Definition

Carcinoma arising in the epithelium of the upper urinary tract.

- **Epidemiology**
  Three times more common in men than women • *Peak incidence:* Sixth decade • Annual incidence in Europe and the USA: 20 in 100 000.
- **Etiology**
  Smoking is the single most important risk factor • A genetic disposition has been proposed but its influence seems to be small • Papillary carcinoma is the most common type • Muscle invasion (T2 tumors) is paramount for staging, treatment, and prognosis.

Imaging Signs

- **Modality of choice**
  Biphasic CT with CT IVP.
- **Pathognomonic findings**
  Irregular polypoid filling defect in the collecting system.
- **CT and MRI findings**
  Irregular polypoid intraluminal mass with only slight contrast enhancement • The collecting system proximal and distal to the tumor may be enlarged.
- **Intravenous pyelogram findings**
  Isolated or multiple filling defects within the collecting system • Dilatation of a single calix (hydrocalix) or the entire collecting system (hydronephrosis, hydroureter).

Clinical Aspects

- **Typical presentation**
  Painless hematuria.
- **Treatment options**
  Curative: Radical resection (nephroureterectomy with partial bladder resection) • *Palliative:* Radiotherapy, chemotherapy.
- **Course and prognosis**
  Depend on the T stage • Well-differentiated in situ and T1 tumors have a very good prognosis • Patients with muscle infiltration (T2) have a much poorer prognosis • T3/T4 tumors have a 5-year survival rate of less than 20%.
- **What does the clinician want to know?**
  Extent: Panurothelial disease • Severity of urinary obstruction • Tumor stage.

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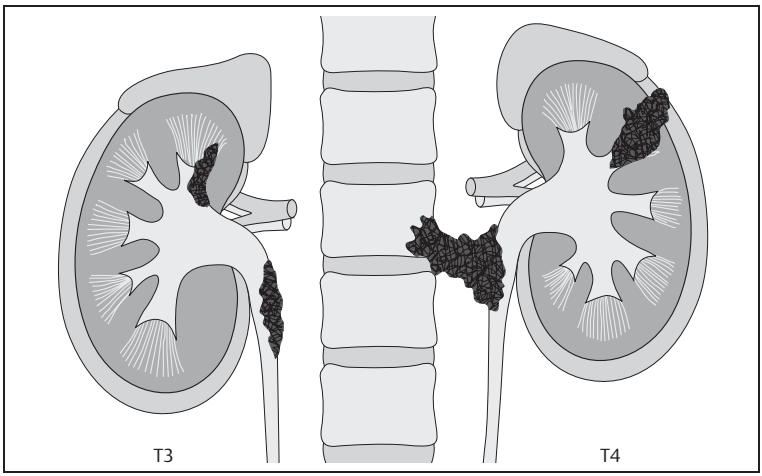

Fig. 2.17 T3/T4 stages of urothelial carcinoma of the renal pelvis and ureter. T3 tumors extend beyond the muscularis propria and invade the peripelvic/periureteral tissue or renal parenchyma. T4 tumors invade perirenal fat or contiguous organs.

Differential Diagnosis

Renal cell carcinoma	– Hypervascular tumor – Predominantly intraparenchymal – Tumor may extend into the renal vein – No urinary obstruction
Renal tuberculosis	– Bizarre morphology – Calcifications
Radiolucent calculus	– Smooth contour – No contrast enhancement – Ureteral spasm distal to the calculus

Tips and Pitfalls

Panurothelial disease: Imaging must include the lower urinary tract and contralateral collecting system in order not to underestimate tumor extent • A tumor may be missed on IVP unless at least three zonograms are obtained.

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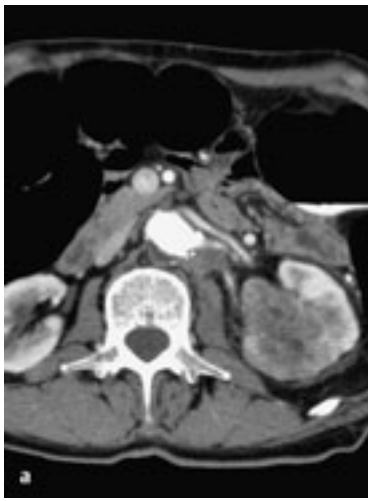

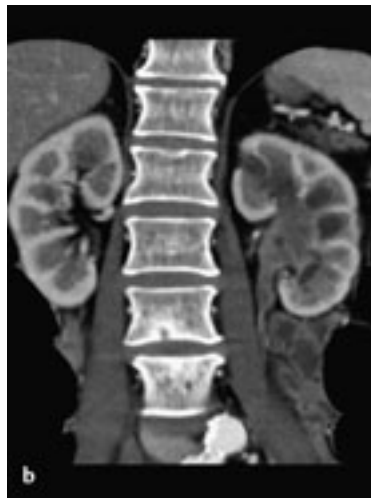

Fig. 2.18 a, b Urothelial carcinoma (T4) of the left kidney extending from the renal pelvis into the proximal ureter.

a Axial corticomedullary phase CT scan. Inhomogeneous opacification of the tumor, which is seen to extend through the posterior parenchyma into the perinephric fatty tissue.

b Coronal reconstruction showing dilated calices and extension of the tumor into the proximal ureter.

