Early stage juvenile vertebral osteochondrosis (Scheuermann's disease)

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Patient: 15 years, female

Clinical History:

A 15-year-old girl complaining of lower back pain for the last 6 months.

Imaging Findings:

A 15-year-old girl presented for diagnostic work-up due to the fact that she was complaining of lower back pain for the last 6 months. She had no significant medical history and laboratory tests were unremarkable. The girl was actively involved in gymnastics during the last years. The plain radiographs of the lumbar spine depicted anterior wedging of the L1 vertebral body, with irregularity of the upper endplate anteriorly. There was also evidence of disc space narrowing at the level of D12-L1, with endplate sclerosis across the disc. Subtle endplate sclerosis was also evident in the L1 vertebral body inferiorly and superiorly with a focus of endplate irregularity, in the superior endplate. L1-L2 disc space seemed within normal limits (Figure 1). Further work-up with MRI of the lumbar and lower thoracic spine was deemed necessary. Sagittal T1W and T2W images as well as T1WI with IV gadolinium were obtained (Figures 2-4). Additional information included disc intensity material herniating anteroinferiorly in the L1 upper endplate, consistent with the presence of a limbus vertebra. There was a high signal intensity ring in the bone surrounding the lesion on the T2W images. The focal irregularity of the upper endplate of L2 vertebral body was consistent with a tiny commencing Schmorl's node. Apart from D12-L1 disc degeneration with loss of height there was also evidence of L1-L2 disc degeneration, with signs of dehydration on the T2WI. There was no evidence of kyphosis in the lower dorsal spine. There was also no evidence of abnormal contrast enhancement indicating tumour or infection.

Discussion:

Juvenile vertebral osteochondrosis (Scheuermann's disease) affects adolescents of both sexes, with a peak incidence between 13-17 years. The most commonly affected region is the mid and lower thoracic spine and usually several adjacent vertebrae are implicated. Less often the lesions may be located in the lumbar or in the upper thoracic spine. Even less frequently changes may be confined to a single vertebra. Current criteria for the diagnosis of Scheuermann's disease frequently include the presence of lesions in at least three contiguous vertebrae, with wedging of at least 5 degrees each. Such criteria however exclude more atypical cases of Scheuermann's disease that can be associated with minor vertebral endplate irregularity without frank wedging. Symptoms may vary, so some patients may be completely asymptomatic while others may exhibit prominent symptomatology. Symptoms may include fatigue, pain exacerbated by physical effort, while signs may be defective posture and local tenderness encountered mainly in midthoracic and lumbar spine either with or without kyphosis.

There are quite a few postulations about the aetiology of the disease. Suggested pathophysiology is that the
Disease may be the result of repetitive trauma, including hyperflexion and axial loading on the growing spine. The cartilaginous Schmorl's nodes are probably stress induced intraosseous displacement of the disc through congenitally or traumatically weakened portions of the cartilaginous endplates.

The hallmark for the radiologic diagnosis of Scheuermann's disease is endplate irregularity. On plain X-rays the wavy superior and inferior endplate of the affected vertebral bodies is associated with intraosseous radiolucent zones of various sizes, consistent with cartilaginous or Schmorl's nodes, with surrounding sclerosis. Wedging of the anterior part of the vertebral body may be seen, along with loss of intervertebral disc space. The degree of kyphosis if present may vary. There is usually no evidence of constitutional symptoms in cases of adolescent kyphosis due to Scheuermann's disease while vertebral defects exhibit a sclerotic rim which is not seen in cases of tubercular lesions.

MR imaging can depict changes seen on plain X-ray films well in advance and more clearly. The affected discs are narrowed and degenerated, showing loss of T2 hyperintensity, reflecting disc dehydration. The disc material can be explicitly seen to herniate into the endplate defect, underneath the non-fused ring apophysis, with the formation of Schmorl's nodes. Hypointensity on both T1W and T2W images is suggestive of the endplate sclerosis as seen on plain radiographs. Occasionally large foci of intervertebral disc material may be observed to prolapse anteriorly and appear submarginally at the rear of the anterior longitudinal ligament. Subsequently a portion of the apophyseal ossification centre may be cut off from the vertebral body and form a limbus vertebra.

There is a wide differential for cartilaginous nodes including, neoplasm, infection, metabolic disorders (i.e. hyperparathyroidism), juvenile rheumatoid arthritis and trauma. Our patient had no history of acute trauma, no constitutional symptoms and unremarkable laboratory tests. The combination of disc herniation and degeneration, irregular vertebral contour in lower dorsal and upper lumbar spine, without kyphosis is a typical case of early stage Scheuermann's disease.

**Differential Diagnosis List:** Juvenile vertebral osteochondrosis (Scheuermann's disease)

**Final Diagnosis:** Juvenile vertebral osteochondrosis (Scheuermann's disease)

**References:**


Description: There is irregularity of the upper endplate of the L1 vertebra, anteriorly. There is also a subtle irregularity of the upper endplate of the L2 vertbral body. The D12-L1 intervertebral space is narrowed. D12, L1 and L2 endplates are sclerotic. Origin:
Description: There is disc intensity material protruding anteriorly into the L1 upper endplate, consistent with a limbus vertebra. A tiny Schmorl's node is depicted in the upper endplate of L2. Origin:
Description: There is a high signal intensity ring in the bone around the herniated disc. Both D12-L1 and L1-L2 discs show dehydration. The tiny schmorl node is again evident in the upper endplate of L2.

Origin:
Figure 4

Description: There is no evidence of abnormal contrast enhancement. Origin: