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Interesting image

Incidentally Detected Periacetabular Calcific Lesion on Follow-up Hip Dual-energy X-ray Absorptiometry

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Abstract

Dual-energy X-ray absorptiometry (DXA) is the standard method for diagnosing osteoporosis and monitoring treatment response. In addition to measuring bone mineral density (BMD), DXA images may reveal incidental osseous or soft-tissue abnormalities. Such lesions can interfere with automatic region-of-interest (ROI) placement and affect BMD measurements. We report a case in which a periacetabular calcific lesion was incidentally detected on follow-up hip DXA, and retrospective image review revealed both the onset of the lesion and an automatic ROI placement error.

A 58-year-old woman with a history of breast cancer underwent annual hip DXA examinations from 2023 to 2026. During the 2026 follow-up examination, a calcific lesion was incidentally identified at the superolateral aspect of the left acetabulum. Retrospective review of prior DXA images demonstrated no lesion in 2023, initial appearance in 2024, and inclusion of the lesion within the automatically generated ROI in the 2025 examination. Therefore, the lesion was excluded from the ROI by manual correction during analysis of the 2026 examination. Orthopedic evaluation determined that the lesion was an extra-articular calcific lesion, and clinical observation was recommended.

This case highlights the importance of reviewing the original DXA images in addition to BMD values to detect incidental lesions and verify the accuracy of automatic ROI placement, thereby contributing to accurate BMD assessment and appropriate clinical management.

Keywords: Dual-energy X-ray Absorptiometry, Bone Mineral Density, Acetabulum Calcific Lesion, Region of Interest

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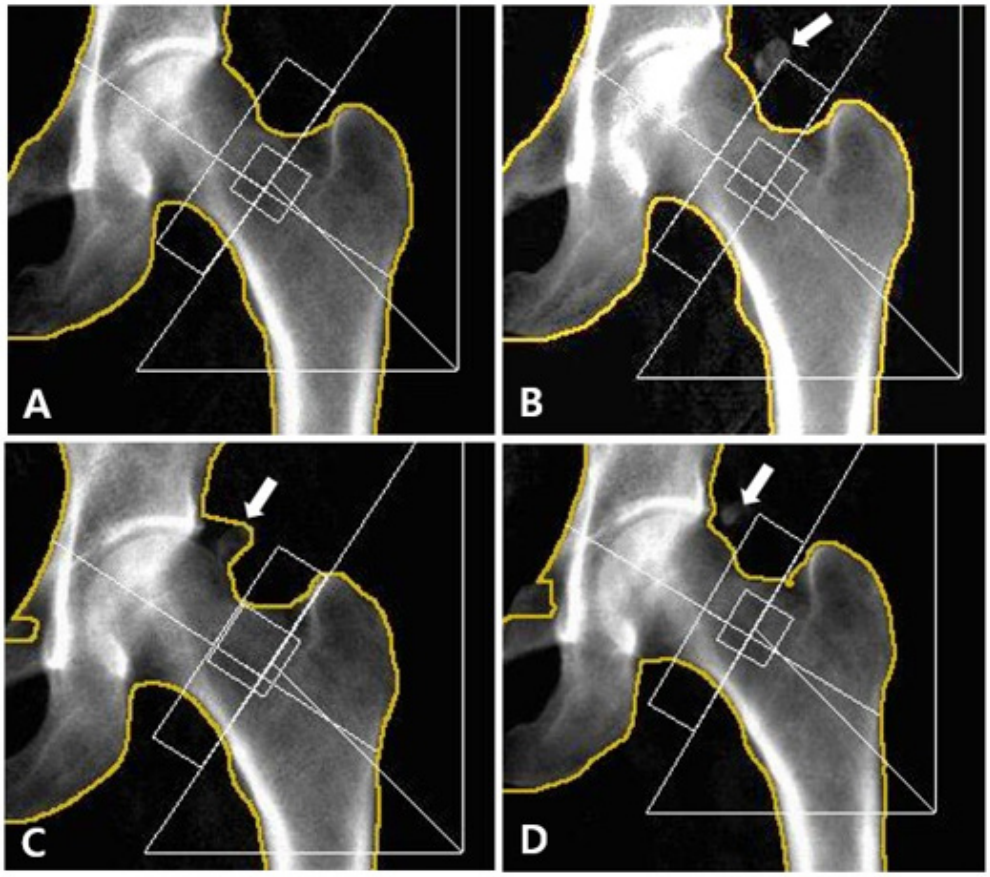

