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Shoulder Pain in a 26-Year-Old Woman

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A 26-year-old female research biologist presented with complaints of acute onset of left shoulder pain which radiated down her arm and up to her neck. There was no history of recent trauma or significant change in physical activity. She had intermittent numbness of her entire arm and four fingers, sparing her thumb. She pointed to the trapezius as her point of greatest pain. She had received a steroid injection into the trapezius that did not alleviate symptoms. Her surgical history included two resections of calcified hematomas of her left deltoid, 20 and 14 years before presentation. On physical examination, she was in no acute distress and had no swelling or deformity. She had full range of motion (ROM) of her neck but she did have mild deltoid atrophy on the left side. There was 10° loss of active and passive ROM of her left shoulder in abduction and flexion compared with the other side. She was tender in the left trapezius, anterolateral acromion, and biceps tendon. She was also tender along her proximal humerus laterally. She had no lymphadenopathy in the axilla or anterior cervical triangle. She was intact to motor, sensory, and reflex testing. The clinical impression was a symptomatic cervical disc versus impingement of the left shoulder. Serum calcium, alkaline phosphatase, and phosphorus levels were normal.

Plain radiography of the proximal humerus (Fig 1) and magnetic resonance (MR) imaging of the shoulder (Fig 2) were obtained.

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Fig 1. Plain radiograph of the left proximal humerus (see text).

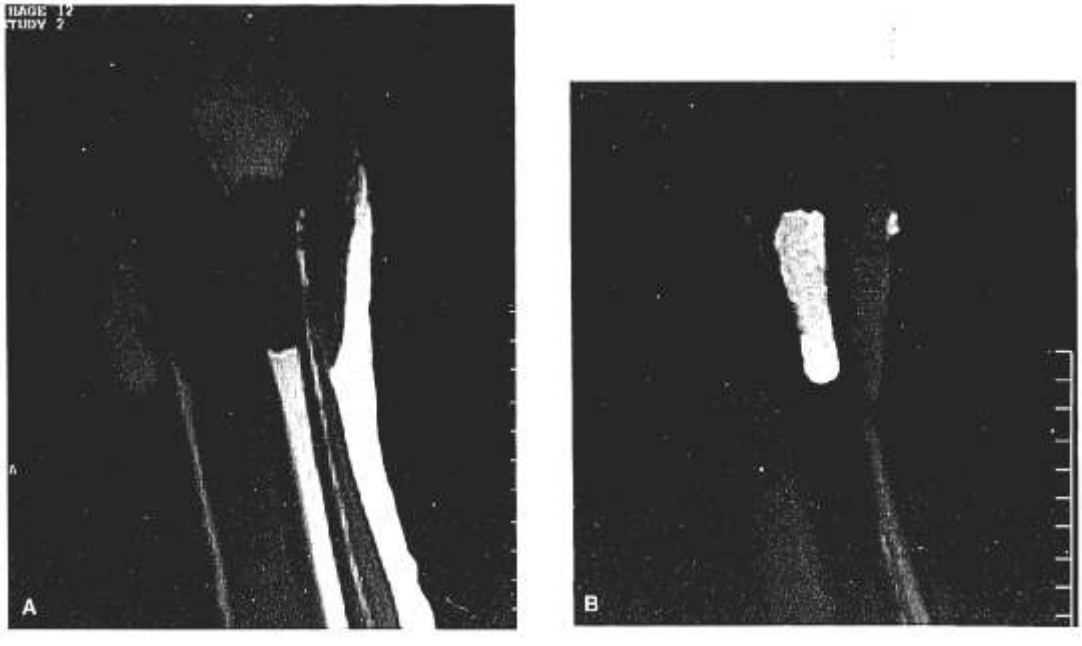

Fig 2A–B. (A) T1 weighted spin echo MR image of proximal left humerus. (B) Fast spin echo T2 weighted MR image (fat suppression) of proximal left humerus.

Based on the history, physical findings, and imaging studies, what is the differential diagnosis?

RADIOGRAPHIC FINDINGS

Plain radiographs (Fig 1) showed subtle increased radiodensity of the proximal metadiaphyseal and diaphyseal medullary cavity (arrows) of the left humerus. There was no evidence of periosteal reaction, cortical disruption, or soft tissue mass.

Magnetic resonance imaging of the cervical spine and rotator cuff was unremarkable. However, a sharply demarcated 6 × 2 × 2 cm geographic lesion of the proximal humerus was defined with low signal intensity on T1 weighted images (Fig 2A) and high signal intensity on fat suppressed images (Fig 2B). The cortex was intact although there was subtle endosteal thinning. There was no evidence of cortical disruption, periosteal reaction, marrow edema, soft tissue mass, or altered signal in adjacent muscle.

