Clinics in Diagnostic Imaging (71)

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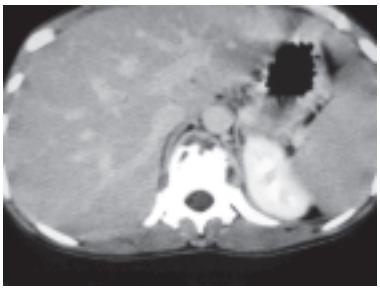

Fig. 1a Enhanced axial CT scan taken at the level of T12 vertebra.

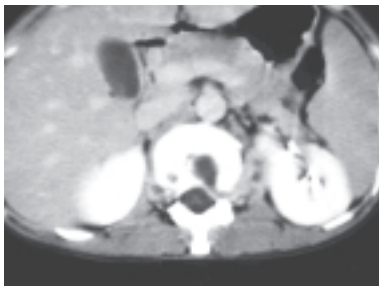

Fig. 1b Enhanced axial CT scan taken at the level of L1 vertebra.

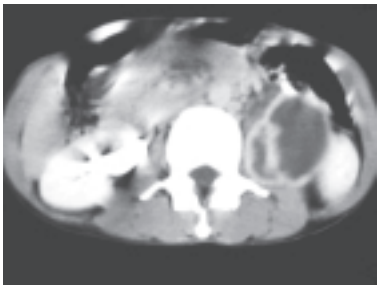

Fig. 1c Enhanced axial CT scan taken at the level of the mid-pole of the right kidney.

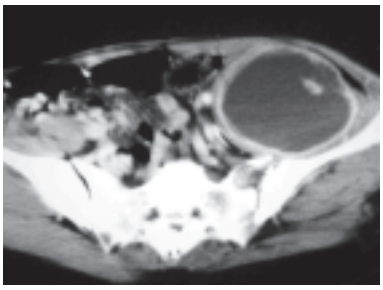

Fig. 1d Enhanced axial CT scan taken at the level of the ilium.

Fig. 1e Enhanced axial CT scan taken at the level of the femoral lesser trochanters.

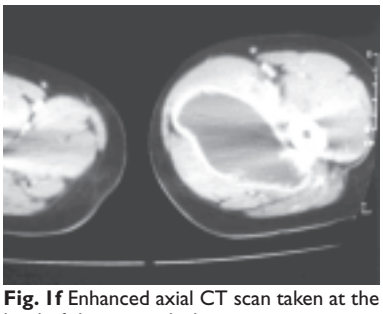

Fig. 1f Enhanced axial CT scan taken at the level of the upper thighs.

CASE PRESENTATION

A 26-year-old woman presented with a progressively painful lump at her left groin and upper thigh for five months. She had no associated fever. She had a history of intermittent back pain for three years. On further questioning, it was discovered that the patient had been partially treated with oral antibiotics by her family physician prior to presentation at the hospital. On admission, her temperature was 37.8ºC. Blood pressure was normal. Physical examination revealed an ill-defined mass at the left groin that extended to the upper thigh. There were no signs of inflammation. Laboratory investigations revealed a serum haemoglobin level of 9.2 g/dL, and a leukocyte count of 6.0 x 10^9/dL with 85% neutrophils, 13% lymphocytes, and 2% monocytes. Erythrocyte sedimentation rate (ESR) was more than 20 mm/hr. Urinalysis was unremarkable. Chest radiograph was normal. As she was suspected to have a soft tissue tumour, computed tomography (CT) of the abdomen was performed (Figs. 1a-f). What do the CT scans show? What is the diagnosis?

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Fig. 2 Lateral thoracolumbar radiograph shows destruction of the anterior borders of bodies of T10 to T12 vertebral bodies and osteolytic areas within the posterior L1 and L2 vertebral bodies.

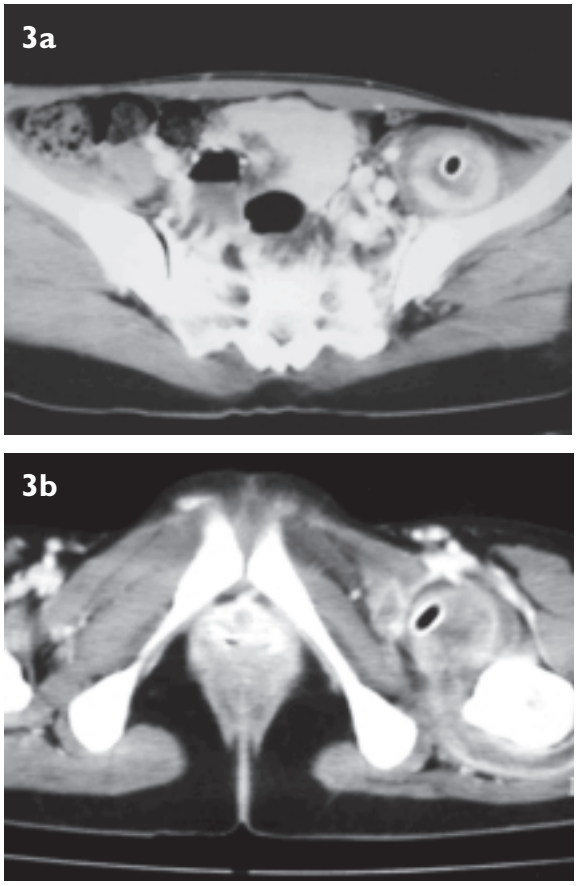

Fig. 3 Follow-up CT scan performed 3 weeks later. (a) Enhanced axial CT scan taken at the level of the ilium, corresponding to Fig. 1d, shows an indwelling silastic tube and a much smaller iliopsoas abscess. (b) Enhanced axial CT scan taken at the level of the femoral lesser trochanters, corresponding to Fig. 1e, shows a small residual left iliopsoas abscess and a much smaller left gluteal abscess.

IMAGE INTERPRETATION

Enhanced CT scans obtained at different levels show osteolytic destruction of the 12th thoracic and first lumbar vertebral bodies (Figs. 1a, b), with a left paraspinal soft tissue mass that extends from the vertebrae to involve the left psoas muscle. The left psoas muscle is markedly enlarged, and displaces the left kidney laterally (Fig. 1c). The lesion is of low attenuation with prominent rim enhancement. It involves the left iliacus muscle (Fig. 1d) down to the iliopsoas insertion, and tracks posteriorly deep to the left gluteus maximus muscle (Fig. 1e) and further distally into the left adductor magnus muscle (Fig. 1f).

DIAGNOSIS

Left iliopsoas abscess secondary to vertebral osteomyelitis.

CLINICAL COURSE

Thoracolumbar radiographs confirmed the bony findings detected on CT and in addition, showed destruction of the anterior borders of T10 to T12 vertebral bodies, and osteolytic lesions in the posterior L1 and L2 vertebral bodies (Fig. 2). Incisional drainage with placement of a silastic tube was performed. Five hundred ml of greenish pus was obtained. Gram and acid fast bacilli stains were negative. Pus culture showed no growth for bacteria and Mycobacterium tuberculosis. However, the patient improved clinically with a course of intravenous Cloxacillin at dosages of 2 g four-hourly for two weeks and 2 g six-hourly for four weeks. Follow-up CT scans three weeks later showed much decrease in size of all the abscesses (Figs. 3a, b). She was well at six-month follow-up.

DISCUSSION

The diagnosis of an iliopsoas abscess remains a difficult clinical challenge due to the deep anatomical position of the psoas muscle. The iliopsoas compartment often acts as a conduit for distant spread of disease. An understanding of the anatomy of the iliopsoas compartment and its relations is therefore important for accurate diagnosis of lesions affecting the psoas muscle[1]. As illustrated in our case, many patients present with subtle or non-specific symptoms, resulting in a delayed diagnosis. The disease may simulate septic arthritis, appendiceal abscess, incacerated hernia, soft tissue tumour of the thigh, tuberculous spondylitis with abscess formation, and pelvic inflammatory disease[2].

Patients are often referred for imaging investigations without a firm clinical diagnosis. Conventional radiographs are often unhelpful in the diagnosis of iliopsoas abscesses. The advent of non-invasive techniques such as ultrasonography (US) and CT are helpful in diagnosis and localisation of iliopsoas abscesses. US is often the initial imaging investigation as non-specific clinical presentation is frequent but a small lesion may easily be missed. CT is more reliable than US in demonstrating iliopsoas abscesses[3].

