
Stippled Ribs: A Potential Pitfall in Bone Scan Interpretation

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A retrospective evaluation of 100 consecutive bone scans was performed to determine the incidence and clinical importance, if any, of increased uptake at the insertion of the illocostalis thoracis portion of the erector spinae muscle group (rib stippling). Rib stippling was deemed present if a focal area of increased technetium-99m methylene diphosphonate (^{99m}Tc]MDP) was identified within the posterior angle of three or more consecutive ribs. Seven of 100 (three bilateral, four unilateral) patients demonstrated rib stippling. Foci intensity was less than the scapular tips, but greater than the adjacent ribs. No patient had a history of chest trauma, pain and/or an abnormal radiograph. Even though increased uptake within the posterior angle of the ribs is an uncommon finding (7%), its recognition as a normal bone scan finding is important to prevent bone scan misinterpretations. Its characteristic scintigraphic appearance and location should serve to differentiate it from the increased uptake of trauma and/or tumor.

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Total-body bone scanning has been shown to be a very sensitive test for the early detection of inflammatory, traumatic, and neoplastic diseases. The false-negative rate is only 0.4% (1). The specificity, however, of the bone scan is much less impressive, as increased tracer uptake does not always occur in pathologic conditions (2). This is exemplified by an observation made in a number of patients referred to our department for routine bone scintigraphy. We noted a focal area of increased accumulation of technetium-99m methylene diphosphonate (^{99m}Tc]MDP) within the posterior angle of three or more ribs with an intensity less than the scapular tip, but greater than the rib itself (rib stippling). It was identified in asymptomatic patients who had normal ribs radiographically. Rib stippling was felt not to be a manifestation of an osseous abnormality, but a normal scintigraphic finding. To confirm this, and to determine its incidence and clinical importance, if any, a retrospective analysis of 100 consecutive bone scans was performed.

MATERIALS AND METHODS

To determine the incidence and clinical importance, if any, of increased accumulation of radiotracer within

the posterior angle of the ribs, we retrospectively evaluated 100 consecutive bone scans seeking the presence of a focal area of increased ^{99m}Tc]MDP within the posterior angle of three or more ribs, the intensity of which was less than the scapular tip, but greater than the rib itself (rib stippling) (Fig. 1). The patients reviewed were referred to our department for bone scans in the detection of either inflammatory, traumatic, or neoplastic disease. There were 57 males and 43 females, ages 18-81 yrs. The scans were performed 2 to 3 hr after the i.v. administration of 15 mCi of ^{99m}Tc]MDP. Each patient had a standard whole-body scan (scintillation camera with whole-body imaging table) or a whole-body tomographic scan.* If rib stippling was demonstrated, clinical and x-ray correlation was obtained, seeking the presence or absence of a roentgenographic abnormality, a history of trauma and/or pain.

RESULTS

Of the 100 consecutive bone scans reviewed, seven (four unilateral, three bilateral) demonstrated (three tomographically, four planometrically) increased accumulation of radiotracer with the posterior angle of the ribs (rib stippling). None of the seven patients had a history of chest trauma, pain, and/or an abnormal chest or rib radiograph (Table 1). Three patients had an otherwise normal bone scan; one had findings consistent with degenerative joint disease, one osteomyelitis,

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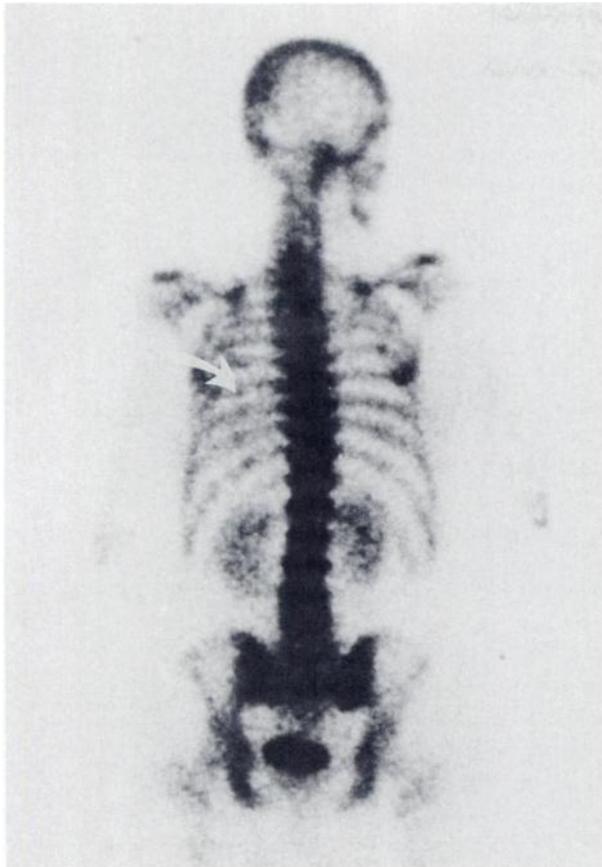


