

THREE-PHASE SKELETAL SCINTIGRAPHY IN A SOLITARY LYTIC OSSEOUS METASTASIS OF RENAL CELL CARCINOMA

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Skeletal metastases are found at post-mortems in 25% or more of patients with renal cell carcinoma (RCC)¹. The incidence reported during life is half of this². Conventional bone scintigraphy is widely employed in the diagnosis and follow-up of many malignant conditions and is generally accepted as the most sensitive amongst the available techniques for the detection of skeletal metastases². However, its value in patients with RCC is not clearly defined, although it has been suggested that scanning may be more sensitive than radiological survey.³ Reddy and Merrick (1980) reported false negative skeletal scintigrams in 4 of 12 cases of RCC with proven skeletal metastases and suggested that a normal skeletal scintigram in a symptomatic patient with known RCC does not exclude skeletal metastases.⁴ Three-phase bone scintigraphy which documents the blood flow, blood pool and the bone uptake phases has received considerable attention since its Original description by Gilday et al.⁵ We describe here a case of a solitary bone metastasis presenting as a cystic lesion radiographically where the conventional delayed bone scan was negative showing a photo deficient lesion. However, the 3-phase bone scan showed a characteristic pattern which yielded valuable additional information providing a clue to the nature of the lesion.

CASE HISTORY

A 54 year old male was admitted in the Combined Military Hospital, Rawalpindi, on 14 Nov. 1988, complaining of pain at the back of right upper thigh alongwith pain in the right knee joint of one month duration. The pain was aggravated by walking and weight bearing. There was no history of trauma or fever. His general and systemic examination revealed no abnormality. On local examination, a 3 x 3cm, hard and tender swelling was palpated on the lateral aspect of the right upper thigh. The overlying skin was normal with no signs of inflammation. Movements at the right knee and hip joints were restricted and painful. The patient's blood picture, urinalysis, blood chemistry, X-Ray chest and liver function tests were normal. Radiographs of the site showed a large lytic/cystic area in the upper femoral shaft causing destruction of the cortex. A diagnosis of bone cyst was made. Bone scintigraphy was advised and a three-phase bone scan was performed by injecting 15 mCi of Tc^{99m}. methylene diphosphonate with the patient positioned under a gamma camera (Scintironix, UK). The blood flow and blood pool images were acquired immediately after- wards followed by delayed imaging at 3 hour postinjection. An intensely hypervascular lesion in the region of the palpable mass was seen in both the blood flow and the blood pool phases. The activity in the lesion was seen to subsequently fade away and the delayed imaging performed after 3 hours showed a cold lesion with a peripheral rim of uptake only (Figure 1).

