CASE REPORT

Calcaneal metastasis from occult renal cell carcinoma simulating a vascular lesion. Report of two cases and review of the literature

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Introduction

Whereas metastasis to bone is not uncommon for certain primary tumours, metastasis to the distal appendicular skeleton is extremely rare. Hypernephroma metastasizing to the calcaneum has been described in only a small number of cases\textsuperscript{1–3} and is even less common as the presenting feature of an occult renal cell carcinoma. Highly vascular bone metastases of the calcaneum mimicking vascular malformations are rarer still; to our knowledge there have been no previously reported cases. We present two cases of occult renal cell carcinoma presenting as a vascular lesion of the foot.

Case report

Case 1

A 71-year-old man attended the orthopaedic department with a 3-month history of pain in the right ankle. He had a history of recurrent fasciitis in the right foot and this pain was initially thought to have been a recurrence of the same. Despite treatment with non-steroidal anti-inflammatory agents, the situation failed to settle and the man noted an enlarging lump over the lateral aspect of his right ankle joint. Examination revealed a tender pulsatile mass with a loud bruit. A provisional diagnosis of a vascular malformation was made. Plain radiograph of the right foot did not show any obvious abnormality (Fig. 1). US of the mass demonstrated a large solid lesion with increased vascularity, but no vascular malformation was seen. Contrast MRI of the foot was performed to further characterize the calcaneal lesion (Fig. 2). US of the abdomen revealed a solid mass in the lower pole of the right kidney (Fig. 3) and contrast-enhanced CT confirmed the mass. There were enlarged lymph nodes in the mediastinum with metastatic deposits in the ribs and the right side of the sacrum (Fig. 4).

In view of the distribution of mediastinal lymph nodes, the presence was postulated of a silent primary lung tumour with regional lymph node enlargement in the mediastinum and metastasis to kidney and bone.

The rib deposit was biopsied under US guidance. The pathologist reported tissue cores demonstrating islands and trabeculae of clear cells set in a fibrovascular stroma, in which numerous delicate capillaries were present. Glycogen was demonstrated within the cell cytoplasm and the cells were CAM 5.2 positive. The appearances were consistent with metastatic renal cell clear-cell carcinoma.

Seeing that the histology was diagnostic of renal cell carcinoma metastasis, a course of palliative radiotherapy combined with gabapentin was planned, with a view to possible treatment with immunotherapy.

Case 2

A 60-year-old manual worker had been hit on the right heel with a hammer while at work. The man had been otherwise well. The pain was severe and the man was referred to the accident and
emergency department where a plain radiograph of the foot and ankle was performed. No fracture was identified but a small lytic lesion was seen which (Fig. 5) was thought to be a pseudocyst (i.e. a normal variant).

The man was seen 3 months later complaining of pain and swelling in the same heel. Examination revealed a boggy swollen pulsatile mass in the calcaneal region. The impression was of a post-traumatic vascular lesion such as a malformation or aneurysm. A plain radiograph of the area demonstrated calcaneal destruction with a soft tissue mass. Doppler US showed the mass to be solid and highly vascular. MRI of foot was performed to further characterize the calcaneal lesion (Figs. 6 and 7). US of the abdomen showed a tumoral mass in the right kidney, and staging CT of the thorax and abdomen was performed (Fig. 8). A diagnosis of metastatic renal cell carcinoma was made on histological evidence and the man received palliative chemotherapy.

Discussion

According to the literature, 30% or more of malignant tumours metastasize to bone,4 and kidney, lung, breast, prostate and colon cancers commonly do so. The peripheral extremities are rarely involved. In one series, 19 malignant foot lesions, 11 of which were metastatic, were found in 2800 bone tumours.1 The calcaneum appears to be the most commonly involved bone in the foot, with the tarsal bones following. Hypernephroma

Figure 1 Plain radiograph of the calcaneum (lateral projection) shows a subtle radiolucency in the body.

Figure 2 Sagittal post contrast MR image of the calcaneum showing a large well defined avidly enhancing lesion containing non enhancing areas due to necrosis.

Figure 3 Transverse ultrasound of the right kidney showing a solid exophytic mass in the lower pole suggestive of renal cell carcinoma.

Figure 4 Contrast enhanced CT of the right kidney confirmed the tumor mass in the lower pole.
metastasizing to the calcaneum has been described in only a small number of cases \(^1\)–\(^3\) and is even less common as the presenting feature of an occult renal cell carcinoma.

Renal cell carcinoma accounts for 85% of all malignant renal tumours, having an incidence of 9.4 per 100,000 Caucasian males in the USA.\(^5\) It is more common in males than females and is often clinically silent for long periods. Renal cell carcinoma may present with haematuria that is either macroscopic or microscopic or both, pain, palpable mass, malaise, nausea, anorexia, weight loss, fatigue, cardiovascular symptoms and symptoms related to metastasis. Between 25 and 57% of individuals with renal cell carcinoma have metastases at the time of initial diagnosis, and over 40% of these metastases involve bone.\(^5\),\(^6\) Metastases tend to be multifocal rather than solitary.\(^7\) Metastasis in renal cell carcinoma is a poor prognostic indicator, and more than 80% of such cases prove fatal within 1 year.\(^8\) Nearly 80% of all metastatic bone lesions are found in the central skeleton and approximately 10% are in the long bones.\(^9\) Only rarely do metastases involve the distal

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**Figure 5** Plain radiograph of the calcaneum in another patient demonstrating an expansile lytic lesion in the posterior aspect of the calcaneum.

**Figure 6** Sagittal T1W spin echo and STIR sequence showing the extension of the tumor mass into the surrounding soft tissues. Note the extension of the tumor into the Achilles tendon.

**Figure 7** Sagittal T1W spin echo and STIR sequence showing the extension of the tumor mass into the surrounding soft tissues. Note the extension of the tumor into the Achilles tendon.

**Figure 8** Non enhanced CT scan of the abdomen showing right renal mass with bilateral adrenal metastasis.
When metastases occur in the feet, the calcaneum is the most common site. The infrequent occurrence of metastases distal to the knee or elbow is thought to be due in part to the relative paucity of red marrow in these bones. Tumour commonly erodes veins and is thus transported to the capillary beds of the lungs or liver. Paravertebral venous plexuses of Baston provide a route for tumour to be deposited in the axial skeleton without first passing through liver or lung, but not in the peripheral skeleton. However, when tumour infiltrates veins in the pulmonary bed, tumour emboli pass into the left heart and are more likely to implant in the peripheral skeleton.

It has been postulated that the slight temperature reduction in the foot may favour the development of metastatic deposits. The relative rates of particular primary tumours metastasizing to hand and foot suggest that other factors are involved as well, including haemodynamic, hormonal and immune responses. It may be that metastatic involvement is under-appreciated in the foot, as this area is not of great interest at autopsy, and if the patient is not ambulatory the lesions may be relatively asymptomatic.

Metastatic involvement of the foot or hand is usually associated with diffuse metastatic spread and thus a poor prognosis. Average survival lengths after diagnosis have been reported as 5.3 and 9.9 months for hand and foot lesions, respectively.

Foot pain is a common complaint, but as the initial presenting symptom of occult carcinoma is rare. Metastasis to the foot should be considered a possible diagnosis in the context of a known malignancy, when atypical features are present, or when standard measures are unsuccessful in treatment.

References