint Committee on Cancer (AJCC) staging of RCC (2010), T1 is tumor <7 cm limited to kidney, T2 is tumor ≥7 cm limited to kidney, T3a is tumor extension into renal vein or perinephric fat, T3b is extension into inferior vena cava (IVC) below diaphragm, T3c is extension into IVC above diaphragm, and T4 is tumor extension beyond Gerota's fascia. Lymph nodal metastasis is N1 and distant metastasis is M1.
- Identifying extent of tumor invasion into the renal vein/IVC has significant implications on staging and surgery. Depending on level of thrombus, an abdominothoracic incision or cardiac bypass may be needed.

Management

- Partial or radical nephrectomy; systemic therapy for metastatic disease

Further Reading

Ng CS, Wood CG, Silverman PM, Tannir NM, Tamboli P, Sandler CM. Renal cell carcinoma: diagnosis, staging, and surveillance. *AJR Am J Roentgenol.* 2008;191(4):1220–1232.

History

- 71-year-old male with hematuria

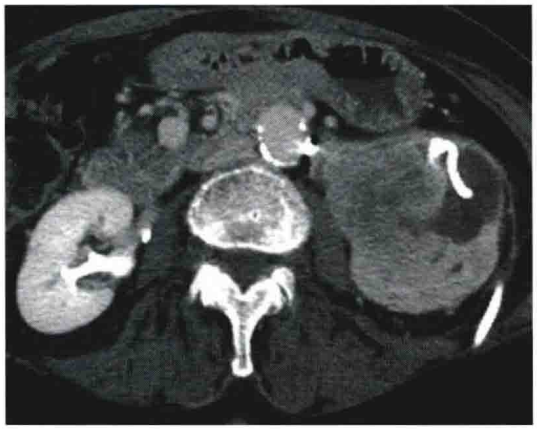

Figure 2.1

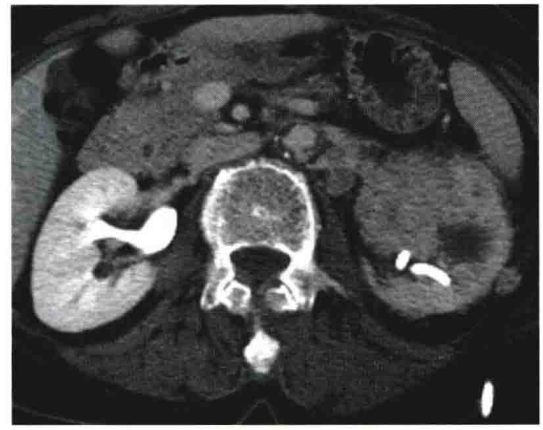

Figure 2.2

Figure 2.3

Case 2 Renal Pelvic Transitional Cell Carcinoma

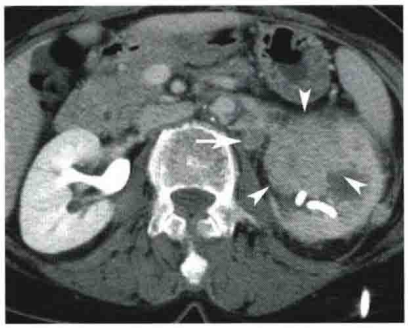

Figure 2.4

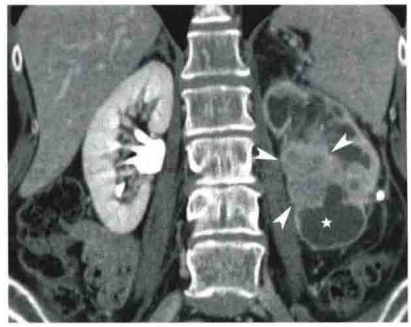

Figure 2.5

Findings

- Axial and coronal contrast-enhanced CT urogram images (Figures 2.1, 2.2 and 2.3) show a large, ill-defined, central hypoenhancing left renal lesion (arrowheads in Figures 2.4 and 2.5). The lesion has indistinct margins and infiltrates the renal parenchyma. It causes obstruction and dilation of multiple calyces (asterisk in Figure 2.5). Renal hilar lymphadenopathy is present (arrow in Figure 2.4). A pigtail catheter has been placed in a dilated calyx.