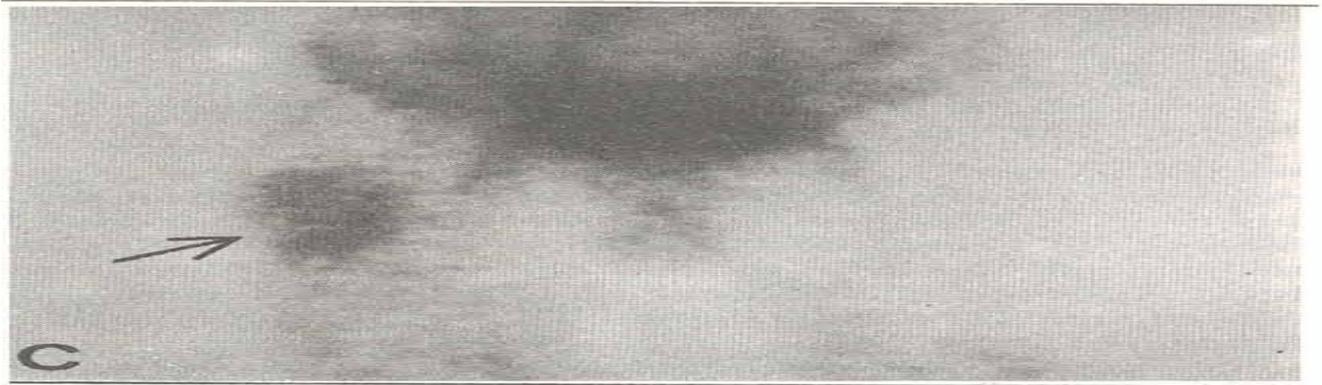
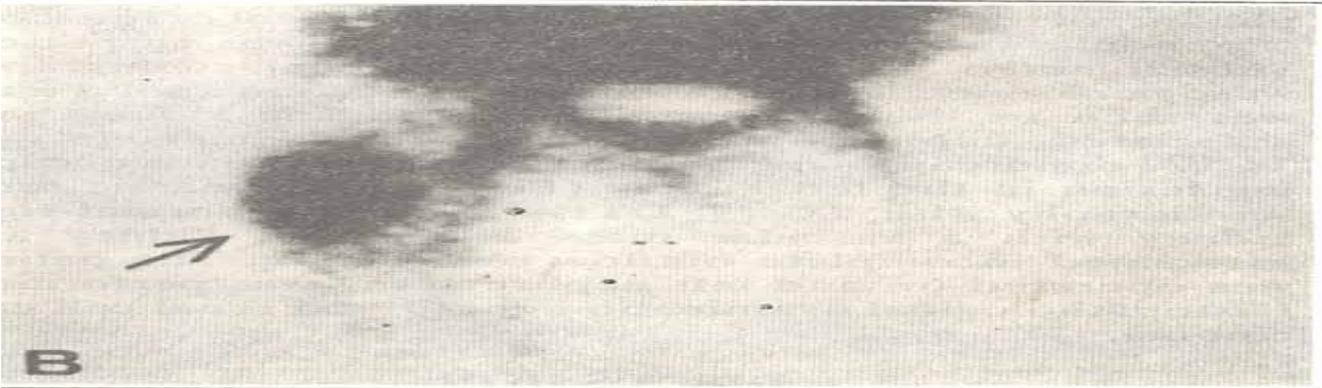


Figure 1. Sequential skeletal scintigraphs at (A) 0-60 sec, (B) 2-3 min, (C) 10 min and (D) 3 hr postinjection. The initially increased activity in the lesion (arrow) during the vascular phase fades away with the delayed images showing a peripheral rim of uptake only.