Scintigraphy confirmed the absence of other skeletal lesions, and showed only mild radiotracer uptake.

DIFFERENTIAL DIAGNOSIS

Fibrous dysplasia
Unicameral bone cyst
Low grade chondrosarcoma
Enchondroma
Dedifferentiated chondrosarcoma
Bone infarct
Metastasis
Lymphoma

An open biopsy was performed (Fig 3).

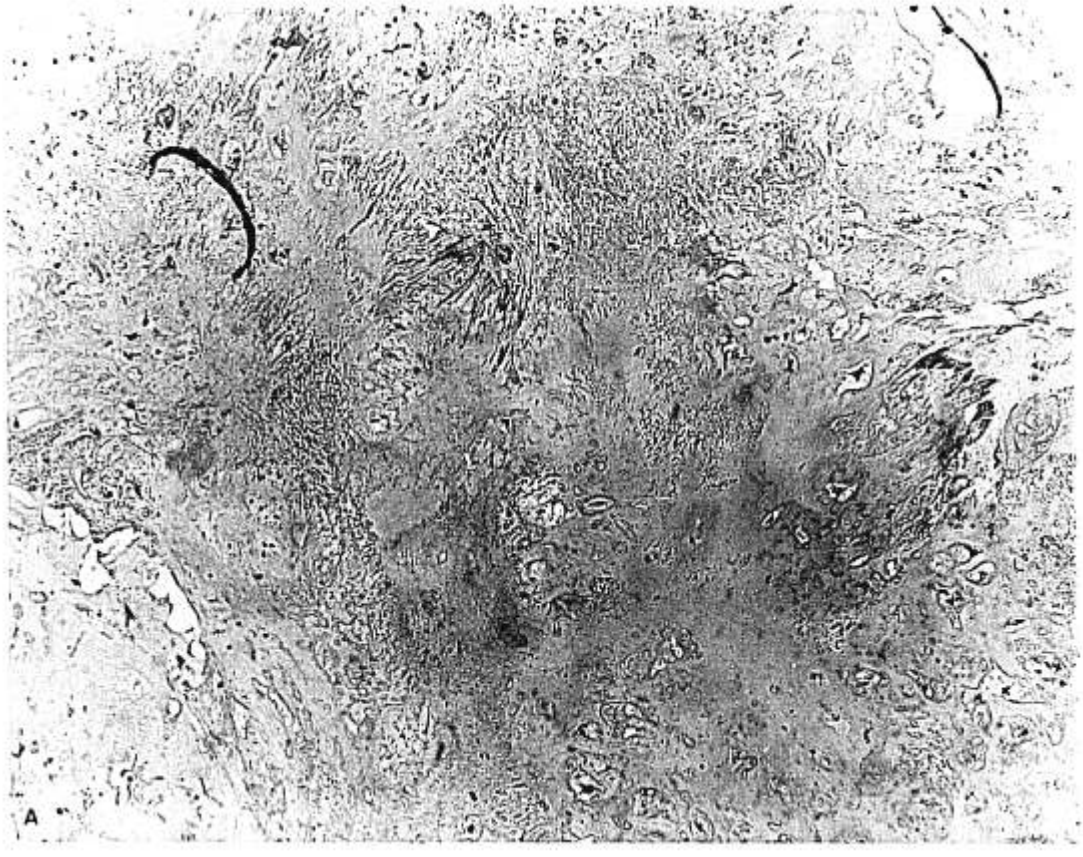

Fig 3A–B. (A) Low power photomicrograph of biopsy (Stain, hematoxylin and eosin; magnification ×110). (B) High power photomicrograph (Stain, hematoxylin and eosin; magnification, ×250). (*Continues*)

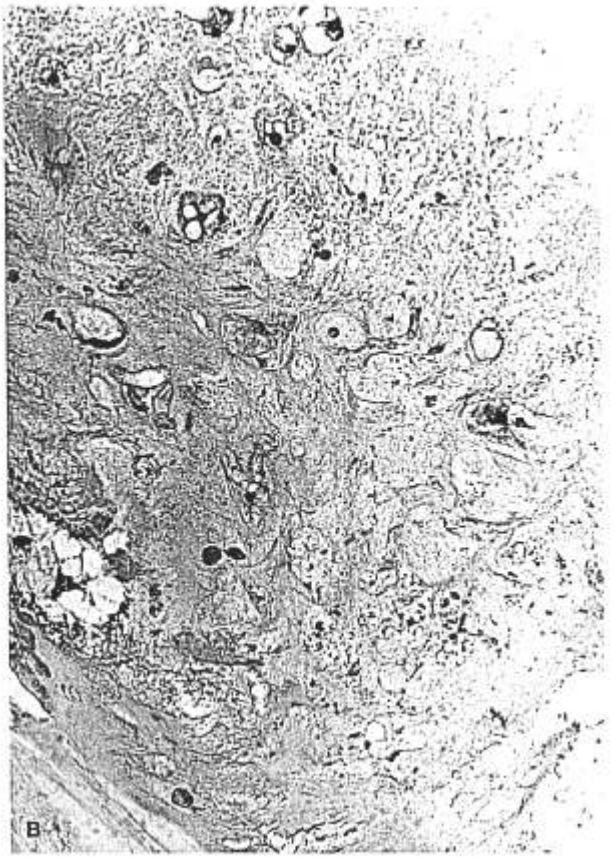

Fig 3A–B. (Continued).

