



Contents lists available at ScienceDirect

AACE Clinical Case Reports

journal homepage: www.aaceclinicalcasereports.com

Visual Vignette

Aortic Calcification Artifact Causing Spuriously High Bone Mineral Density in the Lumbar Spine

Pragya Gupta, MD, Kripa Elizabeth Cherian, MD, DM^{*}, Nitin Kapoor, MD, DM, Thomas Vizhalil Paul, MD, DNB (Endo), PhD

Department of Endocrinology, Christian Medical College and Hospital, Vellore



ARTICLE INFO

Article history:

Available online 17 December 2020

Case Presentation

An 89-year-old woman with well-controlled type 2 diabetes mellitus was referred for routine evaluation of bone health. She had no history of prior falls or fractures, although she reported occasional low back pain for the past 6 months. She was receiving regular calcium and cholecalciferol supplements along with metformin for control of diabetes. Her general and

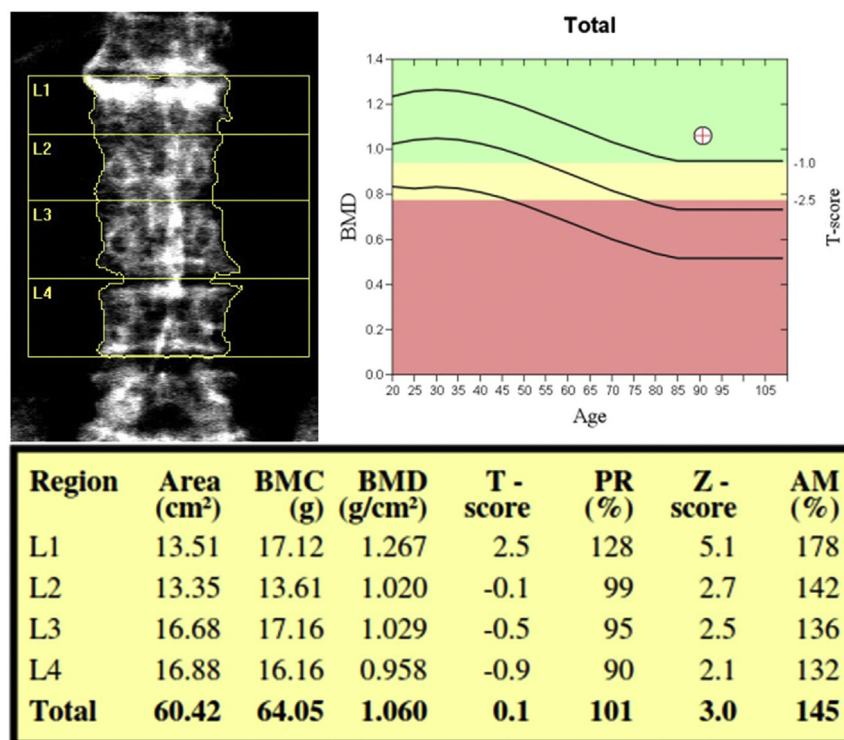


Fig. 1.

Editor's Note: Submissions to "Visual Vignettes" are welcomed. Please submit online via the Journal's Editorial Manager site.

^{*} Address correspondence and reprint requests to Dr. Kripa Elizabeth Cherian, Department of Endocrinology, Christian Medical College and Hospital, Vellore.

E-mail address: kripaec@gmail.com (K.E. Cherian).

<https://doi.org/10.1016/j.aace.2020.12.007>

2376-0605/© 2021 Published by Elsevier Inc. on behalf of the AACE. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).



Fig. 2.

systemic examination results were unremarkable. Breast examination did not reveal any suspicious lumps. Her bone mineral profile was within normal limits. Bone mineral density (BMD)

evaluation by dual-energy X-ray absorptiometry scan (DXA) revealed disproportionately high Z-scores at the lumbar spine (L1-L4) (Fig. 1). An X-ray of the lumbar spine was obtained (Fig. 2). Based on the findings in the lateral radiograph of the lumbar spine, a second DXA scan of the lumbar spine in lateral view was performed (Fig. 3).

What is the diagnosis?

