Soft Tissue Uptake of Bone Radiopharmaceuticals

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EXTRASKELETAL UPTAKE OF bone-seeking radiopharmaceuticals is an unexpected finding. Soft tissue uptake of bone scanning agents is caused by chemisorption on the surface of calcium salts and hydroxyapatite crystals. Metastatic calcification and heterotrophic bone formation are the most common causes. The recognition of patterns of soft-tissue accumulation of bone-seeking agents has an important implication in the differential diagnosis.

CASE REPORT

We report a rare case with cutaneous calcinosis due to parental calcium (Ca)-gluconate infiltration. A 4-month-old child was admitted to the hospital with fever, necrotic wounds, and edema in the left hand and right foot. His medical history revealed that he was treated with multiple Ca-gluconate infusions to treat the hypocalcemic neonatal tetany. Three-phase bone scintigraphy with 99m Tc-methylene diphosphonate (MDP) was performed for the differential diagnosis to exclude osteomyelitis. Blood flow and blood pool phases revealed increased tracer distribution in the right lower extremity. Late, static views showed intense tracer uptake in the left hand and right, lower extremity regions, being localized mainly in the subdermal soft tissue (Fig 1). Bony structures had lower tracer uptake compared with the soft tissue. Radiograph examination of affected areas were within normal limits, except minimal soft tissue swelling. Scintigraphic findings and clinical history supported evidence of soft tissue inflammation secondary to Ca-gluconate toxicity rather than osteomyelitis. Radiographic examination was repeated 1 month later. Soft-tissue calcifications were seen on x-ray with a similar pattern of the 99mTc-MDP distribution (Fig 2).

In a review of literature, common and rare causes of extraosseous calcifications are shown in Table 1.

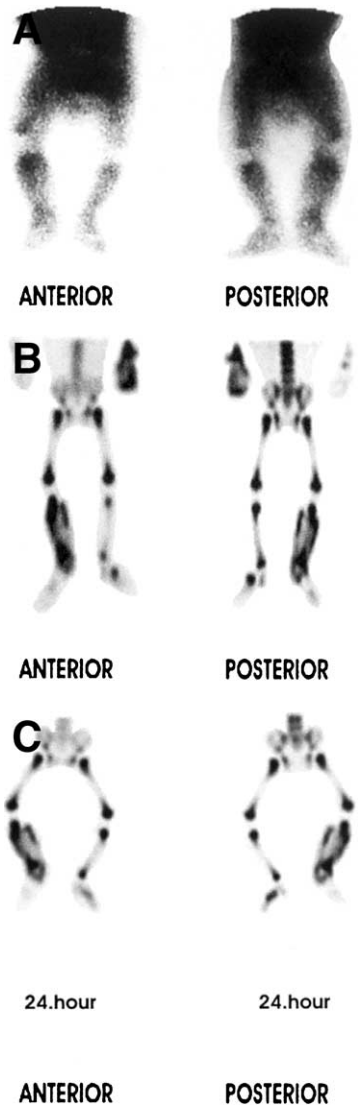

Fig 1. Tc-99m methylene diphosphonate (MDP) blood pool phase of child's lower extremity showing increased tracer distribution in right lower extremity (A). Tc-99m MDP 4-hour late static images of the child, marking intense tracer uptake in the left hand and right lower extremity regions being localized mainly in the subdermal soft tissue (B). Twenty-four-hour images (C).

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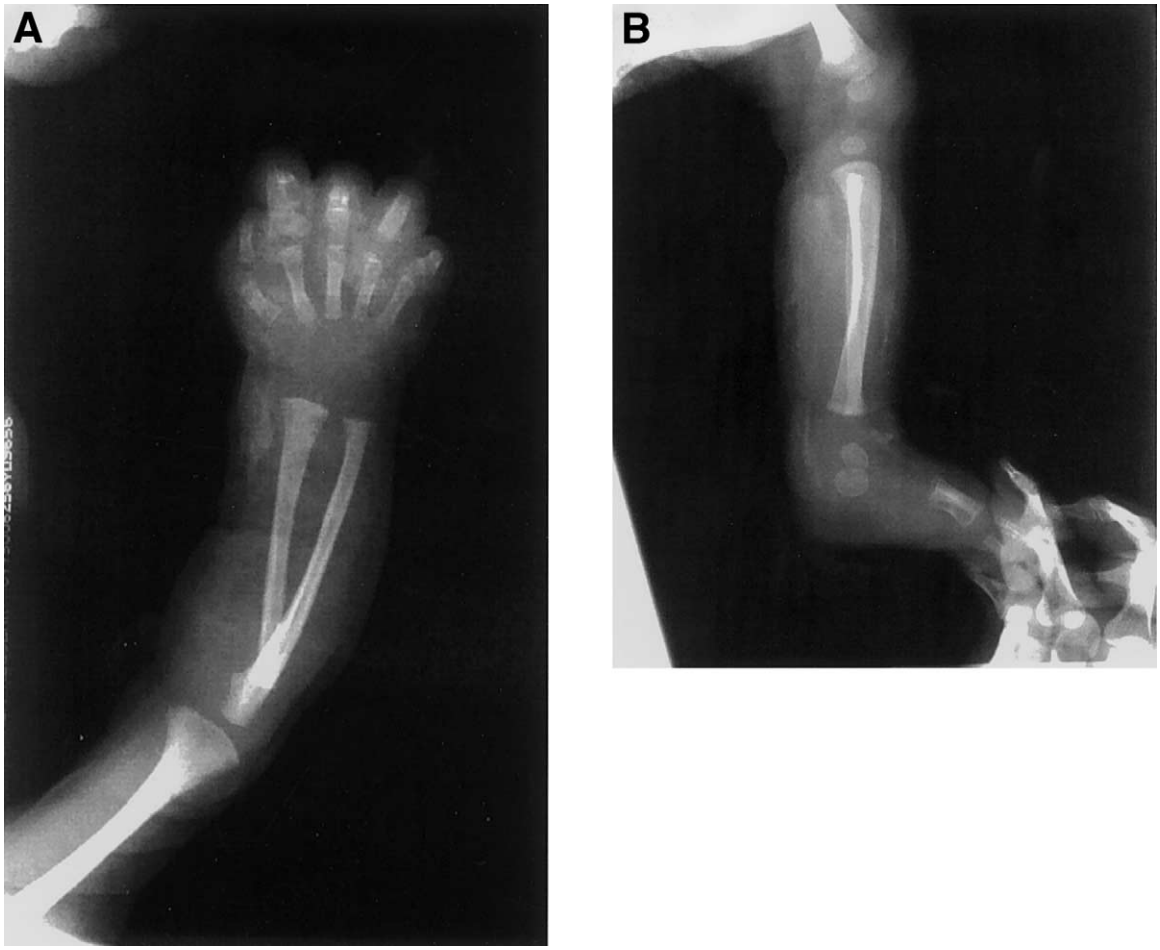

