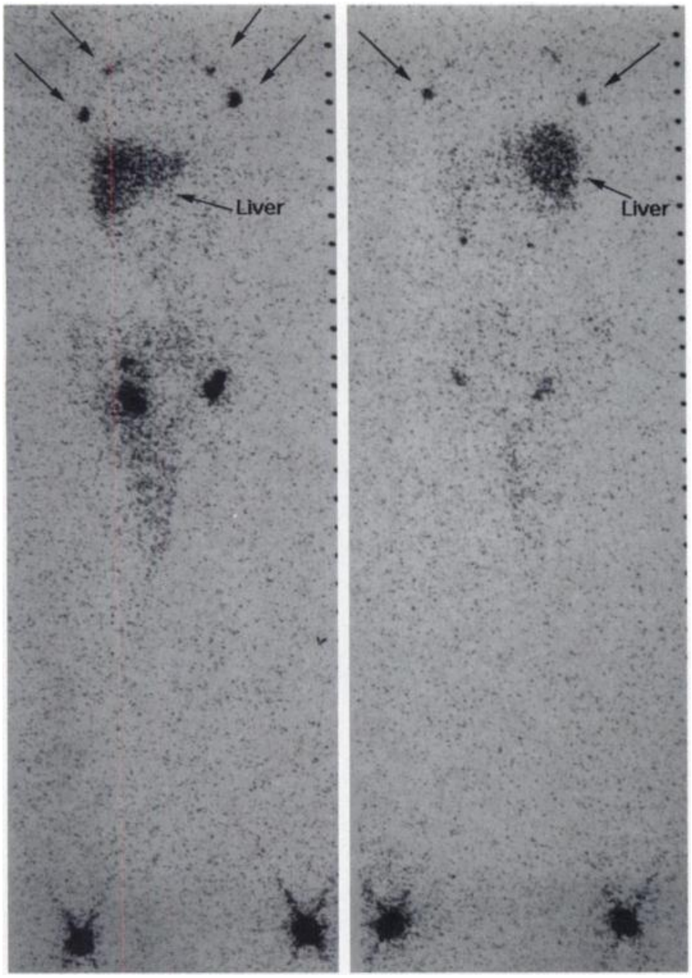

FIGURE 5. Lymphoscintigraphy at 24 hr shows clearing of radiotracer from the regions that previously showed dermal backflow pattern uptake. Axillary radiotracer uptake is still apparent (arrows).

Some primary chylous disorders are caused by congenital lymphangiectasia or megalymphatics that may be associated with obstruction of the thoracic duct. Such high-grade obstruction of intestinal lymph flow results in gradual dilatation of the peripheral lymphatics and subsequent progressive valvular incompetence, which can lead to lymph reflux into the soft tissues of the perineum, genitalia and lower extremities (*9,10*). Therefore, identification of primary lymphedema is important when operative intervention is contemplated to minimize disruption of the existing lymphatics. In this case, subsequent surgery resulted in exacerbation of lymphedema. Reflux of lymph/chyle is best controlled by radical excision and ligation of incompetent retroperitoneal lymph vessels (*10*).

CONCLUSION

Primary lymphedema is probably an under-diagnosed condition and should be included in the differential diagnosis of lower limb swelling. Failure to make this diagnosis could result in exacerbation of lymphedema that may become chronic.

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Soft-Tissue Uptake of Technetium-99m-MDP After Prostate Cryoablation

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Prominent soft-tissue uptake of ^{99m}Tc-methylene diphosphonate (MDP) within the prostate bed was found after cryoablation for prostate carcinoma. CT, MRI and sonographic studies demonstrated liquifactive necrosis of the prostate bed. The probable etiology for ^{99m}Tc-MDP uptake in this case is necrosis with subsequent neovascular hyperemia and microscopic calcium deposits. Three-phase scintigraphy with ^{99m}Tc-MDP appears to be useful for localizing the extent of soft tissue inflammation and necrosis.

Key Works: technetium-99-m-MDP; prostate cryoablation

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Cryoablation is a relatively new approach for treatment of prostate carcinoma. It is believed to achieve prostate ablation with a lower rate of tumor positive margins. The technique involves the perineal insertion of a probe containing five to seven needles that are supercooled to approximately −200°C. The probe is held at this temperature and position until an ice ball forms on the probe needles. The probe is then defrosted and removed. The postprocedural necrosis evolves into stable organized tissue and fibrosis (*1*). Prolonged Foley catheterization is required to avoid bladder outlet obstruction secondary to sloughing of necrotic tissue (*2*). Necrosis, infection and inflammation of the prostatic bed, as well as a syndrome of perineal pain, can occur and cause symptoms that may mimic prostatitis (*1,3*).