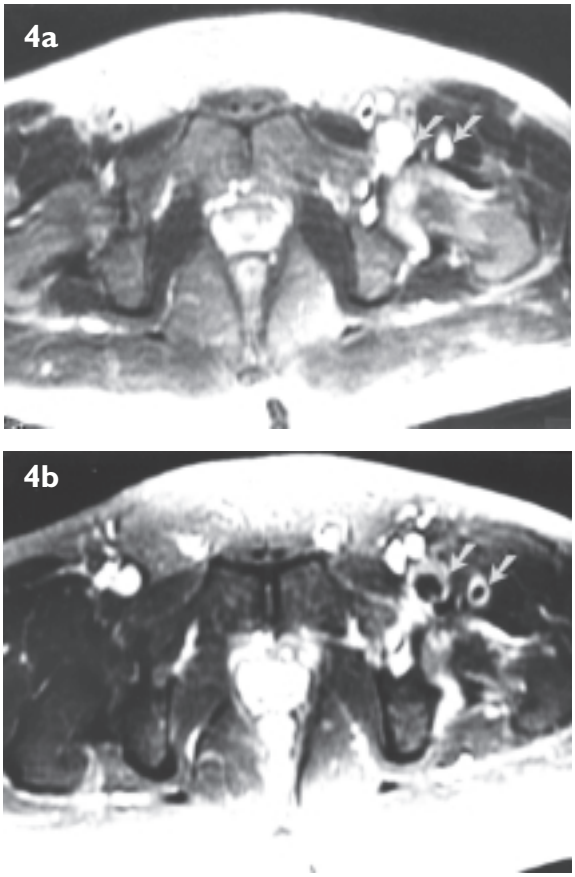

Fig. 4 Primary iliopsoas abscesses in a 40-year-old woman with a known diagnosis of systemic lupus erythematosus on steroid treatment. a) Axial fast spin-echo T2-W MR image taken at the level of the hip joints shows multiple small rounded areas of high signal intensity (arrows) within the distal left iliopsoas muscle. (b) Enhanced axial spin-echo T1-W MR image taken at the same level as Fig. 4a shows a typical pattern of rim enhancement around the rounded lesions (arrows).

Magnetic resonance (MR) imaging shows abscesses as areas of low signal intensity on T1-weighted MR images and areas of high signal intensity on T2-weighted MR images. These findings are often indistinguishable from those of metastases and lymphoma[4]. Abscesses typically display rim enhancement after intravenous contrast administration (Figs. 4a, b).

On CT, an iliopsoas abscess appears as iliopsoas muscle enlargement that has a low attenuation area within. Rim enhancement is typically demonstrated after intravenous administration of contrast agent. The presence of gas bubbles is highly suggestive of infection but it is not pathognomonic since tumour and haemorrhage have been described to produce gas bubbles[5-7]. CT is more sensitive than MR imaging for demonstrating gas bubbles (Fig. 5) as gas appears as areas of low signal intensity on all conventional MR sequences. CT is useful in guiding aspiration and drainage of psoas abscesses, both for diagnosis and therapy (Fig. 6). CT also has an important role in the follow-up of treated lesions (Figs. 1, 3).

Table 1. Classification of iliopsoas lesions.

	Lesion type	
Lesion source	Primary	Secondary
Infection	HIV carrier Immunocompromised patient Corticosteroid treatment	Vertebral infection Renal infection Bowel infection Pancreatic infection
Tumour	Primary muscle tumour Haematogeneous spread from distant primaries	Extension from: retroperitoneal, abdominal and pelvic tumours; lymph nodes; neurogenic tumour; vertebral tumour; Recurrent tumour
Haemorrhage	Bleeding diathesis Anti-coagulation therapy Spontaneous	Trauma Tumour Recent surgery/biopsy Extension from: adjacent bleeding organs and vessels

Adapted from Muttarak M, Peh WCG. CT of unusual iliopsoas compartment lesions. RadioGraphics 2000;20:S53-S66

The iliopsoas muscle compartment may be involved by different disease processes, such as infection, tumour and haemorrhage. As differentiation among the various causes of these lesions may be difficult, iliopsoas lesions may be classified according to whether the disease process was primary (i.e. affecting only the iliopsoas compartment) or secondary (i.e. extending into the iliopsoas compartment from an adjacent structure). It should be emphasised that careful correlation of the imaging features with clinical data is necessary to enhance diagnostic accuracy[1]. This classification is summarised in Table I.