FIGURE 1
Posterior bone scan demonstrating rib stippling (arrow), i.e., increased uptake within posterior angle of ribs; site of insertion of iliocostalis portion of erector spinae muscle group

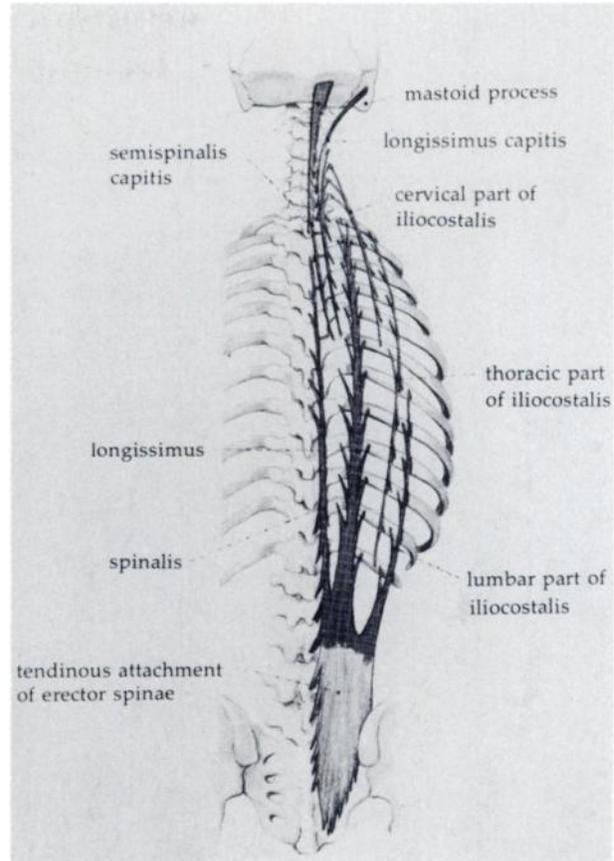


FIGURE 2
Schematic drawing of erector spinae musculature. Note: iliocostalis portion of this muscle group inserts at posterior angles of ribs

TABLE 1
Study Results—100 Bone Scans

| Item | Present | Absent |
|----------------------------|-------------------------------------|--------|
| Rib stippling | 7 (4 unilateral; 3 bilateral) | 93 |
| Radiographic abnormalities | | 7* |
| Clinical symptoms | | 7* |
| Incidence 7% | | |

* Clinical and x-ray correlation was performed on those patients in whom rib stippling was identified.

and one metastasis. None demonstrated increased uptake within the anterior costochondral junction, nor were any of the seven patients under their desirable weight according to their height and frame (3).

DISCUSSION

The angle of the rib is defined as that site on the posterior external surface of the rib that corresponds to

a prominent line to which the tendon of the accessory portion of the iliocostalis thoracic portion of the erector spinae muscle group attaches (Fig. 2) (4, 5). Seven of 100 patients (7%) demonstrated increased uptake of ^{99m}Tc MDP at this site. None had an abnormal chest and/or rib radiograph, and all were asymptomatic. All had normal costochondral junction radiotracer uptake, and none weighed less than desirable for their height and frame. Rib stippling was identified tomographically in three patients, planometrically in four. Rib stippling is felt to represent a normal accumulation of ^{99m}Tc MDP within the insertion of the iliocostalis muscle and not "shine through" from increased uptake within the anterior costochondral junction of the rib and/or an intraosseous abnormality. Awareness of rib stippling, as well as its characteristic location and appearance, should serve to eliminate it as a potential pitfall (false-positive) in bone scan interpretation.

FOOTNOTE

* Siemens Medical Systems Inc., Iselin, NJ (PhoCon).

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