CASE REPORT

A 63-yr-old man with a history of prostate cancer underwent cryoablation, complicated by urinary retention. His past medical history was significant only for hypertension. His medications included norfloxacin, naproxen and oxycodone with acetaminophen.

Three months later, the patient developed pain in the medial aspect of both thighs, unresponsive to naproxen therapy and a reduced urinary stream. Physical examination revealed a flat prostate bed by digital rectal examination, and no other significant abnormality. Laboratory data included a hemoglobin of 13.9 gm/dl and hematocrit of 40.4%. Urinalysis showed 30–90 WBC's and 0–4 RBC's per high power field. His prostate specific antigen (PSA) was less than 0.2 ng/dl 1 mo before these complaints.

CT of the abdomen and pelvis (Fig. 1) was done 3 wk after the cryoablation and showed necrotic debris in the prostate bed extending into the right obturator muscle. An MR study 3 mo postprocedure (Fig. 2) showed liquifactive necrosis in the prostate bed with no evidence of obturator nerve disease, but there were inflammatory changes in the muscles of the thighs, suggesting myositis (not demonstrated in Fig. 2).

A three-phase bone scan done to confirm active myositis (Fig. 3) demonstrated increased activity in the region of the ablated prostate in all three phases. There was no evidence of myositis or metastatic disease. Urine culture yielded mixed flora. A course of doxycycline therapy was initiated for 3 wk with symptomic improvement.

DISCUSSION

Soft-tissue uptake is not an uncommon finding on ^{99m}Tc-MDP bone scintigraphy but has not been previously reported in patients after prostate cryoablation.

Soft-tissue uptake during bone scintigraphy may be seen in both benign and malignant lesions of the breast and also during lactation (*4*). It has also been reported in disorders of diffuse soft tissue, vascular or cartilaginous calcification (*5–7*), cellulitis (*8*), infarction or contusion, metastases from mucinous primary tumors (*9–12*), as well as benign or malignant nonmucinous primary soft tissue tumors (*13–15*), myonecrosis, dermatomyositis or myositis (*16–21*). It may also be seen focally in electrical burns and at injection sites (*22,23*).

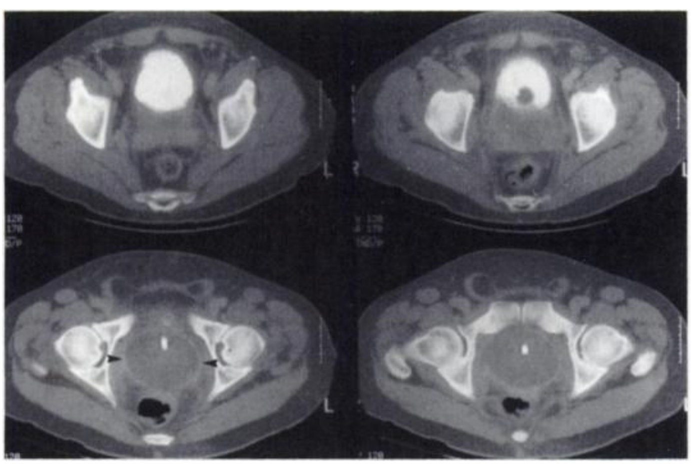

FIGURE 1. CECT of pelvis demonstrates a 7–8 cm low density fluid collection (lower two images, double arrowheads in lower left image) with a mildly enhancing wall which elevates a contrast filled bladder (upper two images) with an indwelling Foley catheter. CT appearance of the collection is nonspecific and may represent either sterile necrotic tissue or pus. There is a small amount of higher density tissue within the collection that has a prostate-like architecture (lower left image). There is extension of the fluid collection into at least half of the right obturator internis muscle (lower right image). The pelvis is otherwise unremarkable, and there is no adenopathy.