In the past, iliopsoas abscess was a well-recognised complication of tuberculous infection of the spine. Currently, non-tuberculous, i.e. pyogenic, iliopsoas abscess is a more frequently encountered disease entity. The most common organisms are Staphylococcus aureus and mixed gram-negative organisms. Secondary infection is much more frequent than primary infection, and is usually due to direct extension from infection of adjacent structures such as the pancreas, kidney (e.g. perinephric abscess), bowel (e.g. appendicitis, diverticulitis, perforated colonic carcinoma), and vertebrae[1,8-11]. Primary iliopsoas abscess is rare and is usually idiopathic. It tends to be found in immunocompromised patients such as those receiving corticosteroids and chemotherapy, and patients with human immunodeficiency virus (HIV) infection (Fig. 7).

Neoplastic and haemorrhagic lesions may be similarly classified into primary or secondary lesions. CT imaging features of tumours include muscle enlargement, areas of low attenuation, irregular

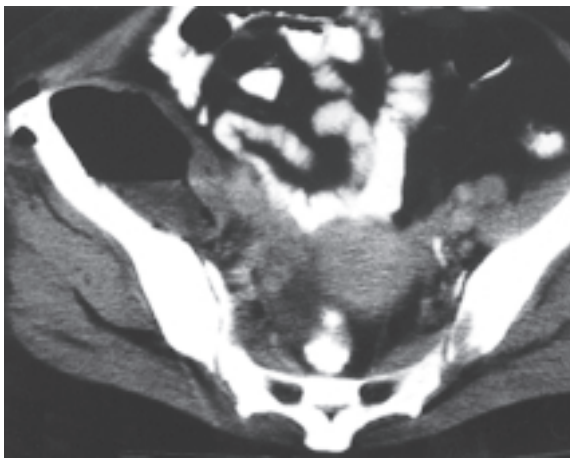

Fig. 5 Secondary iliopsoas abscess in a 47-year-old woman with right iliac osteomyelitis. Unenhanced axial CT scan shows a large swelling of the right iliacus muscle, with an air-fluid level within it. Organism cultured was Salmonella enteritidis.

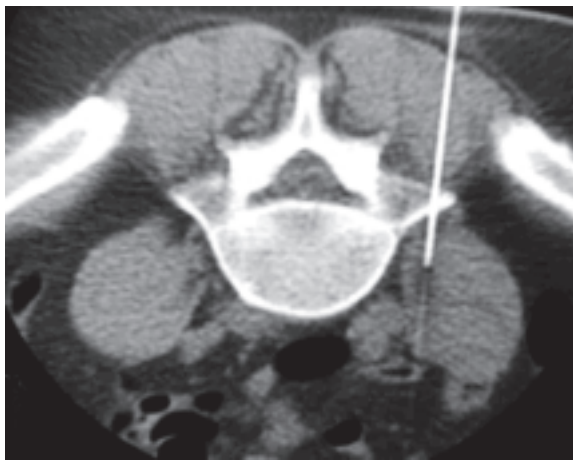

Fig. 6 CT-guided aspiration of a small right psoas abscess in a 45-year-old man. Aspiration was performed with the patient lying prone. The psoas abscess was detected on MR scans (not shown).

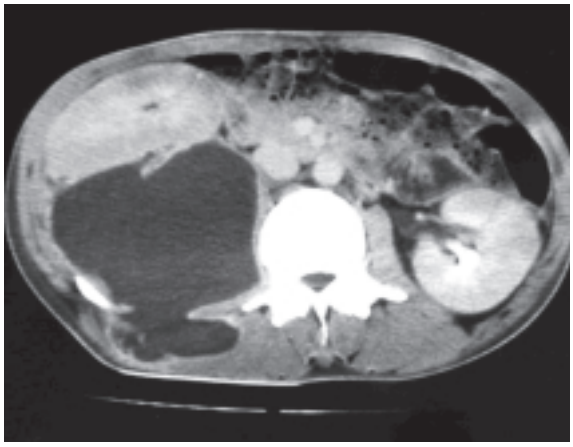

Fig. 7 Primary psoas abscess in a 37-year-old HIV-positive man. Enhanced axial CT scan shows a large abscess in the right psoas muscle with extension to the right paravertebral muscles. The right kidney is anteriorly displaced. Drainage was performed, and Staphyloccoccus aureus was cultured.