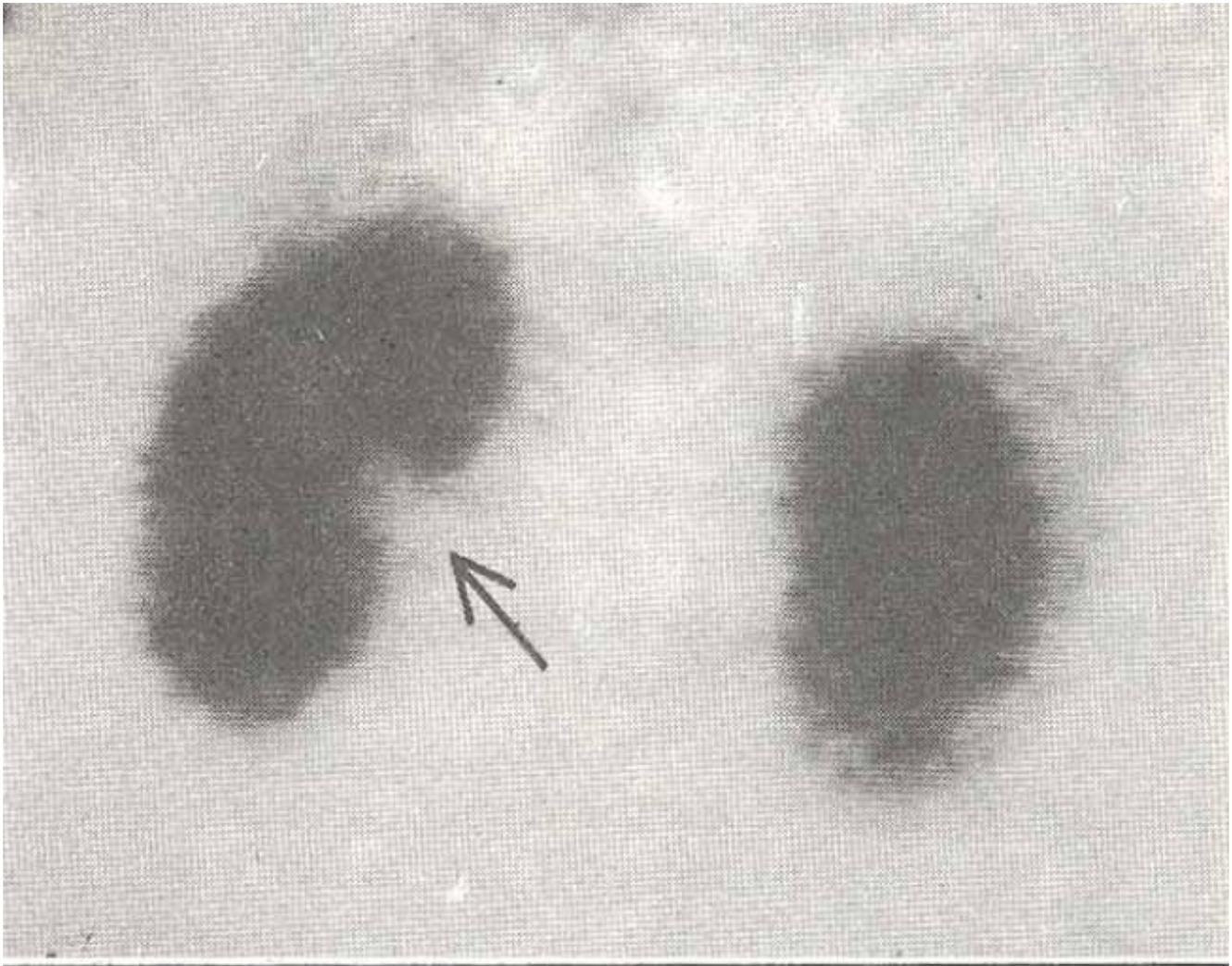


Figure 2. Tc^{99m}-DMSA renal scintiscan showing a space occupying lesion in the right kidney (arrow).

A vascular soft-tissue tumour was suspected. Bone biopsy was performed and the growth was also curetted. Histopathological examination of the frozen section revealed metastatic carcinoma bone. The morphology of the tumor showed clear cell variant of renal cell carcinoma and a primary in the kidney was suspected. Subsequently, ultrasonography and renal scintigraphy were performed. On ultrasound examination a solid mass was seen in the hilar region of the left kidney with associated nephrolithiasis. Static renal imaging with Tc^{99m} dimercapto-succinic acid showed a space occupying lesion in the left kidney (Figure 2). Dynamic renal scintigraphy with Tc^{99m} DTPA showed a normal right kidney with a vascular mass in the left kidney and associated incomplete outflow obstruction. The patient was operated on and left nephrectomy was performed. Histopathological examination confirmed renal cell carcinoma.

DISCUSSION

The uptake of bone-seeking radiopharmaceuticals is an index of the amount of bone repair or replacement occurring at a given site. The majority of skeletal metastases provoke both bone destruction and bone repair. The radiographic appearances of lysis or sclerosis indicate the net balance

whether there is overall more destruction or more formation. Failure to provoke an osteoblastic response is an uncommon but well-documented phenomenon in many forms of malignancy. On conventional delayed bone images areas of bone destruction are sometimes detectable scintigraphically as photon deficient regions, but these can be identified only when scintigrams of high count content and high resolution are employed⁴. The delayed bone image in this case shows a large photodeficient area with only a crescentic rim of increased uptake medially. This particular appearance of a bone metastases of RCC is not uncommon and has been reported previously^{4,6,7}. The early blood flow and blood pool images, however, show an oval-shaped highly vascular lesion which gradually fades away over a few minutes. This provides valuable information and helps differentiate the lesion from other suspected pathologies such as a benign bone cyst (vascular photopenic lesions), abscesses (peripherally hypervascular photopenic lesions) and Osteomyelitis (hypervascular hyperactive lesion). However, in contrast a vascular photopenic lesion seen on a 3-phase bone scan is likely be due to a vascular tumor with minimal osteoblastic activity. The majority of RCCs are highly vascular tumours which on pathologic examination reveal direct arteriovenous communications^{8,9}. Further, the RCC has a tendency to metastasize widely before giving rise to any local symptoms as seen in this case. We therefore recommend that three-phase skeletal scintigraphs be routinely performed in the investigation of patients presenting clinically with solitary bone lesions suspected of being malignant and in all cases of RCC where a skeletal scan is indicated. This will in most instances provide useful adjunctive information leading to a definitive diagnosis and will help reduce the incidence of false-negative bone scans in RCC cases with bone metastases.

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