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Editorial

Osteoporosis and Disabling Hip Joint Osteoarthritis: Is There a Connection?

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Received: August 29, 2016; **Published:** September 09, 2016

Intruduction

Osteoarthritis, generally considered to be progressive in nature, with few possibilities of remission, is a widespread disabling health condition. But can the disease or its severity possibly be reduced? To explore this question, we recently examined the condition known as hip joint osteoarthritis and what emerged was a model that revealed, hip osteoarthritis, most commonly implicated as being caused by age, may be influenced by- multiple overlapping co-existing diseases, such as obesity and cardiovascular diseases, among others [1-4]. We further hypothesized that another age-related disease, which has received limited attention, namely osteoporosis [3], might indirectly explain the need for, as well as the failure of hip joint replacement surgery in selected hip joint osteoarthritis cases.

Of specific interest in this respect is the fact that osteoporosis, an age related health condition associated with bone thinning, weakness, fragility, and increased susceptibility to fracture [5,6], has been viewed more often not as a separate disease entity from osteoarthritis, rather than a possible co-existing factor, a belief that persists despite direct and indirect evidence to the contrary [7-9].

A question then arises as to which fact is valid, and if it is the latter, whether individuals with hip osteoarthritis who also have osteoporosis, along with those deemed at risk for osteoporosis, would possibly benefit from more targeted rehabilitation, medical, educational, or specific adaptations in the event of them requiring surgery.

Methods and Rationale

To examine this question, we sought all reports detailing the frequency of co-existent osteoporosis in the context of primary or secondary hip joint replacements or less severe stages of hip joint osteoarthritis, cognizant that individuals with primary hip joint osteoarthritis are said to have a phenotype with higher rather than low bone mineral density [10]. We also examined the profiles of a small sample of hip surgery patients awaiting primary or secondary hip replacement surgery to examine if cases with an osteoporosis history could be detected among the sample, and if so, whether these cases could be distinguished from those without osteoporosis in some way.

We selected to examine the frequency of osteoporosis, even though other bone conditions such as osteonecrosis can cause hip joint osteoarthritis, as osteoporosis is highly prevalent among those in the higher age ranges, not unlike, osteoarthritis. In addition, bone itself is a potential precursor or mediator of osteoarthritis and hip joint replacement surgery involves invasive procedures to replace diseased bone with metal implants, and thus the nature of the bone tissue may have a bearing on the overall outcome of the surgery, and on limiting the durability of the surgery [11]. We also recognized that since osteoporosis is associated with pain, bone tenderness, and postural changes, it may be challenging to identify or distinguish this health condition from osteoarthritis, which has quite similar symptoms. As well, the condition may not be sought for either, because it is believed osteoarthritis and osteoporosis are not likely to co-occur. Moreover, the disease is often asymptomatic and unless a bone scan is requested, the condition may go undetected.

In examining the data, we expected a small percentage of patients with disabling hip osteoarthritis would be shown to have both osteoarthritis and osteoporosis, even when trauma as a factor was controlled for. Moreover, when examining their medical records, we

expected those with osteoporosis histories to have past histories of other debilitating diseases such as a cancer, asthma, or inflammatory arthropathies requiring steroids, in addition to having a higher than average ages. Their body weights were also expected to be lower than those who had no evidence of osteoporosis on average, but to include high and low body weights-both of which can produce osteoporosis through the pathway of inactivity.

Results

Among the 1037 cases with disabling hip osteoarthritis (600 women and 437 men) we examined, osteoporosis prevailed in 46 cases or 4.4% of cases, almost all being women. Among those cases undergoing primary unilateral hip joint replacement who were otherwise healthy with no trauma history (n = 560), the frequency of having a co-existing osteoporosis diagnosis was 8.8% for women and 1.8% for men.

Additionally, those with a pre-existing osteoporosis diagnosis tended to weigh less than age matched primary hip replacement candidates with no disease (p = 0.02), even though many were overweight rather than underweight, they tended to be less mobile than controls with no comorbid health conditions (p = 0.08), and on average were approximately 6 years older than those who were otherwise healthy with no comorbid disease.

It was also noted that with concomitant osteoarthritis and osteoporosis undergoing revision surgery were more impaired than those undergoing primary surgery with the same health profile, and as a whole cases with osteoporosis suffered from high rates of co-existing cancers, depression, diabetes, anxiety, and cardiovascular conditions (p = 0.001) compared to the cohort as a whole. Published prevalence rates of cases with both osteoporosis and hip osteoarthritis among osteoarthritis patients were found to range from approximately 16-46% [13-18,24,25].

Conclusion

While divergent views exist, it is clear osteoporosis and hip joint osteoarthritis can clearly co-exist [19], especially among older women, even though the two conditions are clearly distinctive clinical conditions and affect bone differentially [20]. Cases that are overweight can also present with osteoporosis, others tend to be of normal weight or underweight. In addition, those cases of disabling hip osteoarthritis who have concomitant osteoporosis may be highly impaired prior surgery as well as at risk for poorer surgical outcomes than those who do not, regardless of type or degree of bone damage [11,12] in light of challenges to implanting prostheses where bone density is compromised.

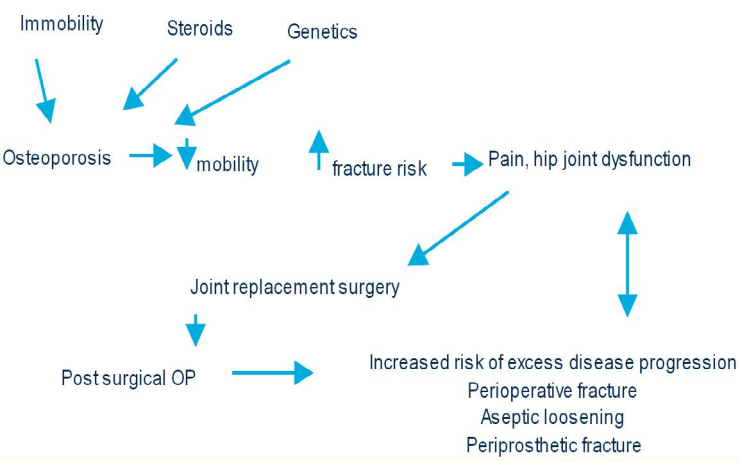

Figure 1: *Schematic of possible interrelationships between osteoporosis determinants and outcomes of untreated osteoporosis (OP) among hip osteoarthritis cases.*

As well, failing to encourage a speedy return to activity after hip joint replacement cases among those with or without osteoporosis could potentially foster the development of secondary osteoporosis with increased risk of serious post-operative consequences as outlined in Figure 1 and noted in the exploratory research mentioned above.

Implications

From a therapeutic and operative perspective, and notwithstanding the need for future research to examine the issue of whether low bone density is implicated in the pathogenesis of some hip osteoarthritis outcomes, we conclude concerted efforts to routinely examine and intervene upon the osteoarthritis patient's bone status where necessary, may clearly prove of immense benefit, regardless of disease stage. Conversely, continuing to consider osteoarthritis and osteoporosis solely as separate disease entities with an inverse relationship [21,22], and conceiving these do not co-occur, or may not occur in cases who are obese, may inadvertently complicate post-operative rehabilitation efforts or secondary surgeries later on significantly and adversely.

Bearing in mind the numbers of hip osteoarthritis cases that are anticipated worldwide in the next few years, as well as the likelihood of them being exposed to steroids and at risk for osteoporosis [21], even if these two conditions are clearly separate entities, recent research shows osteoporosis can influence subchondral bone morphology and the processes of cartilage degeneration [23] and hip joint osteoarthritis [21] in a negative manner. Moreover, sufficient research exists to show a fair percentage of older adults with hip osteoarthritis can now be expected to live to higher ages, and to acquire age-related bone losses attributable to sedentary lifestyles and chronic pain, and which are often indicators of a generalized process of tissue atrophy and predictive of poor healing, limited recovery potential, being prone to falls and injuries and more extensive joint damage [12,28]. Indeed, they may thus be affected at high rather than low rates as demonstrated by Makinen., *et al*. [17], van Dijk., *et al.* [24], and Kirchner., *et al*. [25] who estimated 20-25% of cases requiring hip replacement surgery may have undetected osteoporosis and Phillipov., *et al.* [19] who observed rates of osteoporosis at the hip of the order of 69.5 percent in men and women with a mean age of approximately 60 years, although this rate may be even higher if cases with osteoarthritis are misclassified because they tend to have higher rather than low bone density at affected sites.

Accordingly, Neogi and Felson's [27] view that bone imaging is highly desirable for improving hip osteoarthritis treatments and prevention strategies, along with Kirchener., *et al.'s* view [25] that stresses the utility of appropriate education, plus adequate support for prevention of falls, continuous physiotherapy with muscular strengthening, and use of antiresorptive agents among vulnerable older adults with hip osteoarthritis as possible treatment targets appear highly salient for advancing better hip osteoarthritis health outcomes. As well, more efforts to raise awareness about the role of bone in the osteoarthritic disease process [25] as well as exposing the false belief that adults with osteoarthritis have a reduced risk of osteoporotic and osteoporotic fractures [26] are of paramount importance in the context of the aging population as outlined by Yoshimuru., *et al*. [28]. In the interim, it is hoped this brief will provide a springboard for clinicians and researchers that can lead to a better understanding of hip osteoarthritis and its related clinical associations.

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Volume 4 Issue 1 September 2016