

Clinics in diagnostic imaging (97)

M Muttarak, N Pattamapaspong

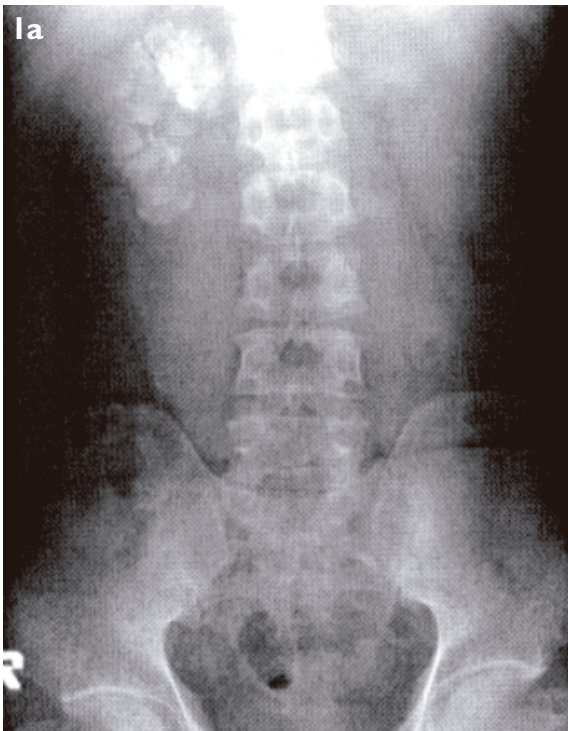


Fig. 1a Anteroposterior abdominal radiograph.

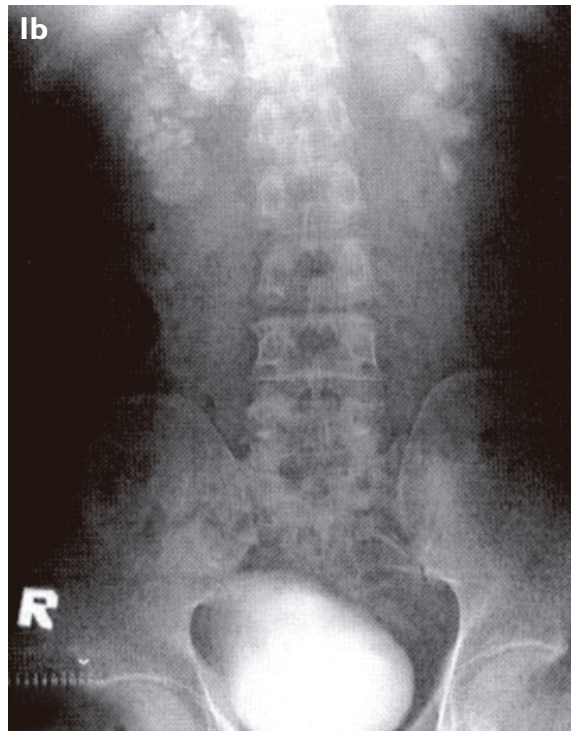


Fig. 1b Full-length IVU taken at one hour.

CASE PRESENTATION

A 50-year-old man complained of episodes of recurrent right flank pain and dysuria for many years. The patient had a medical history of hypertension and gouty arthritis that was being treated on oral medication. Physical examination revealed no abnormal finding. Blood pressure was 130/90mmHg. Laboratory investigations showed a serum haemoglobin

level of 14.7g/dL, haematocrit of 44.1%, white blood cell count of 9.3×10^9 /dL, blood urea nitrogen (BUN) of 15mg/dL (normal 8-20), creatinine of 1.2mg/dL (normal 0.7-1.5), and uric acid of 15.7mg/dL (normal 3.0-8.0). Urinalysis was normal. What do the abdominal radiograph and intravenous urography (IVU) show (Fig. 1a-b)? What is the diagnosis?

Department of
Radiology
Chiang Mai
University
Chiang Mai 50200
Thailand

M Muttarak, MD
Professor

N Pattamapaspong,
MD
Resident

Correspondence to:
Prof Malai Muttarak
Tel: (66) 53 945450
Fax: (66) 53 217144
Email: mmuttara@
med.cmu.ac.th

IMAGE INTERPRETATION

Abdominal radiograph (Fig. 1a) shows extensive parenchymal calcification in a lobar distribution in the right kidney and small calyceal stones in the left kidney. IVU (Fig. 1b) shows no excretion of contrast medium from the right kidney and mild clubbing of the left calyces. The left ureter and urinary bladder appear normal.