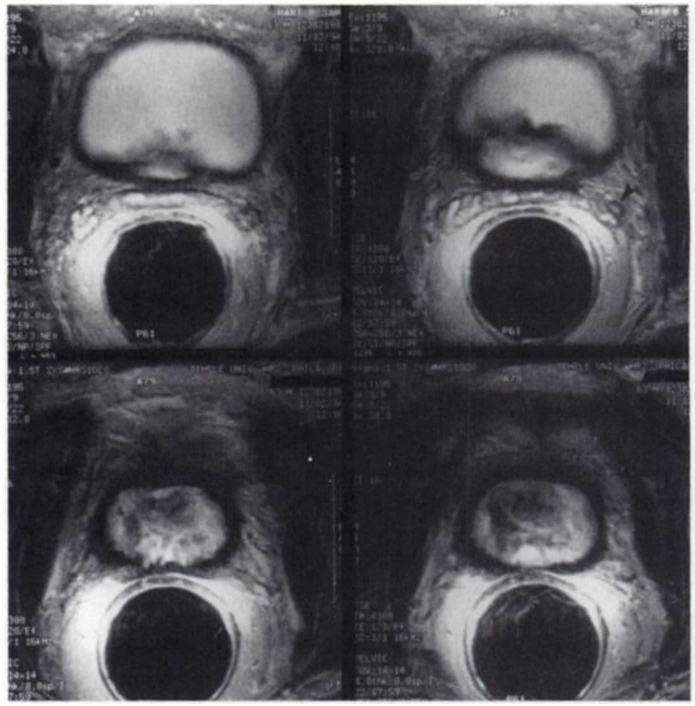

FIGURE 2. T2-weighted MRI and postgadolinium T1-weighted images of the pelvis 3 mo after cryoablation of the prostate show signal abnormalities at the site of the ablation that are suggestive of necrotic and hemorrhagic fluid (posterior and inferior to the fluid filled urinary bladder). There is also evidence of hemorrhage within the seminal vesicles (arrowhead in the right upper image). The thin rim of mild gadolinium enhancement surrounding the postcryoablation necrotic changes represents inflammatory or granulation tissue. There is no gas or other signs of abscess formation.

Most investigators agree that the mechanism is multifactorial and related to soft-tissue calcium concentration and blood supply. A well-studied example is pyrophosphate (PYP) uptake along the periphery of a myocardial infarct, but not the center. Bianco et al. (*24*) showed that ^{99m}Tc-pyrophosphate uptake was greater in the peripheral ischemic, but not the central infarcted portion of the myocardial injury. For the PYP to bind to the excessive calcium within the region of infarction, it must first be presented to the injured tissue by preserved blood flow at the margins of the infarct (*25,26*). Holman (*27*) found that the calcium may be amorphous, crystalline or hydroxyapitite in form.

Other proposed mechanisms include complexing with denatured macromolecules (*28*), binding to phosphate enzyme systems in abnormal or tumor tissue, ion exchange, presence of iron, altered capillary permeability and adsorption into immature collagen (*29*). Fine granular deposits of calcium have also been found in macrophages and neutrophils at infarct margins (*29*).

CONCLUSION

For this patient, the findings of the three-phase bone scan were helpful to localize the area of tissue necrosis and inflammation to the postcryoablation prostate bed. The initial diagnosis of prostatitis was unlikely as the patient had no significant viable prostate tissue at the time of presentation and imaging. In addition to the expected infarction and necrosis that occurs with prostate cryoablation, the postprocedural evolutionary changes likely include inflammatory changes or perhaps even infection of the postoperative soft tissues within the prostate bed based on the white blood cells found in the urine. The rim enhancement seen on CT also suggests inflammation.