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Definition

BPH is the adenomatous enlargement of the transitional zone of the prostate • It is a common condition that is considered abnormal when it causes bladder outlet obstruction and voiding problems • BPH is rarely the primary site of prostate cancer.

- **Epidemiology**
  Common in men aged 50 and older • Often progressive enlargement.

Imaging Signs

- **Modality of choice**
  Transrectal or transvesical ultrasound.
- **Routine diagnostic workup**
  Digital rectal examination • Transrectal or transvesical ultrasound is the first-line imaging modality • Retrograde urethrogram to rule out further urethral strictures in patients with bladder outlet obstruction.
- **Ultrasound findings**
  Inhomogeneous area of high and low echogenicity in the center of the prostate • Acoustic shadowing indicates calcifications • Limited visualization of prostate zonal anatomy.
- **Intravenous pyelogram findings**
  Protrusion of the enlarged prostate gland at the floor of the bladder • Significant enlargement of the prostate can cause bladder base elevation with "J-ing" or "fish hooking" of the distal ureters.
- **MRI findings**
  Exquisite visualization of the zonal anatomy on T2-weighted images • Well-defined enlarged transitional zone • Usually inhomogeneous with areas of high and low signal intensity • Smooth interface with the peripheral zone.
- **CT findings**
  No visualization of the zonal anatomy • Enlargement of the entire prostate gland • Median lobe protrudes into the floor of the bladder • Prostate cancer cannot be excluded.

Clinical Aspects

- **Typical presentation**
  Voiding problems • Reduced urine flow • Often detected in patients undergoing diagnostic assessment for PSA elevation or as an incidental finding on abdominal ultrasound.
- **Treatment options**
  Surgical adenectomy or TURP.
- **Course and prognosis**
  Excellent prognosis • Recurrent BPH is uncommon.
- **What does the clinician want to know?**
  Extent of BPH • Other causes of bladder outlet obstruction (e.g., urethral stricture)? • Signs of prostate cancer?

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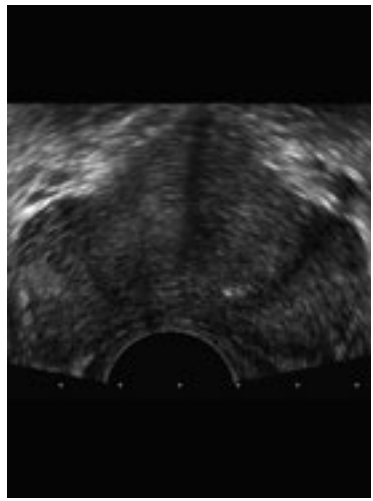
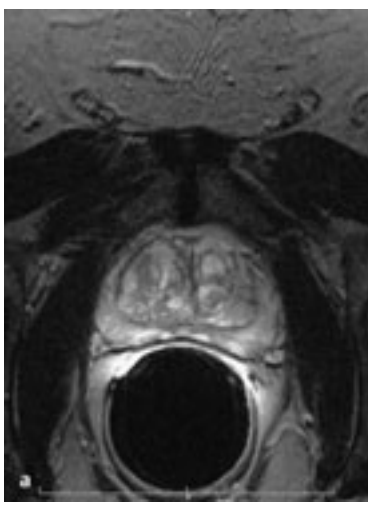
Fig. 3.17 Benign prostatic hyperplasia. Ultrasound.





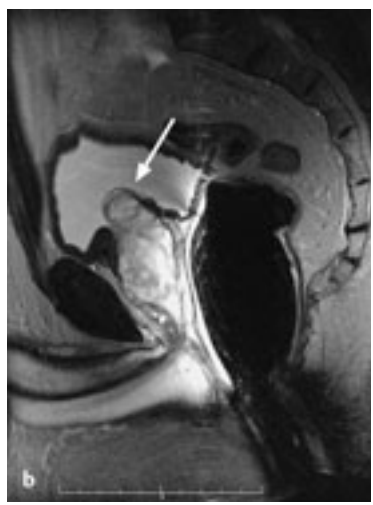


Fig. 3.18 a, b T2-weighted MRI sequence. Good visualization of the zonal anatomy of the prostate. The transitional zone is markedly enlarged and protrudes into the bladder base.
a Axial image.
b Sagittal image.

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Differential Diagnosis

Prostate cancer	– Mainly in the peripheral zone of the prostate – Less bulbous – Biopsy to resolve inconclusive findings
Bladder tumor	– Different morphologic appearance – Arises from the bladder
Prostatic utricle cyst	– Midline cystic lesion, located posterior and superior to the verumontanum, confined to the prostate or extends posteriorly beyond the prostate

Tips and Pitfalls

BPH may be mistaken for prostate cancer.

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