DIAGNOSIS

Right renal tuberculous autonephrectomy.

CLINICAL COURSE

Chest radiograph was performed and showed no abnormality. The patient underwent a right nephrectomy. Histopathological diagnosis was tuberculous pyelonephritis. He made a good post-operative recovery. Anti-tuberculous drugs were given for six months. He was well at three year follow-up. Repeat serum uric acid level was 5.6mg/dL.

DISCUSSION

The prevalence of tuberculosis (TB) has been rising significantly during the past decade, due to the rising number of people with acquired immunodeficiency syndrome (AIDS) and the development of drug-resistant strains of *Mycobacterium tuberculosis*^(1,2). The genitourinary system is the most common site of extrapulmonary TB. Renal TB usually results from haematogenous dissemination of *Mycobacterium tuberculosis* from the lungs. However, radiographical evidence of pulmonary TB is present in less than 50% of patients with renal TB, and active pulmonary disease is present in approximately 5% of such patients⁽³⁾.

Tubercle bacilli lodge in periglomerular capillaries and form cortical granulomas. These cortical granulomas can remain stable for many years⁽⁴⁾. If reactivation occurs, the organisms spread into the medulla, causing papillary necrosis. As the disease progresses, extensive papillary necrosis may present with the formation of frank cavities destroying the renal parenchyma. Communication of the granulomas with the collecting system can lead to spreading of bacilli into the renal pelvis, ureter, urinary bladder, and genital organs. Parenchymal masses can develop and may be calcified. Advanced disease leads to cortical scarring, and infundibular, pelvic and ureteral strictures. Renal TB usually does not manifest until 10-15 years after a primary pulmonary infection⁽⁵⁾.

The most common symptoms of patients with genitourinary TB are frequent voiding and dysuria. Other symptoms include haematuria, and back, flank, and abdominal pain. Some patients may present with symptoms unrelated to genitourinary tract.

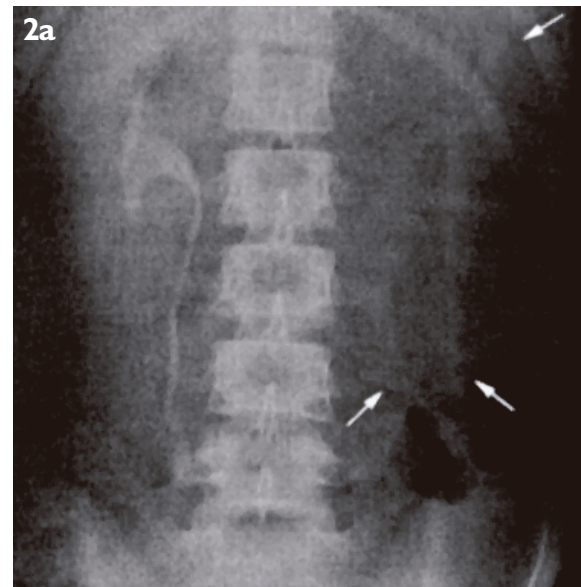


Fig. 2 16-year-old girl who presented with fever and left flank pain. (a) IVU shows normal excretory function of the right kidney and faint nephrogram of the enlarged left kidney (arrows). The right pelvicalyceal system and ureter appear normal. There are multiple lucent densities due to unopacified, dilated calyces in the left kidney. (b) Retrograde pyelogram of the left kidney shows calyceal dilatation, infundibular stenoses (thin arrows) and a contracted renal pelvis (thick arrow).

Constitutional symptoms, such as fever, weight loss, fatigue and poor appetite, are less common^(6,7). The radiological findings in renal TB depend on the extent of the disease process. The early radiographical changes in renal TB may be subtle and difficult to define. A normal IVU does not rule out renal TB. Approximately 10%-15% of patients who present with active renal TB will have normal urographical

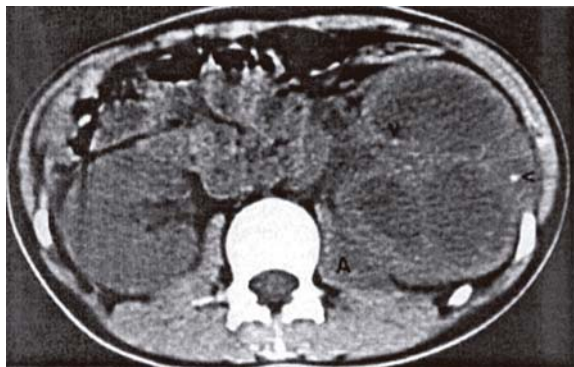


Fig. 3 Unenhanced CT image of the same patient as in Fig. 2 shows enlargement of the left kidney, markedly-dilated calyces, parenchymal thinning with scattered calcifications (arrowheads) and an abscess (A) in the left psoas muscle.

findings. The earliest radiological abnormality is irregularity of the calyx due to papillary necrosis. The lesion can affect either single or multiple calyces, and may involve one or both kidneys. Infundibular strictures result in calyceal dilatation. When the stricture is complete, the entire calyx may not be seen (phantom calyx). The renal pelvis is typically small and contracted.