Differential Diagnosis

- Differential diagnosis of a solid enhancing renal mass includes renal cell carcinoma (RCC), transitional cell carcinoma (TCC), and lymphoma. The mass is hypoenhancing, infiltrating, centrally located in the kidney and maintains the reniform shape. These characteristics are typical of a renal pelvic TCC. RCCs are more common but have a cortical location, distinct margins, distort the renal contour, and are usually hyperenhancing. Renal lymphoma can present as a hypoenhancing perinephric mass, solitary or multifocal parenchymal lesions, or diffuse nephromegaly. Presence of lymphadenopathy helps identify renal lymphoma. It is important to identify renal TCC on imaging as it is treated with nephroureterectomy. Partial or radical nephrectomy is used for RCC and chemotherapy for lymphoma.

Teaching Points

- Approximately 15% of renal tumors are renal pelvic TCCs.
- There is a male preponderance with a peak incidence in the seventh decade.
- TCC is often multifocal, and approximately 30%–50% of patients with upper tract TCC develop bladder TCC.
- Renal TCCs arise from the renal pelvis/collecting system and infiltrate into the parenchyma. The reniform shape of the kidney is maintained on imaging.
- Upper tract TCCs spread by direct invasion and lymphatic spread.
- Lymph nodal metastasis has poor prognosis and is considered stage IV disease.

Management

- Nephroureterectomy and/or systemic therapy

Further Reading

Vikram R, Sandler CM, Ng CS. Imaging and staging of transitional cell carcinoma: part 2, upper urinary tract. *AJR Am J Roentgenol.* 2009;192(6):1488–1493.

History

- 60-year-old man with weight loss and flank pain (Figure 3.1; follow-up CT images were obtained after 4 months Figure 3.2)

