Hip Fracture Discrimination Study: QUS of the Radius and the Calcaneum

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As an emerging alternative to current radiation-based bone densitometry techniques, there is a growing interest in the use of quantitative ultrasound (QUS) measurements for the noninvasive assessment of fracture risk in the management of osteoporosis. However, there are also a multiplicity of technologically different QUS devices available on the market and, so far, no study has compared heel and radius QUS device for the discrimination of subjects with hip fractures. Our study evaluated the ability of three QUS devices (one calcaneal gel-coupled system, one calcaneal water-coupled system, and one radius system) to discriminate osteoporotic from controls subjects, using the same population. We also checked if the combination of two different skeletal sites (i.e., calcaneum and radius) improve the discriminatory ability of the QUS devices. Forty-five women aged 79.1 +/- 7.1 yr with hip fractures within the last 4 d were used as the hip-fracture group and compared to 40 healthy controls from 65-87 yr. In addition, 47 young controls, aged 20-40 yr, were used as reference population to express some of the results as T-scores. QUS measurements were performed with the Hologic Sahara, GE-Lunar Achilles+, and Sunlight Omnisense devices according to the manufacturer's recommendations. Adjusted odds ratio results showed that a decrease in Omnisense SOS of 1 standard deviation (SD) was associated with a significant increase in fracture risk (OR adj. = 2.83) comparable with Sahara BUA (OR adj. = 2.42) and Achilles BUA (OR adj. = 3.29). However, given the large overlap between the 95% intervals of each odds ratio, no significant difference was found between the devices. Similarly, comparison between the areas under ROC curves did not show any significant difference between all the parameters. Considering the parameters provided per default by each QUS device, the Sahara, Achilles, and Omnisense devices classified correctly 70, 67.5, and 62.5% of the subjects, respectively. Although the OR of the combination of radius and calcaneum is improved (3.62 to 4.74) compared with either one of the single skeletal site, the large confidence intervals do not allow to claim a significant difference.

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