

A prospective case-control study of ankle fracture in postmenopausal women

To the Editor—In the recent issue of the journal, Ho et al¹ suggested that postmenopausal ankle fractures among Hong Kong elderly women were not associated with osteoporosis but could be explained by diabetic neuropathy. They also pointed out that the functional outcome of these patients was generally satisfactory if appropriate treatment was given. However, this local study was prone to several methodological defects.

The authors inappropriately described their study design as a prospective case-control study. In fact, according to the detailed descriptions in the methods section of their article, Ho et al¹ initially conducted an age-matched case-control study. They then carried out a prognostic study by following up a single group of ankle fracture patients over 1 year period to observe ambulatory capacity after the completion of treatments on ankle fracture. The term “retrospective study” which is used synonymously with case-control study by some investigators therefore seems more appropriate, because such a design looks backward from the effect (ankle fracture) to ascertain the possible cause (osteoporosis). In contrast, a prognostic study is to prospectively observe the future course of disease (ambulatory capacity) following its onset (the completion of treatments on ankle fracture).²

Inappropriate selection of cases and controls may have posed another methodological drawback. The authors failed to describe the sampling strategies for the recruitment of subjects. Theoretically, the recruitment of a representative sample (eg consecutive cases or a random sample) from all fracture cases could minimise the potential selection biases. However, inclusion of only 18 elderly with fractured ankles over 1 year (between 2002 and 2003) clearly does not reflect the overall number of cases during that period, providing a similar incidence rate of ankle fracture to that of Finns.³ Bone mineral density (BMD) of ankle-fractured cases among Hong Kong postmenopausal women could be either over- or under-estimated based on such small groups of potentially selected patients. Moreover, the temporal

relationship between BMD and ankle or hip fractures could not actually be properly inferred as the BMD was measured after the fractures. On the other hand, choosing a group of femoral neck-fractured women as controls would have underestimated the impact of exposure (osteoporosis) on the risk of ankle fracture because of an established link between hip fracture and osteoporosis.⁴ Accurately estimating the effect of osteoporosis on ankle fracture requires an appropriately designed case-control study with adequate exploration of major potential confounding factors and sufficient statistical power. Findings of the study by Ho et al¹ would have been more informative if the rigors of epidemiological methodology could have been properly considered.

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Authors' reply

To the Editor—Our series¹ consisted of all female patients, 60 years old or above, admitted to the Prince of Wales Hospital with ankle fractures between 2002 and 2003. Prince of Wales Hospital is a major trauma centre serving a population of 0.7 million. As described in reference² cited by Dr Tse, we would like to emphasise that “the study was begun and all new cases that were diagnosed within that inclusive period of time [2002-2003] were included in the investigation”. Our article clearly stated that “during admission of each index patient, corresponding demographic data... and complications were recorded”. We had 22 such cases, which represented most, if not all, of the cases that occurred during the study period. Final analysis was made on 18 cases with reasons already mentioned in our article. Again based on the same reference² referred to by Dr Tse, “the study is a prospective case-control design”.

The concern that “choosing a group of femoral neck-fractured women as controls would have underestimated the impact of exposure (osteoporosis) on the risk of ankle fracture...” appears to rely on biased selected sampling of messages delivered in our article. We emphasised comparison of bone mineral density (BMD) between cases and a sex-age-matched stratum of the general population. In addition, most of our cases had BMD measured within a few days of admission. If there was a chance that osteoporosis set in during post-injury immobilisation, the resulting bias would be small, and if

anything, induce an overestimation of the association between osteoporosis and geriatric ankle fractures. We therefore concluded that there was “no evidence to support osteoporosis as a cause of postmenopausal ankle fracture”. The purpose of including data for geriatric hip fracture was to present a dramatic and important contrast with respect to the differences in association between these two types of geriatric fractures and osteoporosis.

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