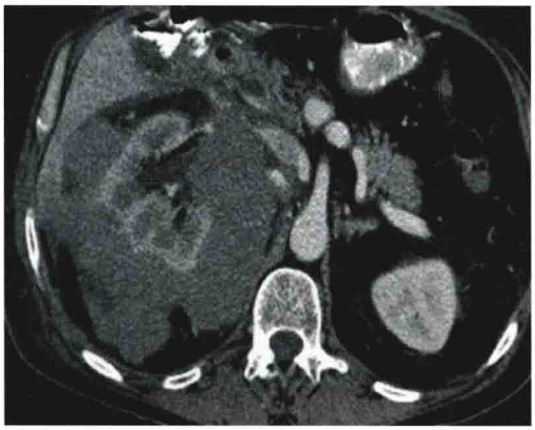

Figure 3.1

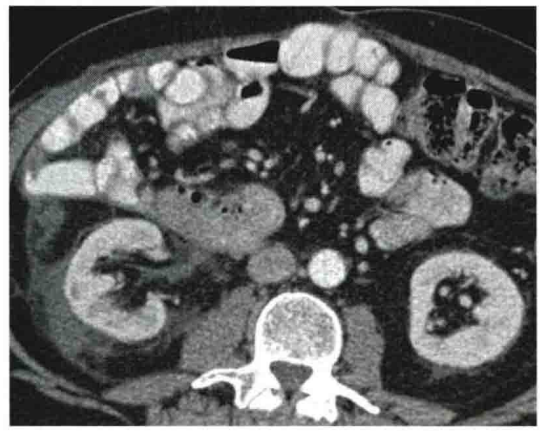

Figure 3.2

Case 3 Perinephric Lymphoma

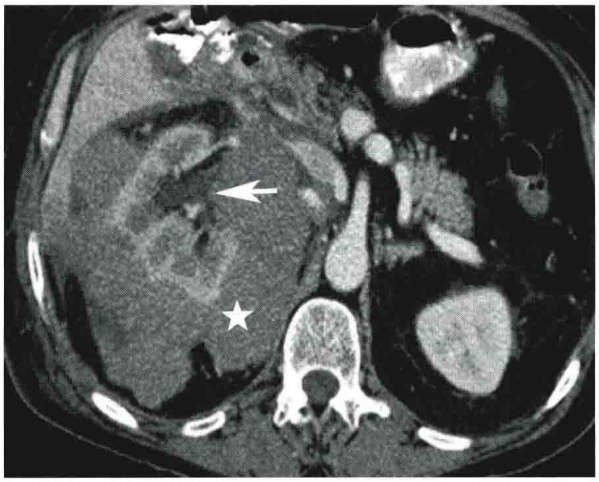

Figure 3.3

Findings

- Contrast-enhanced CT (Figure 3.1) shows a large, homogeneous, mildly enhancing perinephric mass encasing the right kidney (asterisk in Figure 3.3). The large perinephric component displaces and distorts the renal parenchyma and extends to the renal hilum (arrow in Figure 3.3).
- Follow-up CT after chemotherapy reveals significant interval reduction with small residual perinephric soft tissue (Figure 3.2).

Differential Diagnosis

- Differential diagnosis of perinephric soft tissue includes lymphoma, sarcoma, retroperitoneal fibrosis, and perinephric hematoma. Perinephric hematomas can be identified by drop in hematocrit, history of trauma, or biopsy and lack of enhancement. Although retroperitoneal fibrosis can present as perinephric soft tissue, it usually affects the periaortic lower retroperitoneum and is less bulky. Retroperitoneal sarcomas show heterogeneous enhancement and do not typically have perinephric distribution. Bulky, homogeneously hypoenhancing perinephric soft tissue, as seen in this, case would favor lymphoma.

Teaching Points

- Renal lymphoma manifests as a solitary renal mass, multifocal/bilateral renal masses, perinephric masses, or diffuse nephromegaly.
- Perinephric lymphoma can occur from direct extension of retroperitoneal lymphadenopathy or transcapsular spread of parenchymal disease, or it can represent the only manifestation.
- Perirenal lymphoma can completely surround the kidney without functional impairment or parenchymal compression.
- Extension into the renal hilum may encase the renal vessels.
- Perinephric lymphoma is homogeneous and hypoenhancing on CT.

Management

- Percutaneous biopsy can confirm the diagnosis followed by appropriate chemotherapy.

Further Reading

Westphalen A, Yeh B, Qayyum A, Hari A, Coakley FV. Differential diagnosis of perinephric masses on CT and MRI. *AJR Am J Roentgenol.* 2004;183(6):1697–1702.

History

- 48-year-old male with weight loss

Figure 4.1

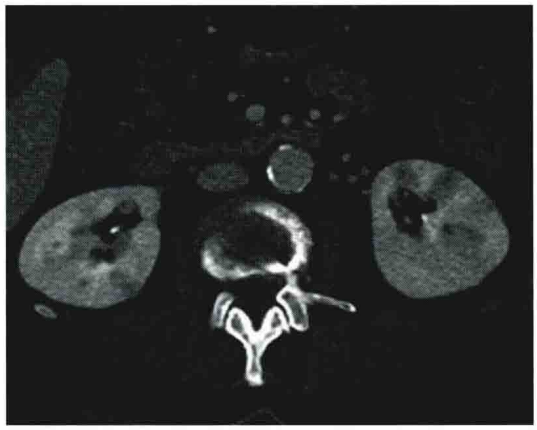

Figure 4.2

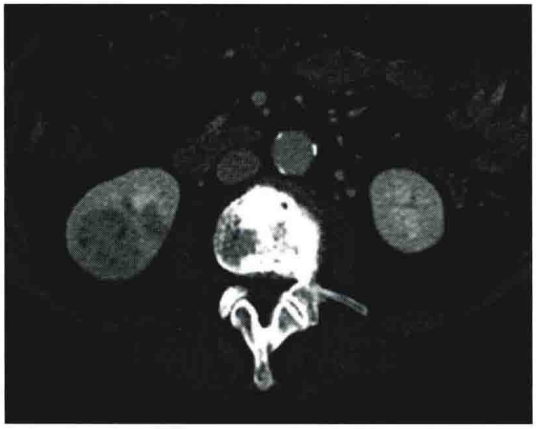

Figure 4.3