Fig 2. X-rays of the child with calcifications on soft tissue around left hand (A) and right lower extremity (B), similar to the pattern seen on the bone scan.

Table 1. Common and Rare Causes of Extraosseous Calcifications

Study	Calcifications
	Common: Dystrophic calcinosis (95% to 98%)
Lim and Sohn[1]	Trauma
Karanauskas, Starshak, and Sty[2]	Inflammation
Tamgac, Baillet, and Alper[3]	Infection
Oguchi, Higashi, Taniguchi, et al[4] and Podrasky, Stark, Hattner, et al[5]	Tumoral necrosis (Primary or secondary metastases)
Khayat, Achram, and Rizk[6]	Fat necrosis
Roman, Angelides, and Gibson[7]	Varicose veins
Petrocelli, Bassett, Mirra, et al[8]	Systemic sclerosis
Itoh, Baba, and Taneichi[9]	Amyloidosis
Okada, Nomura, and Shirataka[10]	Systemic lupus erythematosus
Veerapen, Watt, and Dieppe[11]	CREST syndrome
Ruiz Franco-Baux, Garcia Hernandez, Correa Garcia, et al[12]	Dermatomyositis
Black and Kanat[13]	Ehlers-Danlos syndrome
Laroche, Ricq, Cantagrel, et al[14]	Werner syndrome
Hung, Tsai, Kao, et al[15]	Pancreatic calcification
Walsh, Perniciaro, and Randle[16]	Basal cell carcinoma
Alfonso, Howard, and Lopez[17]	Nevus
Stemerman[18]	Malignant fibrous histiocytoma
Anghileri[19]	Syringomas
Basler, Watters, and Taylor[20]	Acne
Martino, Braccioni, Cariati, et al[21]	Malherbe epithelioma
Buka, Wei, Sapadin, et al[22]	Pseudoxanthoma elasticum
	Less common: Metastatic calcinosis
Hwang, Lee, Park, et al[23]	Hyperparathyroidism
Stokkel, Valdes Olmos, Hoefnagel, et al[24]	Paraneoplastic hypercalcemia
Campbell, Macfarlane, Fleming, et al[25]	Milk-alkali syndrome
Gezici, van Duijnhoven, Bakker, et al[26]	Sarcoidosis
Braga, Miranda, Lucca, et al[27]	Chronic renal failure
Matsuo, Tsukamoto, Tamura, et al[28]	Calciphylaxis
Corstens, Kerremans, and Claessens[29]	Vitamin D overdose
	Uncommon: Idiopathic calcinosis
Ruiz-Genao, Rios-Buceta, Herrero, et al[30]	Idiopathic calcinosis of scrotum, penis, vulva
Schepis, Siragusa, Palazzo, et al[31]	Milia-like idiopathic calcinosis cutis
Juzych and Nordby[32]	Subepidermal calcified nodule
Peller, Ho, and Kransdorf[33]	Tumoral calcinosis
Mendoza, Lavery, and Adam[34]	Calcinosis cutis circumscripta
Cousins, Jones, Whyte, et al[35]	Calcinosis cutis universalis
	Iatrogenic calcinosis
Orellana, Velasquez, Meneses, et al[36]	Parenteral Ca-gluconate extravasation
Janigan, Perey, Marrie, et al[37]	Parenteral inorganic phosphate
Fig, Shapiro, and Shuklin[38]	Tumor lysis syndrome
	Repeated heel sticks in the newborn
	Prolonged use of calcium-containing electrode paste in electroencephalogram, electromyogram, brain stem auditory evoked potential

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