Answer

Spuriously elevated BMD due to aortic calcification artifact and L1 vertebral fracture. There was a compression fracture involving the L1 vertebra, abdominal aortic calcification, as well as significantly high BMD at the lumbar spine (L1-L4) as measured by DXA. In view of the discrepancy between the findings on imaging and the expected age-related decline in BMD, lateral DXA was performed. The abdominal aorta was thus excluded from the plane of the X-ray beam from the DXA scanner, and this unmasked the presence of severe osteoporosis that was previously obscured by the vascular calcification. The diagnosis of osteoporosis is usually based on central DXA, consisting of the spine, neck of the femur, and hip.¹ Of the many artifacts that interfere with the estimation of BMD at the lumbar spine, vascular calcification is a well-documented but less-appreciated confounding factor. Bone loss and vascular calcification share many common risk factors, including age, and have been found to coexist in the elderly population. Hence, vascular calcification should be taken into consideration during interpretation of DXA in certain groups, such as very elderly individuals or persons with chronic kidney disease.² The causes of increased BMD include the presence of vertebral fractures, degenerative changes such as osteophytes, calcification of the anterior longitudinal ligament, vascular calcification, and osteoblastic metastases. In the present case,

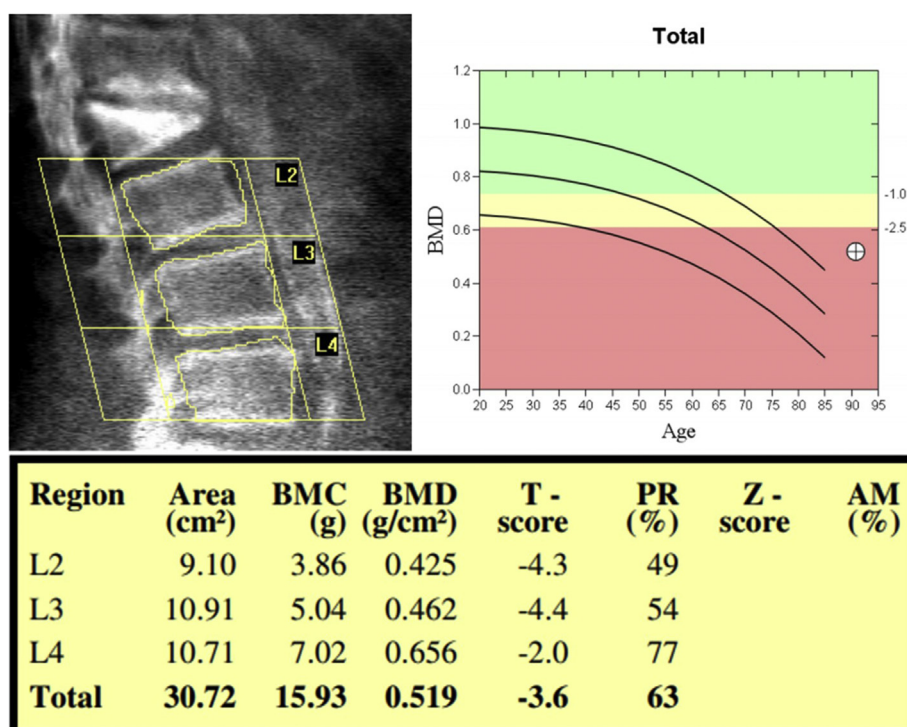


Fig. 3.

considering the patient's advanced age and the presence of a vertebral fragility fracture in the presence of high BMD, she underwent workup for the presence of occult malignancy, which proved to be negative. Clinical examination had ruled out the presence of suspicious breast lumps. There was no evidence of M-band on serum electrophoresis. Thus, in this patient, the high BMD was attributable to the presence of a prior vertebral fracture and the presence of vascular calcification. No other artifact was evident in the DXA image of the lumbar spine in posteroanterior projection. The X-ray beam used in the DXA scan is projected in the anteroposterior/posteroanterior direction and detects calcium in the aorta as it passes through the body. This artifact may be avoided if the DXA scan of the lumbar spine is done in lateral view (Fig. 3) which in this case revealed severe osteoporosis. Identification of this artifact is important, because the DXA scan is an

important and widely used tool to diagnose osteoporosis and aids in decision-making for appropriate management.³

Disclosure

The authors have no multiplicity of interest to disclose

References

1. Camacho PM, Petak SM, Binkley N, et al. American Association of Clinical Endocrinologists and American College of Endocrinology Clinical Practice Guidelines for the diagnosis and treatment of postmenopausal osteoporosis—2016. *Endocr Pract.* 2016;22(suppl 4):1–42.
2. Rubin MR, Silverberg SJ. Vascular calcification and osteoporosis—the nature of the nexus. *J Clin Endocrinol Metab.* 2004;89(9):4243–4245.
3. Avramovski P, Avramovska M, Lazarevski M, Sikole A. Femoral neck and spine bone mineral density-surrogate marker of aortic calcification in postmenopausal women. *Anatol J Cardiol.* 2016;16(3):202–209.