Screening Intervals for Bone Mineral Density Testing Among Elderly Women Can Be Extended, Especially for Those with Normal or Mildly Osteopenic Results

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Study Overview

Objective. To determine the most appropriate intervals for screening for osteoporosis among elderly women with normal bone density or osteopenia.

Design. Longitudinal cohort study of women, the Study of Osteoporotic Fractures (SOF), who had an initial dual-energy x-ray absorptiometry (DXA) scan for evaluation of bone mineral density (BMD) between 1986 and 1988 at 4 sites across the United States.

Setting and participants. 4957 women aged 67 years or older who had either normal values (T score of ≥ –1.00 at the femoral neck and total hip) or measurements consistent with osteopenia (T score of –1.01 to –2.49) at their initial screening DXA and had no history of a hip or clinical vertebral fracture or treatment for osteoporosis. 1255 women were included in the analysis of transition from normal BMD to osteoporosis; 4215 women were included in the analysis of transition from osteopenia to osteoporosis (513 women with baseline normal BMD were included in this osteopenia analysis as well because they had at least 1 BMD measurement following the development of osteopenia). Authors classified osteopenia as mild (T score of –1.01 to –1.49), moderate (–1.50 to –1.99), or advanced (–2.0 to –2.49). Women in the SOF are from 4 areas: Minneapolis, Pittsburgh, Baltimore, and Portland. Subjects were followed for up to 15 years and had planned DXA examinations at years 2, 6, 8, 10, and 16 after the initial exam.

Main outcome measure. Estimated interval between initial screening and time at which 10% of participants transitioned from a normal or osteopenic BMD to osteoporosis prior to (1) developing a hip or clinical vertebral fracture or (2) initiating treatment for osteoporosis.

Main results. Nearly all subjects were white, and most were between 67 to 74 years of age at baseline (77.4% in the analysis of the transition from normal BMD

to osteoporosis, and 68% in the analysis of transition from osteopenia to osteoporosis). For the different analytic groups, 77.9% and 59.6%, respectively, were overweight or obese at baseline, and 25.6% and 36.1% had a fracture of some type after the age of 50 years. Few smoked (5.2% and 6.8%), and 24.2% and 15.5% actively used estrogen. Of women with a baseline normal BMD, 0.8% developed osteoporosis over the 15-year follow-up period, as did 4.6% of those with mild osteopenia, 20.9% with moderate osteopenia, and 62.3% with advanced ostepenia. Controlling for BMI, estrogen use at baseline, any fracture after age 50 years, current smoking, current or past use of gluococorticoids, and a diagnosis of rheumatoid arthritis, the estimated time for 10% of the subjects to develop osteoporosis was 16.8 years, 17.3 years, 4.7 years and 1.1 years among those with normal, mild osteopenic, moderate osteopenic, and advanced osteopenic BMDs at baseline. Older age and current estrogen use were significantly associated with longer time period for transition from osteopenia to osteoporosis. Higher BMI was associated with a longer time period for transition among those who had advanced osteopenia at baseline. A sensitivity analysis that examined the time interval between the baseline DXA and 2% of women having a hip or clinical vertebral fracture found similar values as for the primary outcome (15 years for women with a normal or mildly osteopenic BMD and 5 years for those with moderate or advanced osteopenia).

Conclusion. Baseline BMD strongly predicts later development of osteoporosis for elderly women. While 10% of those with moderate or advanced osteopenia at baseline developed osteoporosis after nearly 5 years and 1 year, respectively, this transition occurred after more than 15 years for those with a normal or mildly osteopenic BMD at baseline. Intervals for screening BMDs could follow from these findings.

Commentary

Guidelines call for an initial BMD measurement using DXA scans for women over the age of 65 years or those with a high risk for the development of osteoporosis [1,2]. However, the recommended interval for screening is uncertain. Medicare pays for screening every 2 years, in part because of the recognition that this time period is required to detect a significant change in BMD, mostly related to the precision of DXA scans [1]. This study set out to examine the interval at which 10% of the sample developed osteoporosis prior to experiencing a hip or clinical vertebral fracture or commencing therapy for osteoporosis. Authors examined data from the long-running Study of Osteoporotic Fractures, which initially enrolled subjects in 1986 and 1988 and has followed them for up to 15 years with repeated DXA scans. They found that 10% of subjects would develop osteoporosis after 16.8 years if they had a normal BMD at baseline and after 17.3 years if they had mild osteopenia at baseline. The development of osteoporosis was more rapid with moderate and advanced osteopenia, with 10% of these groups transitioning after 4.7 and 1.1 years, respectively.

These results are consistent with a prior analysis of the SOF cohort [3]. In that study, the correlation between the initial BMD and a subsequent BMD measured on average 8 years after the initial one was high at 0.92. When determining risk of a future fracture, the subsequent BMD measurement added little prognostic value to the initial BMD. These results suggested that the initial BMD alone is adequate to predict risk for a fracture, without the need for a repeat BMD conducted 8 years later on average. The present study carries this analysis further by extending the period over which the SOF cohort was examined, leading to more specific information on time intervals for the transition to osteoporosis.

This study had several limitations. Of the initial 8514 women who initially received DXAs as part of the SOF, nearly one-half were excluded from this study: 2197 women had osteoporosis at baseline, 260 had a prior history of a hip or vertebral fracture or took medications for osteoporosis, and 1083 had only 1 DXA with complete results and did not have one of the outcomes of interest (17 additional subjects did not have results for the femoral neck at the baseline examination). Additionally, details provided in the online supplemental materials demonstrate that only 50% of subjects included in this study were followed for more than 7.9 years, with 25% of subjects followed for 5.5 years or less. The average follow-up was 8.8 years, with a range of 1.1 to 14.6 years. The lack of long-term follow-up for many subjects and the high rate of exclusions could bias the results substantially; as a result, more long-term data from varied sources will be needed to confirm these results. Authors do report that excluded subjects did not differ from included

subjects on age ($P = 0.71$), femoral neck T scores ($P = 0.47$), and total hip T scores ($P = 0.97$). Finally, the lack of racial diversity is concerning in that nearly all of the participants in this study were white.

Because of the novelty of this data and the existing uncertainty around screening intervals, I would expect these results to change practice patterns. The recommendations for defining screening intervals would be more powerful if accompanied by additional studies finding similar results. Screening BMDs for patients with normal or mildly osteopenic BMDs after age 65 may be unnecessary for at least 15 years. Intervals for patients with moderate or advanced osteopenia should be shorter. Because of the strong association between older age and the development of osteoporosis, authors discuss the impact of age on screening intervals, especially on those subjects with moderate osteopenia at baseline. For subjects age 67 years with moderate osteopenia, the interval over which 10% of the sample developed osteoporosis was 5.6 years. The time interval decreased to 3.7 years for those who were 80 years of age at initial screening. As a result, age should likely come into the determination of screening intervals for this group.

Applications for Clinical Practice

For elderly women, screening BMDs can likely be done every 15 years after a normal or mildly osteopenic result. Screening intervals should be substantially shorter for women with moderate or advanced osteopenia, in the range of every 5 years and 1 year, respectively. Guideline organizations should consider revising their recommendations regarding screening based on these results.

—Review by Jason P. Block, MD, MPH

References

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