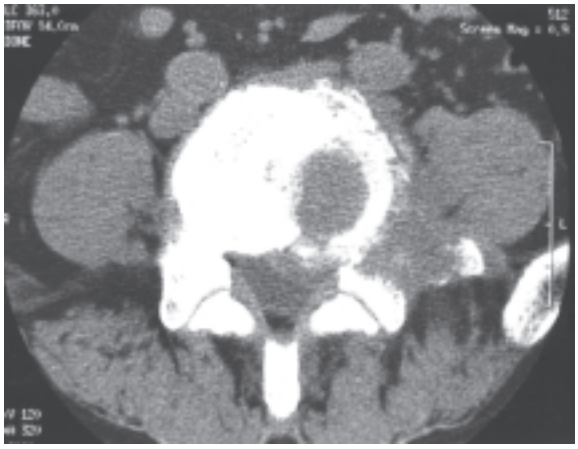

Fig. 8 Vertebral tumour involvement of the psoas muscle in a 64-year-old man with carcinoma of the piriform sinus. Unenhanced axial CT scan shows osteolytic destruction of the L5 vertebral body and left pedicle with soft tissue extension into the left psoas muscle.

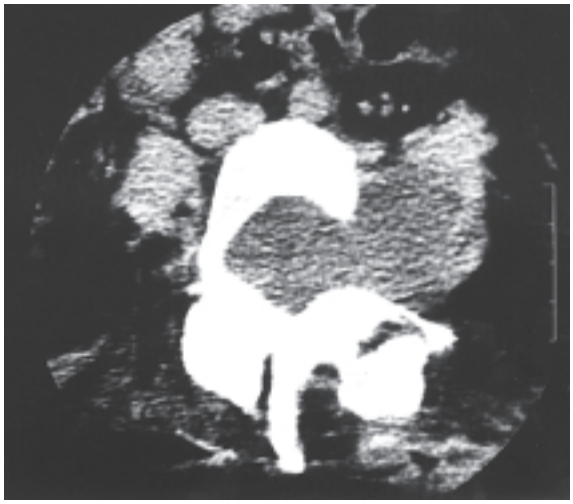

Fig. 9 Neurogenic tumour of the psoas muscle in a 42-year-old woman with neurofibromatosis. Enhanced axial CT scan shows extension of a dumb-bell shaped hypodense mass through an enlarged left L3/4 intervertebral foramen to involve the left psoas muscle.

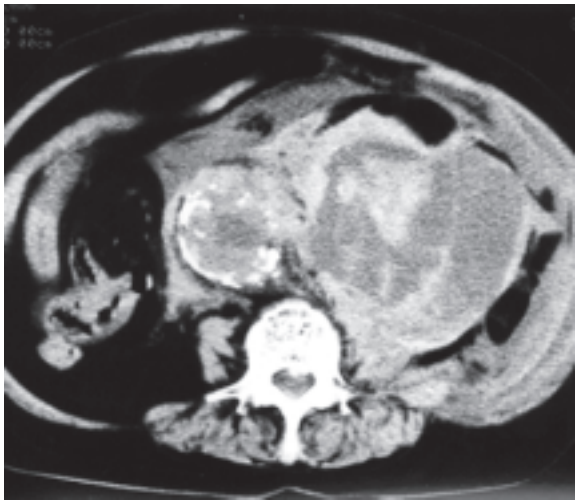

Fig. 10 Haemorrhagic involvement of the psoas muscle in a 70-year-old man with a ruptured abdominal aortic aneurysm. Unenhanced axial CT scan shows a large retroperitoneal haematoma extending from the aortic aneurysm. Calcification of the aortic wall is present. There are areas of high attenuation within the haematoma, indicating fresh blood.

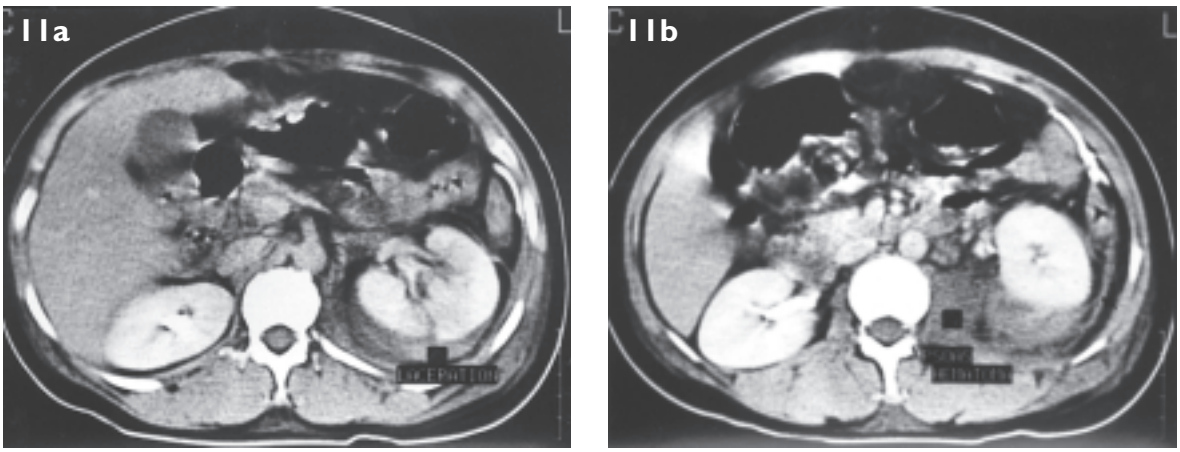

Fig. 11 Haemorrhagic involvement of the psoas muscle in a 35-year-old woman injured in a road traffic accident. (a) Enhanced axial CT scan taken at the level of the mid-pole of the left kidney shows a laceration of the posterior parenchyma of the left kidney (labelled) and a rim of perinephric haematoma. (b) Enhanced axial CT scan taken at the level of the lower pole of the left kidney shows extension of the left perinephric haematoma to the left psoas muscle (labelled).

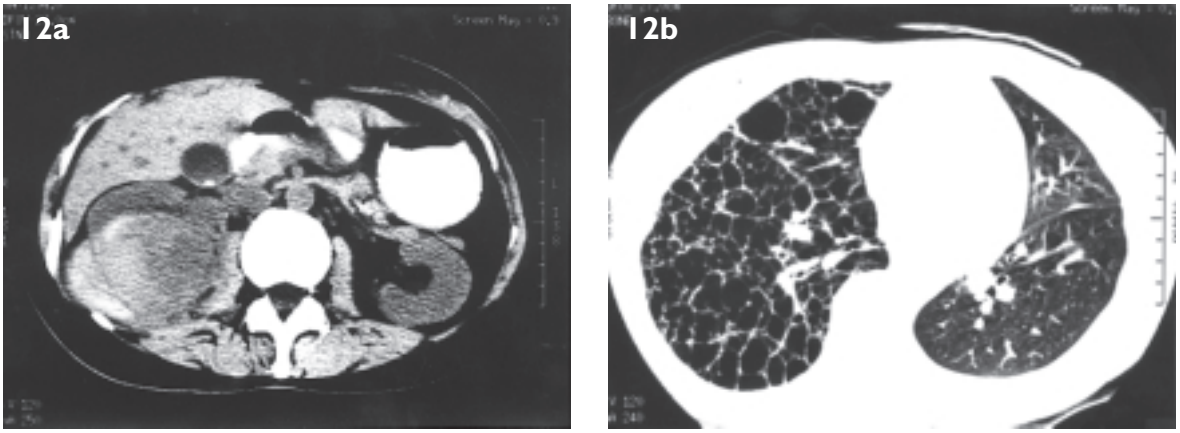

Fig. 12 Haemorrhagic involvement of the psoas muscle in a 29-year-old woman with lymphangioleiomyomatosis and spontaneous rupture of a right renal angiomyolipoma (not shown). (a) Unenhanced CT scan of the kidneys shows high attenuation areas of fresh haemorrhage within the right perinephric space that involves the right psoas muscle. (b) High-resolution CT scan of the lungs shows multiple well-defined thin-walled cysts in the right lung. Left lung transplantation had previously been performed.