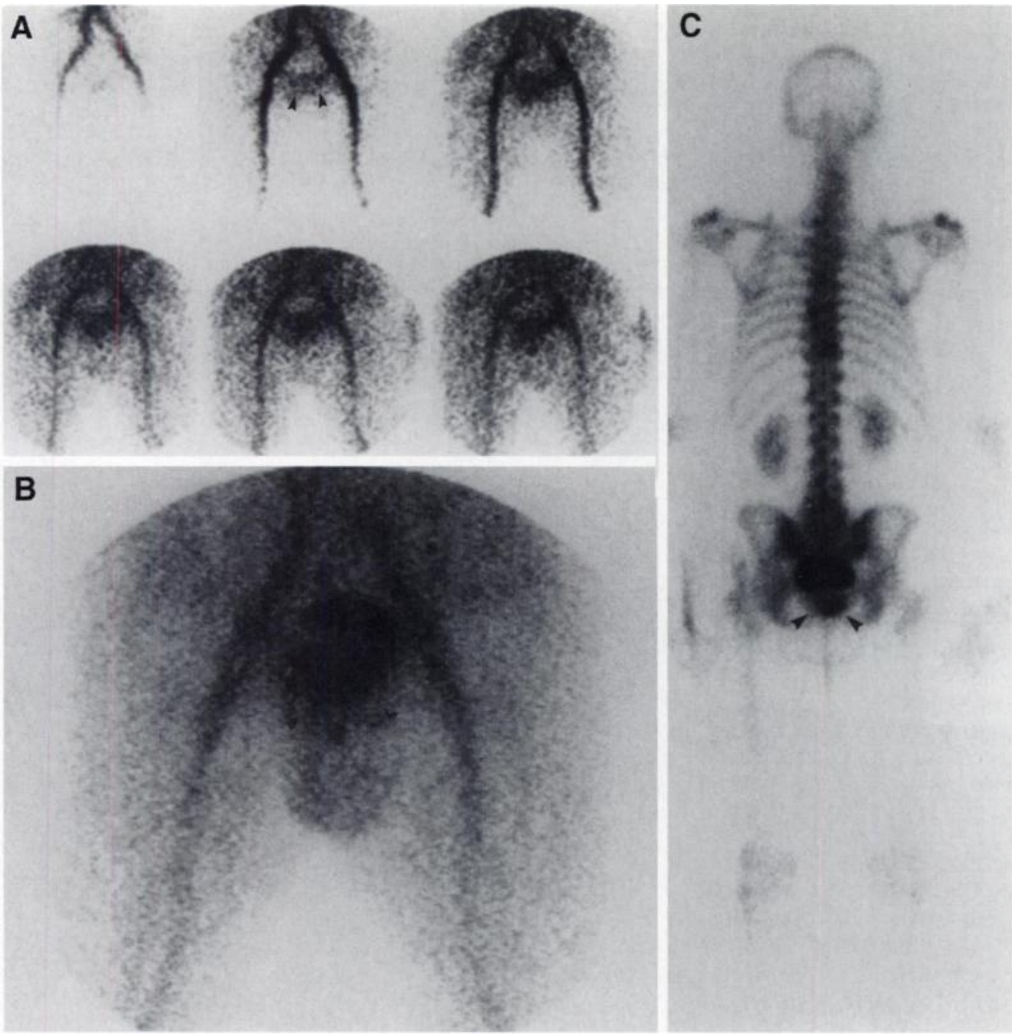

FIGURE 3. (A) A three-phase bone scan performed 3 mo after the cryoablation shows increased blood flow (double arrowheads). (B) Soft-tissue hyperemia in the bed of the cryoablation (double arrowheads). (C) Delayed image shows intense ^{99m}Tc-MDP fixation at the same site (double arrowheads, just below the bladder). No evidence of bony metastasis or myositis.

In this patient, the uptake of ^{99m}Tc-MDP in the postcryoablative prostate bed was probably multifactorial. The subacute inflammatory changes will increase the local interstitial calcium and produce denatured proteins (*30*). The uptake of ^{99m}Tc-MDP in this patient's postcryoablation prostate bed, not unlike myocardial necrosis, is related to a combination of neovascularization, subacute inflammatory changes and early microscopic calcium and denatured protein formation. Continued experience with postcryoablation bone scans may prove ^{99m}Tc-MDP fixation to be a common finding.

For postcryoablation patients, the relatively common syndrome of idiopathic perineal pain after the procedure makes the evaluation of pelvic pain complaints problematic. The symptoms are vague and nonspecific and often lead to numerous diagnostic tests in the attempt to arrive at a solid diagnosis. Although modalities such as CT, MRI and ultrasound have high spatial resolution, they often raise new and unsuspected questions of pathology when vague or unexpected findings are uncovered. Three-phase scintigraphy with ^{99m}Tc-MDP may be a useful study not only for localizing the extent of soft tissue necrosis and inflammation but to help exclude other inflammatory processes such as, in this case, myositis.

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Intense Uptake of Technetium-99m-MDP in Primary Breast Adenocarcinoma with Sarcomatoid Metaplasia

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Focal soft-tissue accumulation of bone-seeking radiopharmaceuticals has many causes but is usually less intense than skeletal activity. Extraskeletal new bone formation, as seen in myositis ossificans and extraskeletal osteosarcoma, represents an exception where markedly increased uptake can be seen. Technetium-99m-MDP uptake in primary breast carcinoma has been recently investigated using scintamammographic techniques to differentiate malignant from benign lesions. The mechanism of uptake remains unclear but is likely multifactorial and nonspecific. We present a case of primary breast carcinoma with florid ^{99m}Tc-MDP activity relative to normal bone. Tumor histopathology in this patient demonstrates malignant new bone formation as the likely mechanism for the marked radiotracer avidity.