Fig. 1. Serial left hip dual-energy X-ray absorptiometry (DXA) images obtained annually from 2023 to 2026. Baseline DXA image obtained in 2023 showing no calcific lesion around the left acetabulum (A). DXA image obtained in 2024 showing a newly developed calcific lesion (arrow) at the superolateral aspect of the left acetabulum (B). DXA image obtained in 2025 showing the calcific lesion (arrow) included within the automatically generated region of interest (ROI) during bone mineral density analysis (C). DXA image obtained in 2026 showing the calcific lesion (arrow) manually excluded from the ROI before bone mineral density analysis (D).

Dual-energy X-ray absorptiometry (DXA) is widely used as the standard imaging modality for the diagnosis of osteoporosis and assessment of treatment efficacy. In addition to measuring bone mineral density (BMD), DXA images may reveal various incidental osseous and soft-tissue abnormalities [1,2]. These abnormalities may influence automatic region-of-interest (ROI) placement and consequently affect BMD measurements [3-5].

A 58-year-old woman with a history of breast cancer underwent annual left hip DXA examinations (GE, Lunar iDXA, enCORE software, USA) for osteoporosis follow-up between 2023 and 2026. During the 2026 follow-up examination, a calcific lesion was incidentally identified at the superolateral aspect of the left acetabulum (Fig. 1D). To determine the onset of the lesion, the DXA images obtained between 2023 and 2025 were retrospectively reviewed. No lesion was identified on the 2023 examination (Fig. 1A), whereas the lesion first appeared on the 2024 examination (Fig. 1B). Review of the 2025 examination demonstrated that the calcific lesion had been included within the automatically generated ROI (Fig. 1C), resulting in an ROI placement error comparable to that reported in previous studies involving adjacent high-density structures [4]. The measured BMD values at that time were 0.649 g/cm² at the femoral neck and 0.777 g/cm² for the total hip. For the 2026 examination, the calcific lesion was manually excluded from the analysis, and the ROI was manually adjusted before BMD measurement (Fig. 1D). The resulting BMD values were 0.676 g/cm² at the femoral neck and 0.742 g/cm² for the total hip.

Because the 2025 and 2026 examinations were performed one year apart, physiological changes in BMD cannot be excluded. Therefore, direct comparison of the two measurements is limited, and the quantitative effect of including the calcific lesion on the BMD values cannot be determined. Furthermore, sensitivity analysis using the original data could not be performed because the original analysis data were no longer available. Nevertheless, DXA guidelines recommend excluding metallic objects, soft-tissue foreign materials, calcified lesions, and other structures that may interfere with BMD measurement from the analysis ROI whenever appropriate [3,5]. Orthopedic evaluation, including an anteroposterior (AP) pelvic radiograph, concluded that the lesion represented an extra-articular calcific lesion, and conservative follow-up was recommended because the patient was asymptomatic. The orthopedic evaluation was performed at another hospital, and the detailed imaging data were therefore not available for inclusion in this report.

This case demonstrates that retrospective review of serial DXA images can identify both the onset of an incidental periacetabular calcific lesion and an automatic ROI placement error. Careful evaluation of the original DXA images, in addition to BMD values, facilitates detection of incidental abnormalities, verification of appropriate ROI placement, and provision of additional imaging information that may assist clinical decision-making [1-5].

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