margins, bone destruction (Fig. 8), and retroperitoneal lymphadenopathy. Tumour involvement of the iliopsoas compartment is most often secondary to direct extension of an adjacent tumour e.g. retroperitoneal, abdominal or pelvic tumours; neurogenic tumours (Fig. 9); direct invasion from lymphadenopathy; and bone tumours. Because imaging appearances may be non-specific, knowledge of the history of a known pre-existing tumour is very useful. CT imaging features of fresh haemorrhage consist of discrete areas of high attenuation (Fig. 10), sometimes with a fluid-fluid level. Chronic haematomas may be difficult to distinguish from tumours and infection, and intravenous contrast adminstration may be useful. Imaging is useful in helping to determine the underlying cause of haemorrhage (Figs. 11a, b), and knowledge of the patient's clinical history is very important to aid diagnosis (Figs. 12a, b).

In summary, imaging has a significant role in diagnosis of iliopsoas lesions, particularly infective ones. CT is currently the most useful single technique for visualising the anatomy of and disease processes involving the iliopsoas compartment. The imaging features of infection, tumour and haemorrhage may however appear similar. CT- guided biopsy and drainage may be required to help confirm the diagnosis and guide disease management.

ABSTRACT

A 26-year-old woman presented with a progressively painful lump at her left groin and upper thigh for five months. She also had intermittent back pain for three years. Radiographs and CT showed osteolytic destruction of the several contiguous thoracolumbar vertebrae with a large left iliopsoas abscess that extended to involve the left gluteus maximus and adductor magnus muscles. She responded well to a course of antibiotics. The role of imaging and imaging features of iliopsoas abscesses are discussed, together

with a classification of an approach to the diagnosis of iliopsoas lesions. CT is currently the single most useful technique for visualising the anatomy of and disease processes involving the iliopsoas compartment.

Keywords: Abscess, computed tomography (CT), iliopsoas muscle, muscle infection, psoas disease

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REFERENCES

1. Muttarak M, Peh WCG. CT of unusual iliopsoas compartment lesions. RadioGraphics 2000; 20:S53-S66.
2. Oliff M, Chuang VP. Retroperitoneal iliac fossa pyogenic abscess. Radiology 1978; 126:647-52.
3. Daly BD, McPhillips M, Leung AW, Evans RM, Metreweli C. Ultrasound, computed tomography and magnetic resonance in the investigation of iliopsoas compartment disease. Australas Radiol 1992; 36:294-9.
4. Yang WT, Yeo W, Metreweli C. Imaging of iliopsoas metastasis. Clin Radiol 1999; 54:85-9.
5. Lenchik L, Dovgan DJ, Kier R. CT of the iliopsoas compartment: valuein differentiating tumor, abscess, and hematoma. Am J Roentgenol 1994; 162:83-6.
6. Van Dyke JA, Holley HC, Anderson SD. Review of iliopsoas anatomy and pathology. RadioGraphics 1987; 7:53-84.
7. Nash S, Rubenstein J, Chaiton A, Morava-Protzner I. Adenocarcinoma of the lung metastatic to the psoas muscle. Skeletal Radiol 1996; 25:585-7.
8. Mendez G Jr, Isikoff MB, Hill MC. Retroperitoneal processes involving the psoas demonstrated by computed tomography. J Assist Comput Tomogr 1980; 4:78-82.
9. Gordin F, Stamler C, Mills J. Pyogenic psoas abscesses: noninvasive diagnostic techniques and review of the literature. Rev Infect Dis 1983; 5:1003-11.
10. Williams MP. Non-tuberculous psoas abscess. Clin Radiol 1986; 37:253-6.
11. Kaul V, Jackson M, Farrugia M. Non-tuberculous iliopsoas abscess due to perforated diverticultis presenting with intestinal obstruction and a groin mass. Eur Radiol 2001; 11:959-61.