LOCALIZED PIGMENTED VILLONODULAR SYNOVITIS OF THE KNEE WITH BONE INVOLVEMENT MIMICKING A BENIGN BONE TUMOR: CT AND MR FINDINGS

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The localized form of pigmented villonodular synovitis is characterized by a limited involvement of synovium. Although the knee is the joint that is commonly affected, bone changes in this location are not usual. We report the case of a histologically proven localized form of this entity in the knee, which mimicked a benign bone tumor on the basis of an MR pattern, CT findings, and scintigraphic results. Bone changes which may cause a pitfall in the diagnosis of the disorder are discussed.

Key-words: Synovitis - Knee, MR.

Pigmented villonodular synovitis (PVNS) is a benign local or diffuse proliferative disorder of the synovium of unknown etiology that may affect any joint, but is frequently found in the knee (1, 2). Bone involvement by PVNS has been described by many investigators; some of which have drawn the attention particularly to the bone changes. The osseous involvement in PVNS may be of varied nature, from a cystic change to a lesion with tumoral appearance or rapid osteolysis (3-11). In this report, we show that bone changes associated with a small popliteal cyst-like disorder in our patient caused a pitfall and led to a misdiagnosis. The bone lesion was considered a benign bone tumor and the relevance of the small synovial disorder was not appreciated. The unsuspected synovial disorder turned out, surgically, to be a localized PVNS.

Case report

A 44-year-old woman presented with several years history of a gradually increasing left knee pain which was exacerbated during weekly sport activities. She remembered no history of previous trauma and denied having episodes of swelling or locking. The patient experienced some pain on the anterior aspect of the knee, but it was localized particularly at the posteromedial aspect in the popliteal fossa. Several physical examinations revealed no positive finding; no joint effusion nor palpable soft tissue mass were noted. The result of different tests for lesion of ligaments or menisci was normal. There was no joint instability. Radiographic examination of the left knee showed no significant abnormality. A bone scintigraphy was performed which revealed a focal lesion in the posteromedial part of the tibia (Fig. 1). On the basis of this result, an MR study was performed which found a focal bone involvement of the posteromedial aspect of the superior margin of the tibia with focal cortical defect. Different sequences delineated a small cyst-like lesion with a well-defined sclerotic margin in this site. The lesion showed a low signal intensity on T1-weighted images and was hyperintense on T2 gradient-echo and STIR images (Fig. 2). There was a very small hypointense area within the center of the bone lesion on T2 gradient-echo images which resembled a calcification of a nidus of osteoid osteoma (Fig. 2B). STIR sequence showed some amount of oedema around the lesion (Fig. 2C). Although the lesion had a more cystic-like pattern, a bone tumor could not be excluded. Different sequences also showed a small and well-circumscribed cyst-like thickening of synovium in the popliteal fossa adjacent to the bone lesion. It did not draw attention and seemed to be related to a small posterior synovial recess, so, its presence was not appreciated by this study before surgery (Fig. 2). A noncontrast CT examination was also performed, which showed the localized bone lesion with its well-defined sclerotic margin (Fig. 3). The lesion seemed to contain some bone trabecula-
lation of histiocytes, macrophages containing hemosiderin deposition, giant cells and a fibrous stroma which was compatible with the diagnosis of a localized PVNS. The histologic examination of bone fragment of the tibia showed cystic changes without any tumoral lesion. A revision of the MR study demonstrated that the small soft tissue mass had a homogeneous hypo-intensity on T1-weighted images, a heterogeneous hypointensity on T2 gradient-echo sequence which could effectively be related to hemosiderin depositions, and an increased signal intensity on stir images that mimicked a cystic formation (Fig. 2).

The patient had an uneventful postoperative course. One month after surgery, she was completely asymptomatic and returned to work.

Discussion

PVNS is a rare benign proliferative disorder of the synovium of unknown origin which usually affects young adults; it is almost always monoarticular and slowly progressive, occurs most often in large joints, particularly in the knee. The disease presents two distinct forms, one is diffuse the other is localized. The diffuse form involves almost the whole synovium and is accompanied with joint effusion and soft tissue mass. The localized form of articular PVNS is characterized by a focal and limited involvement of synovium as a nodular tumefaction or pedunculated lesion protruding into the articular cavity (1, 2, 7). Symptoms and clinical signs are nonspecific and resemble internal derangement. Laboratory tests are unremarkable. MR appearance of localized PVNS is characterized by a focal and limited involvement of synovium as a nodular tumefaction or pedunculated lesion protruding into the articular cavity (1, 2, 7). MR appearance of localized PVNS is relatively specific and is characterized by a decreased signal intensity on both T1- and T2-weighted images. This specific signal pattern is specially visualized by gradient echo images and reflects the amount of hemosiderin deposition in the affected synovium. Because the hemosiderin content in localized PVNS varies, the MR pattern is not always constant. If less hemosiderin is present, it can modify the specific signal intensity of the lesion. So, the MR appearance of PVNS is not always pathognomonic, but is highly suggestive of the diagnosis in most cases (2, 5, 7, 9, 12). Moreover, some synovial diseases which are accompanied by articular hemorrhage may also show the similar MR pattern as PVNS and must be considered in the differential diagnosis such as hemophilia, subacute hematoma, rheumatoid arthritis, synovial hemangioma, or synovial sarcoma (1, 5, 9).

There are few reports about the MR pattern of PVNS on short inversion time inversion recovery (STIR) sequence. Lin et al (2) reported five cases with this sequence available, which showed an increased signal intensity that seemed to correlate with the oedema component of the associated inflammatory reaction. Our case also demonstrated a well-circumscribed hyperintensity that mimicks a cystic formation (arrowhead).
Bone changes, involving juxta-articular bone, most frequently consist of cyst-like areas which are rounded lytic lesions, usually bordered by sclerotic margins, cortical erosions, osteopenia or degenerative changes (3-10). In the knee, the joint space is usually preserved. Bone lesions are most often located on both sides of the knee joint. Bone involvement confined to one side of the joint, as it was seen in our patient is rare, but has been reported (4, 8, 13). Some investigators proposed that increased intraarticular pressure, resulting from entrapment of proliferating synovial mass between articulating surfaces, leads to focal bone reaction. This reaction causes a cortical defect through which the diseased synovium can penetrate into the bone (3, 14). Others suggested that synovial disorder penetrates the bone by growing through vascular foramina (4, 7, 15). Subchondral bone lesions are more frequently visualized in localized PVNS than in diffuse form. These lesions may be single or multiple. If solitary, they may mimic bone neoplasms (3, 4, 8, 11). Bone changes are rarely visualized on radiographic examination, but they are seen as clearly on an MRI as on a CT study. These lesions generally have well-defined sclerotic borders; the synovial mass itself is not as well defined on CT as on MRI (2, 3, 6, 7, 12).

The difficulty in suggesting the correct diagnosis in our patient was probably due to the unusual small appearance of the synovial lesion, and the presence of the solitary bone involvement which attracted attention. This missed diagnosis seemed to have been particularly influenced by the result of the bone scintigraphy.

Conclusion

We wish to draw attention to the fact that juxta-articular bone lesions may cause a pitfall in image interpretation, and one may be misled towards the diagnosis of bone tumor in the presence of a minor synovial disorder. This case emphasizes the importance of a meticulous MR evaluation in the presence of such lesions.

References