



Rugger-Jersey Spine in Chronic Kidney Disease

A 23-year-old female was admitted with fever and abdominal pain for 1 day. She was diagnosed with lupus nephritis, and she underwent a renal transplant, which was complicated by transplant rejection. She was on renal replacement therapy following that. She had a recent episode of autoimmune hemolytic anemia and was on azathioprine and hydroxychloroquine. Computed tomography of the abdomen performed as part of the workup for abdominal pain showed ill-defined sclerosis of the vertebral endplates at multiple contiguous levels, producing an alternating dense–lucent–dense appearance consistent with the rugger-jersey spine sign [Figure 1]. The imaging also showed acute cholecystitis. Her serum creatinine was 856 $\mu\text{mol/l}$ (reference 40–100 $\mu\text{mol/l}$), calcium 1.7 mmol/l (reference 2.15–2.55 mmol/l), phosphate 2.4 mmol/l (reference 0.8–1.5 mmol/l), and parathyroid hormone 58 pmol/l (reference 1–8 pmol/l).

Rugger-jersey spine is pathognomonic of hyperparathyroidism, particularly the secondary form related to chronic kidney disease. The imaging appearance is due to a difference in the density of normal mineralized bone and newly formed unmineralized bone (osteoid) at the vertebral endplates. In chronic kidney disease with untreated hyperparathyroidism, osteoclasts increase bone resorption, which subsequently causes an increase in osteoblast activity. The osteoblasts form the new bone in the presence of low calcium levels, and therefore, the osteoid is low in hydroxyapatite and appears more opaque on radiographs. This difference in hydroxyapatite content between osteoid and normal mineralized bone causes the distinct striped pattern of the rugger-jersey spine.

Osteopetrosis and Paget's disease are the two conditions that can have similar imaging findings. In osteopetrosis, there is a



Figure 1: Computed tomography abdomen shows bandlike regions of increased opacity at the superior and inferior margins of the vertebral bodies (alternating dense–lucent–dense appearance, indicated by yellow arrow), consistent with the rugger-jersey spine sign.

sharp demarcation between the peripheral bony sclerosis and the relative lucency of central vertebral bodies (in contrast the indistinct margins in Rugger-Jersey spine), producing the characteristic “sandwich vertebrae” appearance. In Paget's disease, the characteristic bone expansion, trabecular thickening, and increased opacity of the cortex on all sides of the vertebral body cause the classical “picture frame vertebrae” appearance.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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