Hearing Loss and Osteoporosis- a wake-up call?
Author: Mrs Helen Riddell, Lecturer, Division of Nursing, Queen Margaret University, Edinburgh EH21 6UU.
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Recently I was talking with an elderly relative who raised the subject of her hearing loss. This had been particularly swift and profound in one of her ears, and her hearing aid was no longer effective. She had experienced a long history of osteoporosis, leading to a number of fractures over the last two decades, and a marked loss in height due to vertebral deterioration. This led me to speculate whether there was an association between osteoporosis and hearing loss. I reasoned that as the conductive apparatus for sound transmission consisted (in part) of three very small connected bones (ossicles) in the middle ear, then their density might also be reduced through osteoporosis, leading to poor conduction or even dislocation, with consequent hearing impairment.

I decided to perform a ‘rapid’ scan of existing research in order to answer my own question. What I found were a number of studies which clearly showed an association between osteoporosis and sensori-neural hearing loss (SNHL) or nerve deafness (this type of hearing loss is associated with old age and referred to as presbycusis). For instance a recent controlled trial (Kahveci et al 2014) concluded that there was an association between SNHL, tinnitus and osteoporosis. SNHL is attributed to osteoporotic deterioration of the temporal bone, which contains the cochlea and vestibular apparatus (which regulates balance). Furthermore according to Yeh et al (2015) there is an increased risk of sudden sensorineural hearing loss (SSNHL) in people with osteoporosis. These researchers conducted a very large comparative cohort study in Taiwan and concluded that patients with osteoporosis were at 1.76 times the risk of developing SSNHL than patients without osteoporosis. Mendy et al (2014) in the US were also interested in testing out whether there was an association between bone mineral density (BMD) (reduced in osteoporosis) hearing and balance impairment, and concluded that there was, particularly in older adults. These studies are particularly interesting, since they suggest a link between loss of balance and falls and fractures in people with osteoporosis. However, a study in 2004 concluded that there was no association between falls, fractures and hearing loss (along with vestibular deterioration) in people with osteoporosis (Purchase-Helzner et al 2004), and isolating osteoporosis as a factor in vestibular degeneration is likely to be problematic, due to the many other causes of age-related loss of vestibular function (Zalewski...
2015). Nevertheless it seems reasonable to accept the conclusions of Upalaa et al (2016) who reviewed the research evidence for a relationship between osteoporosis and hearing loss, through a meta-analysis. These authors conclude ‘our result is the strongest evidence of the association between hearing loss and osteoporosis ever reported’ (page 6).

However a note of caution is struck by most of these researchers, who point out that a number of factors can confound a clear association between reduced BMD and hearing loss. These include co-existing systemic disease, such as cardiac problems and diabetes, the assessment of BMD—which varies according to which bones are used for measurement, self report of hearing loss rather than measurement through audiology and ethnic origin. Also trying to find healthy age-matched controls, and whether or not people with osteopenia are included in samples (since this is not classified as osteoporosis by the WHO) provide further challenges for researchers in this field.

So what of my speculations?. It seems that the ossicles can be affected by another bone disorder-otosclerosis. This can be related to reduced BMD but the evidence is not sufficiently robust to suggest that there is clear association between these two conditions, and researchers are still trying to establish the causes of otosclerosis, although Atan et al (2016) conclude that the tendency for these conditions to co-exist warrants testing people with otosclerosis for osteoporosis.

Is research evidence sufficiently robust to support the suggestion from Oskiris et al (2013) that people with a diagnosis of low BMD should be automatically screened for hearing loss?. That debate lies in the future, but it is clear from my brief scan of related research that world-wide interest in this topic is growing fast.

References:


