A Case of Probable Hydroxyapatite Deposition Disease (HADD) of the Hip

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We describe a patient with acute calcific periarthritis in an unusual site, the ilio-femoral ligament. The clinical findings in this patient resembled those of septic arthritis. T2*-weighted images with gradient field echo clearly showed foci of low signal intensity in this region, corresponding to the calcification shown on plain radiographs, and increased signal intensity around the foci, representing edema. These signal intensities were diagnostic of the disease.

Keywords: acute calcific periarthritis, calcium hydroxyapatite crystal, ilio-femoral ligament

Introduction

Hydroxyapatite deposition disease (HADD) is a self-limiting condition that usually resolves spontaneously within four weeks. It is characterized by an acute inflammatory reaction with pain, extreme tenderness, local swelling, and redness. HADD usually occurs in the shoulder. When it occurs at other sites, it may be difficult to distinguish from infection. We present conventional radiography and magnetic resonance (MR) imaging findings of a case of HADD in the hip. The role of MR imaging in the diagnosis of this condition is demonstrated.

Case Report

The patient, a 44-year-old woman, awoke one morning with acute left hip pain. The pain was nonradiating and was exacerbated by any movement of the left hip. She had no history of recent trauma or overuse. On physical examination, she was found to be pyrexial (38.7°C). Soft tissue swelling was seen in the left gluteal region. The area over the left femoral head was extremely tender without erythema. Hip movement was reduced as a result of the pain. No adenopathy was noted. A neurologic examination found no abnormality. Laboratory studies showed normal calcium and alkaline phosphatase levels and normal liver and renal functions. A complete blood cell count revealed mild leukocytosis (12,900/μl). The erythrocyte sedimentation rate (30 mm/hour) and C-reactive protein level (3.5 mg/dl) were slightly elevated. No evidence of gout, pseudogout or metabolic disorders associated with metastatic or dystrophic calcification was observed.

Plain radiographs demonstrated calcification lateral to the left hip joint with clearly visible margins (Fig. 1A). The calcification was initially interpreted as an accessory ossicle (os acetabula). Because of the sudden onset of pain and pyrexia, septic arthritis of the left hip was strongly suspected. Within two hours of the patient’s admission, coronal T2*-weighted images (T2*WI) with gradient field echo and proton density-weighted images (PDWI) with fast spin echo were obtained with a 0.5T superconducting unit (Gyroscan NT-5, Philips, Best, The Netherlands). T2*WI conditions were as follows: TR/TE = 549/20 ms, 4-mm slice thickness with 0.4-mm intersection gap, 20-cm field
Fig. 1. A 44-year-old woman with acute left hip pain
(A) Anteroposterior view showing segmented calcification near the superior lip of the acetabulum. (B) A coronal proton density-weighted image demonstrating foci of low signal intensity in the ilio-femoral ligament (arrow), corresponding to the calcification shown on a plain radiograph. (C) Increased signal intensity, representing edema, is visible around the calcification in a coronal $T_2^*$-weighted image with gradient field echo (large arrow). Associated joint effusion is indicated (small arrow).

Fig. 2. The same hip shown in Fig. 1 at two weeks
(A) Anteroposterior view showing resolution of the calcification. (B) A coronal proton density-weighted image and (C) coronal $T_2^*$-weighted image with gradient field echo demonstrate regression of the calcification and the edema. Associated joint effusion has completely disappeared.

of view, four excitations, and $256 \times 192$ matrix. The PDWI conditions were as follows: TR/TE = 1500/15 ms, 4-mm slice thickness with 0.4-mm intersection gap, 3-echo train length, 20-cm field of view, four excitations, and $256 \times 205$ matrix. Both $T_2^*$WI and PDWI showed foci of low signal intensity in the ilio-femoral ligament, corresponding to the calcification shown on plain radiographs. The $T_2^*$WI also showed increased signal intensity around the foci, representing edema. Hip effusion was observed, but the bony pelvis and hip joint were normal (Fig. 1B, C). HADD associated with calcium hydroxyapatite crystal deposition was diagnosed. After viewing the MR images, we realized that we had incorrectly interpreted the plain radiographs. The MR images clearly indicated that the plain radiographs were showing acute soft tissue calcification consistent with HADD.

Aspiration of the hip yielded three milliliters of thick, purulent-appearing yellow fluid. Gram staining of the specimen showed many leukocytes but no bacteria. The laboratory reported that the
Discussion

Painful periarticular calcific deposits in tendons and soft tissues have been given many names: calcific periarthritis; tendinitis; peritendinitis and bursitis; calcium hydroxyapatite crystal deposition disease; periarthritis calcarea; peritendinitis calcarea; and hydroxyapatite rheumatism. The most frequent site of involvement is the shoulder, although other sites such as the wrist, hand, foot, elbow, hip, neck, and lumbar spine have been described. These deposits are usually monoarticular in distribution. The disease can affect men and women of all ages, but is particularly common in those between 40 and 70 years of age.

The etiology of this condition is uncertain. One possible mechanism is local hypoxia leading to fibrocartilage formation, which, in turn, leads to calcium deposition and vascular proliferation. Calcium is deposited in the degenerated area within the substance of the tendon or ligament and gradually works its way through the tendon or ligament, perhaps being expelled into the bursal cavity. The deposits appear milky or cheesy in consistency. Identification of individual calcium HA crystals is not generally possible with ordinary or polarized light microscopy because of the minute size of the crystals (75 to 250 nm in length); precise identification requires electron microscopic radioisotopic techniques or X-ray diffraction analysis.

Clinical manifestations of calcific periarthritis are variable and some patients may be entirely asymptomatic. Acute symptoms include pain, tenderness, local edema or swelling, restricted active and passive motion, and mild fever, although most patients are afebrile. Middle-grade fever such as that observed in this patient is an uncommon manifestation. Acute severe pain is usually associated with rupture of the calcification into an adjacent bursa or surrounding soft tissue where it is phagocytosed by inflammatory cells. Chronic symptoms and signs may also be present, including mild, nonincapacitating pain and tenderness.

The radiologic features of calcific periarthritis depend on the site of involvement. Zander reported the radiological appearance of calcific periarthritis near the hip joints in three forms: (a) well-localized, fairly compact, and dense (discrete); (b) composed of several segments (segmented); or (c) relatively cloudy (amorphous). In the chronic phase, the calcification is usually dense and sharply outlined. In the acute phase, the calcification is usually less dense, oval, and “paste-like” in appearance and is associated with soft tissue swelling. Kawashima reported that many para-acetabular lesions are missed, especially in reports of asymptomatic adult patients, because observers incorrectly assume that round, discrete para-acetabular densities are os acetabula rather than calcific periarthritis. Both opacities occur in similar sites. However, only the calcification of calcific periarthritis changes periodically in shape and size. Obviously, after the cessation of growth, newly developing opacities must be regarded as calcific periarthritis. Adjacent osseous tissues may be entirely normal, although osteoporosis, cystic lesions, reactive sclerosis, contour irregularities, and frank erosions are sometimes apparent.

The inflammatory response is the most conspicuous feature of the MR images in this disorder. Inflamed and edematous soft tissues and muscles appear as regions of high signal intensity in T2-weighted spin echo sequences and in gradient echo sequences, and signal enhancement after the intravenous administration of gadolinium compounds is to be expected. Adjacent marrow signal intensity may be altered because of intraosseous edema. The deposits of calcium hydroxyapatite crystals are of low signal intensity in all MR imaging sequences. A decrease in the size of the edematous, inflamed tissue and its high signal intensity correlate with clinical improvement.

Methods of treatment include aspiration, local surgical excision, and local anesthetic injection. The result of local anesthetic injection is rapid and long-lasting pain relief with a shortened clinical course. The clinical findings in this disorder may resemble those of a variety of other diseases, such as septic arthritis, gout, and CPPD crystal deposition disease. Calcific periarthritis outside the shoulder joint is a condition of which many doctors are unaware, so it is frequently not recognized. The appearance of soft tissue calcification on a radiograph may be missed or misinterpreted as accessory bones or avulsion fractures. Although MRI is not required for HADD diagnosis, it is invaluable for ruling out other processes (such as septic arthritis), and it can provide useful information for prompt diagnosis and early treatment of this disease.
References