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ORIGINAL RESEARCH

Radiofrequency Echographic Multispectrometry (REMS) can Overcome the Effects of Structural Internal Artifacts and Evaluate Bone Fragility Accurately

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Abstract

Purpose This study measured bone mineral density (BMD) in a Japanese population using the novel non-ionizing system using radiofrequency echographic multispectrometry (REMS) and compared the results with those obtained using traditional dual-energy X-ray absorptiometry (DXA). We aimed to identify any discrepancies between measurements obtained using these instruments and identify the influencing factors.

Methods This cross-sectional study examined patients with osteoporosis treated at a single center from April to August 2023. We examined BMD assessment by DXA and REMS in lumbar spine and proximal femur. Patients were categorized into two groups: those with discrepancies between lumbar spine BMD measured by DXA and REMS, and those without. Semiquantitative evaluation of vertebral fractures and abdominal aortic calcification scoring were also performed and compared between the two groups, along with various patient characteristics.

Results A total of 70 patients (88.6% female; mean age 78.39 ± 9.50 years) undergoing osteoporosis treatment were included in the study. A significant difference was noted between DXA and REMS measurement of BMD and T-scores, with REMS recording consistently lower values. The discrepancy group exhibited a higher incidence of multiple vertebral fractures and increased vascular calcification than the non-discrepancy group. Multivariate analysis indicated that diabetes mellitus, severe vertebral fractures, and increased abdominal aortic calcification scores were significantly associated with discrepancies in lumbar spine T-scores.

Conclusion This study suggests that REMS may offer a more accurate measurement of BMD, overcoming the overestimation of BMD by DXA owing to factors such as vertebral deformities, abdominal aortic calcification, and diabetes mellitus.

Keywords Abdominal aortic calcification · Bone mineral density · Dual-energy X-ray absorptiometry · REMS · Semiquantitative grading of vertebral fractures

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