Fatty retroperitoneal tumours – plain film and computed tomographic appearances

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Summary: Three patients with large fatty retroperitoneal tumours are presented. In all three the fatty mass was visible (but initially not recognized as such) on plain abdominal radiographs. Computed tomography (CT) confirmed the presence of fat within these tumours. Attention is drawn to the importance of the correct interpretation of the plain abdominal radiograph when such fatty tumours are present. Computed tomography then proves the presence of fat as well as site of origin of such tumours.

Introduction

Large fat containing retroperitoneal tumours are rare. The fatty component of such tumours is frequently not recognized.¹ However the fatty content of such tumours may be visible on plain radiographs. Computed tomography (CT) can detect differences in soft tissue attenuation of less than 0.5%.² This ability to detect differences in tissue attenuation and thus tissue density with great sensitivity makes CT the ideal method for detection of fat within such tumours.³ CT also allows demonstration of the site of origin of and involvement by such tumours.

Case reports

Case 1

A 47 year old man presented with right sided renal colic. A plain abdominal radiograph showed a large calculus on the right (Figure 1a). This was subsequently shown to lie within the ureter during urography and was removed using a basket passed cystoscopically.

A right sided mass was felt on clinical examination some days postoperatively. An ultrasound examination suggested an infected urinoma. He was referred for CT guided percutaneous drainage of this 'collection'. At review of his radiographs prior to CT, a lucent mass with some solid components was noted (Figure 1a). This was thought to be a fatty tumour. The subsequent CT examination (Figure 1b) confirmed this and a diagnosis of retroperitoneal liposarcoma was made.

Some weeks later a 10 kg retroperitoneal pseudocapsulated tumour was removed completely. Histological examination confirmed a low grade

(lipogenic) liposarcoma. A follow up CT scan one year after resection was normal and the patient remains well 2 years after resection.

Case 2

This 66 year old lady presented because of increasing abdominal girth. She was admitted to her local hospital and a plain abdominal radiograph (Figure 2a) was thought to show no abnormality. She was then referred to our hospital for computed tomography (CT). On review of her abdominal film prior to CT (Figure 2a) a lucent area was noted on the right. There was some calcification within this lucency and the lucency appeared to be continuous with a solid left sided mass. The appearances were felt to be due to a liposarcoma.

The CT examination (Figure 2b) confirmed these findings. Some weeks later an 8 kg retroperitoneal tumour was resected without difficulty. Histological examination showed a myxoid liposarcoma. The patient remains well 15 months after surgery.

Case 3

A 57 year old lady presented because of sudden severe left sided abdominal pain. A plain abdominal radiograph taken at the time of admission (Figure 3a) was initially thought to be normal. This film was reviewed by the authors and as a lucent mass was present on the left in the region of the kidney, a diagnosis of angiomyolipoma was made. Computed tomography (Figure 3b) confirmed a partially fatty tumour involving the left kidney. There was an area of relatively high attenuation inferiorly (Figure 3c) which did not enhance. This was thought to be a haematoma and this was later confirmed. The remainder of the examination was normal and the patient had no

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Figure 1 (a) Control film from an IVU, showing a right sided ureteric calculus (small arrow). There is a large lucent mass on the right with some ore solid stroma within it (curved arrows), with deviation of the colon to the left (straight arrow). (b) Computed tomography showing a large fatty mass causing displacement of the contrast filled bowel to the left.

stigmata of tuberous sclerosis.

A left partial nephrectomy was performed. Histological examination of the resected specimen confirmed the diagnosis of angiomyolipoma with recent perinephric haemorrhage.

produce symptoms, either due to their bulk or compression of adjacent organs.⁴ Frequently the lucency caused by the fat within these tumours is only noted in the plain radiograph on retrospective review.^{1,5} The possibility of fatty tumours should be considered when unusual lucencies are seen on plain abdominal radiographs. This is especially so when dealing with patients who have an appropriate clinical history, such as large mass or generalized increase in abdominal size (Case 2). Such a lucency when seen on plain films may be due to angiomyolipoma, liposarcoma or may be in

Figure 2 (a) Plain abdominal radiograph showing a lucent area on the right (arrows). This contains some calcium. In addition there is a large soft tissue mass (arrowheads) causing deviation of the gas filled colon to the left. (b) Computed tomograph showing the mixed fatty mass (which contains a calcified area) with larger solid myxoid component.