Key Words: breast carcinoma; technetium-99m-MDP; bone scintigraphy; sarcomatoid carcinoma

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Technetium-99m-methylene diphosphonate (MDP) uptake in extraosseous malignancies is occasionally seen on delayed imaging but is typically less intense than skeletal activity. The following case illustrates striking accumulation of ^{99m}Tc-MDP in primary adenocarcinoma of the breast.

CASE REPORT

A 61-yr-old woman was admitted to the hospital with bleeding from a large breast mass. Sixteen months before this admission, she was involved in a motor vehicle accident, suffering multiple pelvic fractures. The patient, a Jehovah's witness, eventually went on to recovery without transfusion despite moderate blood loss. Physical examination during that hospitalization demonstrated a 10-cm right breast mass; the patient had been aware of this mass for several years but had not sought medical attention. Fine-needle aspiration of the lesion revealed a high-grade ductal adenocarcinoma. Immunoperoxidase staining for estrogen and progesterone receptors was negative. These findings were confirmed on a subsequent core biopsy, which also revealed extensive sarcomatoid metaplasia with a spindle and pleomorphic cell population as well as areas of cartilaginous and osseous differentiation (Fig. 1). Immunoperoxidase staining confirmed the presence of cytokeratin in areas of conventional ductal carcinoma. Sarcomatoid regions were negative for cytokeratin but decorated with vimentin.

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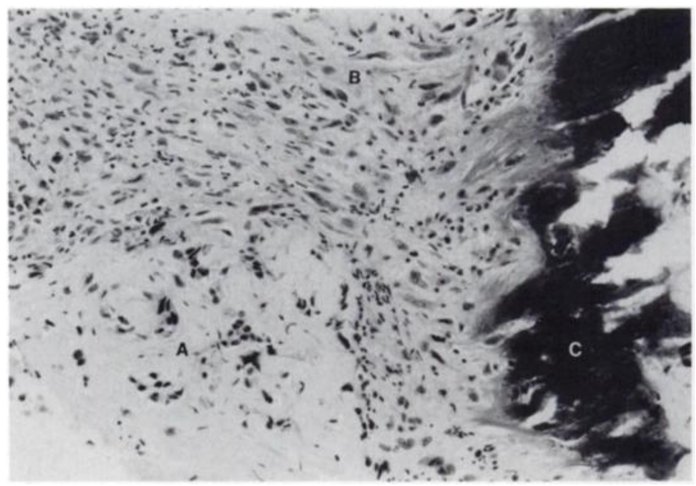

FIGURE 1. (A) Pathologic specimen from breast tumor demonstrates areas conventional ductal adenocarcinoma, (B) spindle sarcomatoid population and (C) extraosseous bone formation.

The patient refused all treatment options and was lost to follow-up, having failed to keep multiple clinic appointments. However, 2 wk prior to the current admission, she eventually presented to the outpatient clinic complaining of diffuse pain, which had worsened over a period of several weeks. Laboratory studies at that time were remarkable for a hemoglobin of 9.9 gm/dl, alkaline phosphatase of 2202 IU/liter (normal range 38–126 IU/liter) and a normal serum calcium. A chest radiograph demonstrated multiple new pulmonary nodules, consistent with metastatic disease (Fig. 2). She again refused treatment and returned home until presenting 2 wk later with bleeding from the breast tumor. In the interim, the primary cancer had enlarged to approximately 24 cm in diameter and was now adherent to the chest wall. Skeletal scintigraphy was requested to determine the presence of osseous metastatic involvement. Delayed images obtained 2 hr after injection of 20 mCi ^{99m}Tc-MDP demonstrated intense uptake of the radiopharmaceutical within the primary breast carcinoma, vastly out of proportion to skeletal uptake (Fig. 3). Limited osseous metastatic disease was seen in the skull and possibly the shoulders. There was no evidence of uptake within the lung metastases seen on the plain radiograph.

Since that time, the patient has agreed to intervention and is receiving chemotherapy consisting of cyclophosphamide, 5-FU and adriamycin, before palliative surgery (toilet mastectomy).