Based on the physical findings, radiographic studies, and histologic picture, what is the diagnosis and how should this lesion be treated?

See page 275 for the diagnosis and treatment for the lesion.

Continuation of ORP Conference from page 269.

HISTOLOGY

Macroscopically, the sections showed fragments of partial calcified, bluish-white or bluish-gray semitranslucent hyaline cartilage with a distinctly lobular arrangement. Microscopic examination showed the tumor to be composed of disorganized chondrocytes in myxoid background with ossification in areas (Fig 3). The cartilage had normal cellularity and no cellular atypia or pleomorphism. The cartilage was surrounded completely by plates of lamellar bone and bone marrow. The chondrocytes were in lacunae, were small, and had a round, regular nucleus. The diagnosis was enchondroma.

TREATMENT AND DISCUSSION

Enchondroma is usually an asymptomatic lesion; many are discovered incidentally on radiographic examination.[8] Enchondroma usually is discovered in the third or fourth decade of life and is equally frequent in men and women. Approximately 40% to 65% of solitary enchondromas occur in the hands or the feet. Solitary enchondromas occur in the long tubular bones in approximately 25% of cases and are more common in the bones of the upper extremity than in those of the lower extremity.[6]

In this case, the patient experienced acute onset of left shoulder pain that radiated down her arm and up to her neck. Clinically, there were atypical features in this patient's presentation that raised concerns over the diagnosis. The acute onset of radiating pain with no clear history of trauma or stress and no radiographic evidence of fracture made it imperative to consider possible malignancy.[8]

The history of pain at night is typical of chondrosarcoma and many bone malignancies.[4] Enchondromas are generally clinically asymptomatic although the pain may be induced during strenuous physical activity.[3] In some cases, this may be attributable to a stress fracture through the lesion. In this case, the patient did not do any exercise and presented with acute onset of left shoulder pain. It is unusual to see a pathologic fracture in enchondroma of larger bones. Pain unassociated with fracture should arouse the suspicion of malignancy.[8]

Tendonitis, rotator cuff disease, or cervical spine problems also may produce shoulder pain. Bursal injection may be helpful in distinguishing tendonitis from other causes of pain.[4] However, in this case, the steroid injection did not resolve the pain. In cases such as this, where diagnostic uncertainty is present clinically, even a radiographically benign lesion may require an open biopsy.

Definitive treatment should be planned after a final pathologic diagnosis is rendered. The distinction between enchondroma and low grade chondrosarcoma remains difficult.[1–5,7,8] When potential uncertainty exists, open biopsy allows sampling while controlling potential compartment contamination. Adequate biopsy material is mandatory, and permanent sections should be reviewed in conjunction with clinical and radiographic information. In 1985 Mirra et al[3] reported that it was possible to diagnose enchondroma from chondrosarcoma with great accuracy provided that (1) a thorough history is obtained; (2) radiographic examination, including standard tomograms, and computed tomography scan were used; (3) the lesion is properly sampled; and (4) careful review of histologic patterns was performed. As indicated previously, differentiation of a low grade chondrosarcoma from an enchondroma can be difficult on a purely histologic basis. Mirra and coauthors[3] proposed several histologic criteria for making the distinction. Enchondromas tend to form well circumscribed nodules that may be surrounded by bony trabeculae. This permeative quality is probably the most important histologic feature separating chondrosarcoma from enchondroma.[3,8] Solitary enchondromas of long bones usually need no treatment because they typically do not involve or compromise

the cortex.[8] If the lesion must be removed, simple curettage should be sufficient. The reported 10-year local recurrence rate for enchondroma was 4%.[1] Atypical lesions may require a more individualized approach, bearing the possibility of malignancy in mind.

After biopsy, this patient was treated with physical therapy to regain normal ROM. The slightly atypical history of acute pain onset without trauma and the patient's concerns over a strong family history of cancer led her to elect curettage and bone graft. Freeze dried cancellous allograft chips mixed with iliac crest bone marrow was used to reconstruct the defect. At 6-month followup, the patient had full ROM and was pain free.

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