Figure 3 (a) Plain abdominal radiograph showing the lucent fat in the region of the lower pole of the left kidney (arrows). (b) Post-contrast CT view showing a partially fatty tumour arising from the left kidney (c) Pre-contrast CT scan showing a moderately high attenuation area (small arrows), within the mainly fatty tumour (large arrows). This did not enhance and at surgery was shown to be due to 'recent' clot.

a necrotic mass.⁵ In addition, when a large fluid containing structure is in immediate contact with a homogeneous soft tissue structure, such as liver, it may appear radiolucent.⁶ Thus a hydronephrotic renal collecting system or a pancreatic pseudocyst may stimulate a fat-containing tumour. Computed tomography allows demonstration of fat (if present) within such masses, as well as their site of origin and other organ involvement.

If the fat-containing mass is shown by CT to be retroperitoneal but extra-renal, then it is much more likely to be a liposarcoma than a lipoma.⁷ These authors suggest that when such a mass is seen it is better to assume malignancy and proceed with total excision without preliminary biopsy. The presence of inhomogeneity, poor margination, other soft tissue density intermixed with fat, contrast enhancement of the soft tissue component or evidence of invasion of surrounding tissue indicates a liposarcoma.⁵ Focal calcification (Figure 2b) can also be present in liposarcomas.⁸ This may also occur after radiotherapy to such tumours.⁹ Therefore on CT these tumours have a

variety of appearances, depending on the relative amounts of fat and other tissue present within them. Their appearance varies from a mainly lipomatous tumour (Figure 1b) to a solid one (Figure 2b), which can be indistinguishable from other soft tissue density tumours, the diagnosis being made histologically in these cases.

The majority of liposarcomas occur in the 40–60 year age group, with a male preponderance.⁷ It is considered to be the most common malignant soft tissue tumour.¹⁰ The present consensus of opinion is that all retroperitoneal sarcomas are malignant *de novo*.⁹

Five different histological types of retroperitoneal liposarcoma are described. Differentiated (lipomatous), embryonal, myxoid, pleomorphic and round cell. Accurate histological differentiation is important for prognosis. In one series the five year survival rate for the purely myxoid form was 60%, while that for the round cell type was 10%.¹⁰ Total radical surgical excision of the whole tumour (including the pseudocapsule which frequently occurs) followed by

adjuvant radiotherapy is the treatment of choice for these tumours.⁷

As against the rather poor prognosis presented by retroperitoneal liposarcoma, the angiomyolipoma has a good prognosis. It is a benign tumour containing all the elements implied by its name. Two groups are afflicted by this condition. The first group are those suffering from tuberous sclerosis in whom the tumours are usually small and multiple. The other group is females, mainly in the 33–55 age group. In these the tumours tend to be large and single. They are frequently present with acute symptoms due to bleeding into or around the tumour. In one series 94% had sudden or intermittent flank or abdominal pain, 30% had haematuria of varying degree, 38% had a palpable abdominal mass, while 13% presented with shock due to massive retroperitoneal haemorrhage.³ The preoperative diagnosis of such tumours should be possible in virtually every case. The fat content of the tumour may be visible on the control plain or tomographic films of an intravenous urogram.¹ The detection of fat within a renal tumour is diagnostic of this condition.¹¹

On CT these tumours appear heterogeneous (Figures 3b and c) with varying amounts of soft tissue interspersed throughout the predominantly fatty mass. The tumour often extends through the renal capsule into the perinephric space. There is no significant increase in density of the angiomyolipoma

after intravenous administration of contrast medium.¹² On non-contrast enhanced scans areas of increased density due to recent haemorrhage (Figure 3c) are frequently seen. Occasionally haemorrhage into the tumour can be so extensive as to obscure the presence of fat making the CT diagnosis of angiomyolipoma impossible.¹² Although this tumour is benign, the risk of massive haemorrhage (Case 3) warrants surgical resection. If necessary, bleeding caused by this sort of tumour can be controlled by transcatheter embolization following CT diagnosis.¹³ However the long term effects of this therapy have not yet been established.

In a child, a Wilm's tumour may contain enough fat to be recognized on CT,³ while in adults there is the theoretical possibility of an intrarenal liposarcoma. The only case of such a tumour we have been able to find in the recent literature¹⁴ did not have CT performed, so any differentiating features have not been described. If there is any doubt clinically, then angiography should be performed as the angiomyolipoma is a vascular tumour, while liposarcoma is avascular.^{1,5}

In conclusion we wish to emphasize the importance of CT in confirming the presence of fat within retroperitoneal tumours, but we also stress the importance of careful evaluation of the plain abdominal radiograph to detect the presence of the lucencies due to the fat within such tumours.

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