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Editorial

Peripheral Artery Disease and Osteoporosis

Editorial

The frequency of peripheral arterial disease (PAD) increases with advancing age similar to that of osteoporosis [1], which is the most common bone disease worldwide and a growing public health issue for the aging population. Thus, a better understanding of osteoporosis and related problems are of utmost importance. According to World Health Organization criteria, diagnosis of osteoporosis is based on bone mineral density (BMD) values or presence of osteoporotic fractures [2].

A number of studies have shown greater loss of bone density, higher risk of osteoporosis and osteoporotic fractures in patients with cardiovascular disease (CVD), suggesting a link between atherosclerosis and osteoporosis. Earlier case control studies showed that postmenopausal women with osteoporosis were more likely to have coronary [3] or aortic [4,5] atherosclerosis compared to those without. Lower femoral neck BMD T-score was an independent predictor of PAD among postmenopausal women (OR: 0.20) [6]. When 5268 men and women were evaluated, women with a low femoral neck BMD had a significantly increased risk of PAD (OR:1.49) [7], and this was not true for men or lumbar BMD measurement. In another cross-sectional analysis of 3075 older women and men, individuals with higher BMD values had significantly lower rate of CVD, independent of the influence of age [8]. When patients with a first hip/femur fracture (n=6763) were compared to controls (n=26341), odds ratio for the risk of hip/femur fracture was 1.96 in patients who experienced a stroke at any time before enrollment [9]. Interestingly, the risk of fracture was further increased among patients younger than 71 years (OR: 5.12), and patients who had experienced a hemorrhagic stroke tended to be at a higher risk compared with those who had experienced an ischemic stroke.

Other than the bone density, the association of CVD to osteoporotic fractures was also investigated specifically in longitudinal studies. Advanced aorta calcification was accompanied by lower bone density among 2662 healthy postmenopausal women at baseline, and bone loss was found to be accelerated after follow-up of up to 7.5 years [10]. Also, severe aorta calcification was an independent predictor of hip fractures in the same study during the observation period. Analysis of another cohort that included 5781 older men showed that PAD was associated with higher rates of hip bone loss and increased risk of nonspine fractures in a follow-up of 4.6 years on average [11]. A cohort of 31,936 Swedish twins has shown similar results, with adjusted hazard ratios of hip fracture after a diagnosis of heart failure as 4.40, after a stroke as 5.09, after a diagnosis of peripheral atherosclerosis as 3.20, and after an ischemic heart disease event as 2.32 [12]. This study also proposed genetic associations between CVD and osteoporosis. Among men and women aged 50 and over (n=624) who were followed during 4 years, severe aortic calcifications were positively associated with the presence of osteoporotic fractures (OR=1.93), and progression of aortic calcifications was associated with higher decline in BMD [13]. In a similar study among 781 men, those with significant aorta calcification had a 2- to 3-fold increased risk of fractures after appropriate adjustments [14].

Controversial results were also reported in a couple of studies. Most importantly, aortic calcification detected in the middle age was not a predictor of hip fractures after 31 years of follow-up in the Framingham Study [15]. However, the method of detection of aortic calcification was a significant drawback of the study. Follow-up of 837 adults for 4 years demonstrated a weak and age-dependent association between PAD and osteoporosis limited to female gender, and PAD was not associated with fractures [16].

PAD is one of the four main types of CVD, including coronary heart disease, cerebrovascular disease, and atherosclerosis / aneurysm. [17]. It has been well understood that PAD is associated with not just circulatory disturbances in the lower extremities but also with all-cause mortality, cardiovascular mortality, other cardiovascular outcomes, multi-morbidity,

falls, functional decline and disability. It is evident that PAD is not inferior to other types of CVDs regarding clinical outcomes in the long term.

Current evidence is not convincing that screening for osteoporosis in people diagnosed with CVD, or vice versa, should be a part of routine patient care. Although both PAD and osteoporosis are common among elderly people, it still needs to be elucidated whether there are modifiable pathogenic and clinical relationships between these two. While the population of advanced age has been growing faster, newer clinical trials are also needed to identify the risk of fractures in CVD patients at more advanced ages including oldest olds.

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