LETTER / Pediatric imaging

Scurvy in a 3-year-old autistic girl: Whole-body magnetic resonance imaging findings

Keywords Pediatric; Whole-body magnetic resonance imaging (MRI); STIR imaging; Scurvy

Dear Editor,

Scurvy is difficult to diagnose due to its rare occurrence and nonspecific musculoskeletal symptoms. A better understanding of the whole-body magnetic resonance imaging (MRI) appearance of scurvy will help detect this curable disease and prevent the use of invasive procedures in young children.

A 3-year-old girl with a history of developmental delay was admitted to a local hospital with worsening diffuse pain and limping. Ultrasound of hips, knees and ankles were considered normal. A nuclear bone scan showed increased uptake in the right femoral and tibial metaphyses and left humeral metaphysis. The girl was referred to our hospital and whole-body MRI was performed using a Siemens 1.5-T Aera® scanner and a 18-channel body coil with coronal

Figure 1. Three-year-old girl with scurvy. Whole-body MRI (STIR sequence; TR/TE = 5481/57 ms) in the coronal plane shows symmetrical bilateral increased signal intensity in the bone marrow of all the metaphyses and metaphyseal equivalents of the axial and peripheral skeleton. A. Increased signal intensity in the metaphyses of both proximal humeri (arrow heads), the left proximal humeral epiphysis (arrow) and the surrounding soft tissue. B. Increased signal intensity in the distal radial metaphyses (arrow heads) and sacrum (arrow). C. Increased signal intensity in the anterior arches of the 3rd to 8th left and right ribs. D. Increased signal intensity in the proximal femoral metaphyses (arrow) and adjacent to the triradiate cartilage of both acetabula (arrow heads). E. Increased signal intensity in the metaphysis of the distal femurs and proximal tibias and surrounding muscles and soft tissues. There is no fracture or joint effusion.
short tau inversion recovery (STIR) sequences. It showed diffuse abnormal marrow signal with bilateral multifocal increased signal intensity within all the upper- and lower-limb metaphyses, the sacral wings and the anterior rib cartilage. Adjacent periosteal reaction and soft tissue signal abnormalities were found in both knees (Fig. 1). No primary tumor was detected. Bone marrow aspiration did not reveal neoplastic cells. Additional clinical history revealed gingival swelling and bleeding and a restricted diet confined to chocolate cookies and pasteurized milk. The plain radiographs were reviewed (Fig. 2) and showed mild stigmata of scurvy in both knees including a dense zone of provisional calcification in the metaphyses, a sclerotic epiphyseal rim in the epiphyseal center of ossification and metaphyseal spurs but no subperiosteal hemorrage. When the vitamin C level returned to < 0.2 mg/dL (normal 0.6–2.0 mg/dL), the patient was diagnosed with scurvy.

Scurvy is a disease caused by a vitamin C deficiency, leading to endochondral ossification failure and capillary endothelial abnormalities. The initial symptoms are nonspecific [1]. Radiological findings include generalized osteopenia with cortical thinning and subperiosteal hemorrhage. A prominent zone of provisional calcification known as the white line of scurvy or Frankel’s line in the metaphyses and a sclerotic epiphyseal ring known as the Wimberger ring around the epiphyses have been reported [2]. Frankel’s line extends beyond the metaphyseal margin resulting in a beak-like formation known as Pelkan’s spur. As scurvy is rare and its radiological presentation is not well known by many radiologists, whole body MRI can play a key role in its diagnosis [3]. The features of scurvy have been shown on conventional MRI of specific joints [2,4,5] and include a diffuse, multifocal decreased signal on T1-weighted images and increased signal intensity on T2-weighted images within the bone marrow. Adjacent soft tissues are hyperintens relative to normal due to periosseous edema, subperiosteal hemorrhage, and subperiosteal fluid collection [4]. Most patients with scurvy undergo additional imaging investigations such as computed tomography or biopsy before the diagnosis is confirmed [1–6]. To our knowledge, whole-body MRI findings of scurvy in young children have never been reported. As multifocal lesions with increased signal intensity on whole-body STIR MRI are not specific, differential diagnosis includes hematologic malignancies, Langerhans cell histiocytosis, bone marrow metastases of neuroblastoma and child abuse [3]. Whole-body coronal STIR MRI helps identify occult causes of musculoskeletal pain and point radiologists to a diagnosis of scurvy if it reveals diffuse symmetrical bilateral increased signal intensity in the metaphyses and adjacent soft tissue abnormalities. Recognition of the typical MRI features of scurvy could avoid unnecessary invasive procedures.

Disclosure of interest

The authors declare that they have no competing interest.

References


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