Radiological findings in the ureter are also variable. Early ureteric infection produces mucosal irregularity due to ulcerations. Healing of these ulcers results in ureteric fibrosis. Multiple strictures may produce alternating segments of dilatation and narrowing. This beaded appearance is characteristic of ureteric TB. The ureter may be shortened and straightened, producing a pipe-stem appearance. The urinary bladder may show poor distensibility, owing to irritative spasm or fibrosis. Renal calcifications are a common manifestation of TB on radiographs. Calcifications may be amorphous, granular, curvilinear, or lobar. Extensive parenchymal calcification in a lobar pattern with autonephrectomy, similar to the presented case, is called putty kidney and is characteristic of end-stage TB⁽⁵⁻⁷⁾. Because renal function is compromised at the time of presentation in more than 50% of the cases, antegrade or retrograde pyelography is often necessary (Fig. 2).

Computed tomography (CT) is helpful in identifying the manifestations of renal TB and extrarenal spread of disease^(1,2,5,7-10) (Fig. 3). However, CT is less sensitive than urography in the detection of early uroepithelial mucosal changes. CT is the most sensitive method to identify renal calcification, which occurs in

approximately 40%-70% of renal TB⁽⁴⁾. Other CT features include various patterns of hydronephrosis depending on the site of the stricture, parenchymal scarring and low-attenuation parenchymal lesions. Ultrasonography is less sensitive than either urography or CT in the evaluation of urogenital TB^(5,9).

The differential diagnosis for the radiological features of renal TB includes chronic pyelonephritis, papillary necrosis, medullary sponge kidney, calyceal diverticulum, renal cell carcinoma, and xanthogranulomatous pyelonephritis^(1,6,7). Renal TB should be considered whenever a pattern of chronic renal inflammatory disease with multiple abnormal findings is recognised.

ABSTRACT

A 50-year-old man presented with recurrent episodes of right flank pain and dysuria for many years. Abdominal radiograph and intravenous urography showed extensive right renal parenchymal calcification in a lobar distribution and a non-functioning right kidney, characteristic of end-stage tuberculosis. The pathology, clinical manifestations, and radiological findings of renal tuberculosis are discussed.

Keywords: genitourinary tuberculosis, kidneys, renal diseases, tuberculosis, tuberculous autonephrectomy

Singapore Med J 2004 Vol 45(5):239-241

REFERENCES

1. Harisinghani MG, McLoud TC, Shepard JAO, Ko JP, Shroff MM, Mueller PR. Tuberculosis from head to toe. *RadioGraphics* 2000; 20:449-70.
2. Engin G, Acunas B, Acunas G, Tunaci M. Imaging of extrapulmonary tuberculosis. *RadioGraphics* 2000; 20:471-88.
3. Becker JA. Renal tuberculosis. *Urol Radiol* 1988; 10:25-30.
4. Leder RA, Low VHS. Tuberculosis of the abdomen. *Radiol Clin North Am* 1995; 33:691-705.
5. Kenney PJ. Imaging of chronic renal infections. *Am J Roentgenol* 1990; 155:485-94.
6. Narayana A. Overview of renal tuberculosis. *Urology* 1982; 19:231-7.
7. Gibson MS, Puckett ML, Shelly ME. Renal tuberculosis. *RadioGraphics* 2004; 24:251-6.
8. Kawashima A, Sandler CM, Goldman SM, Raval BK, Fishman EK. CT of renal inflammatory disease. *RadioGraphics* 1997; 17:851-66.
9. Baumgarten DA, Baumgartner BR. Imaging and radiologic management of upper urinary tract infections. *Urol Clin North Am* 1997; 24:545-69.
10. Wang LJ, Wong YC, Chen CJ, Lim KE. CT features of genitourinary tuberculosis. *J Comput Assist Tomogr* 1997; 21:254-8.