Bone Scanning in the Child and Young Adult

Part II*

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Abstract. The sensitivity of the radionuclide bone scan in identifying osteoblastic reaction in bone and in detecting local alterations in blood flow is valuable in many benign diseases involving bone, particularly those which are more common in children and young adults, and in which early detection may be critical to future health. Bone scanning offers a simple yet reliable means for establishing an early diagnosis, evaluating the extent of the disease, and assessing the therapeutic response in disorders resulting from infection, trauma, or vascular insult. Useful information may also be obtained in disturbances of growth and development, and in congenital lesions.

Key words: Technetium phosphates - Skeletal scintigraphy - Children - Osteomyelitis - Avascular necrosis - Bone infarction - Stress fracture.

Infection

Infective lesions in bone are detected by skeletal scintigraphy with a sensitivity comparable to that in metastatic disease and similarly providing an opportunity for diagnosis at a significantly earlier time than by orthodox radiology. This is particularly applicable in acute osteomyelitis in which it is now generally accepted that the bone scan will be abnormal at least several days prior to radiological change. Duszyński et al. [8], in one of many similar studies, investigated 42 patients suspected of having early acute osteomyelitis. Of 19 shown subsequently to have focal infec-

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Fig. 1A–C. Scan changes of acute osteomyelitis in a 12-year-old girl. A In the “flow” study, immediately after injection and in the subsequent “blood pool” image, there is an area of accumulation in the upper humerus, indicating hyperaemia. B and C In the delayed study, there is intense focal uptake in the metaphysis of the right upper humerus (B) compared to the normal left humerus (C).

It may, however, be difficult to differentiate osteomyelitis from other inflammatory disorders, such as cellulitis and septic arthritis, and lesions associated with intense focal uptake such as the healing phase of a bone infarct in patients with sickle-cell anaemia, particularly in view of the susceptibility of the latter to salmonella osteomyelitis. For this reason, Gilday et al. [18] strongly recommend the routine combined use of the “blood pool” study and bone imaging. Seventy of 71 children with osteomyelitis were identified correctly in this way by noting the focal nature of both hyperaemia and later uptake. Cellulitis will demonstrate a diffuse hyperaemic phase but in later studies, progressive decrease in activity results in either a normal image or diffuse non-focal accumulation [28], (Fig. 2). Hyperaemia will be observed typically in septic arthritis as diffuse increased uptake in the “blood pool” study persisting in varying intensity in and around the joint in delayed scans (Fig. 3). On occasions, there may be such peri-articular uptake, resulting from hyperaemia of the adjacent bone to cause difficulty in excluding accompanying osteomyelitis (Fig. 4). In general, however, the scan changes of septic arthritis do not occur quite as early after the onset of symptoms as those of osteomyelitis. It may be difficult also to differentiate cases of septic arthritis in which there is only mild accumulation, from transient synovitis (Fig. 5), but hyperaemia is rare in the latter condition. Particularly when the hip is involved in septic arthritis, it may be possible to demonstrate complicating ischaemia of the femoral head (Fig. 6) and Savage et al. [38] have observed this also in transient synovitis.