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An Ounce of Prevention is Worth a Pound of Cure

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We read the recent publication by Fram et al. (1) with great interest. This study provides a summary of available literature on incidence, risk fractures, and treatment options for both intraoperative and postoperative periprosthetic humeral fractures. While the development and implementation of shoulder arthroplasty technology has lagged behind its lower extremity counterparts (i.e. total hip and total knee arthroplasty), so too has the outcomes research. We feel that examination of the lower extremity arthroplasty literature highlights the significance of osteoporosis on fracture risk and should be similarly considered in shoulder arthroplasty.

Osteoporosis is common in the older adults undergoing arthroplasty and likely contributes to the increasing incidence of lower extremity periprosthetic fracture, reported to be 0.3-5.5% after primary TJA and as high as 30% after revision arthroplasty (2, 3). Shoulder arthroplasty similarly has a large range of reported periprosthetic fracture rates (1.2-19.4%) (1). This study identifies press-fit stem, revision arthroplasty, history of instability, female sex, posttraumatic arthritis, osteonecrosis, and increased medical comorbidity index as risk factors for periprosthetic fracture. Low bone density was not specifically addressed, but the strongest risk factor of female sex (OR, 4.19) is likely confounded by the higher prevalence of osteoporosis in females. In lower extremity arthroplasty, multiple studies have identified the elevated risk of periprosthetic proximal femur fractures in osteoporotic patients (4, 5, 6). The correlation of osteoporosis and periprosthetic humeral fracture has not been examined as robustly but was specifically addressed in a recent database study which found a significantly higher rate of periprosthetic fracture in

those with osteoporosis (OR 1.49) (7). With optimization of the other factors identified in this article, improving bone health may help mitigate the risk of periprosthetic fracture and is therefore an important perioperative concern.

Consideration of bone health should, in our opinion, be a standard component of the pre-operative evaluation in shoulder arthroplasty patients. Ongoing work by our group has found that the majority of patients presenting for arthroplasty meet criteria for osteoporosis screening. If patients have not had dual energy x-ray absorptiometry (DXA) testing in the past two years, we recommend applying the National Osteoporosis Foundation criteria to determine if such evaluation is indicated (8). Subsequently, for those with osteopenia or osteoporosis, we recommend referral to a bone health/fracture liaison service, primary care provider, or further evaluation by the orthopedic clinic.

In summary, osteoporosis has been associated with periprosthetic fracture and need for revision surgery in shoulder arthroplasty. Extrapolating from lower extremity arthroplasty, osteoporosis may also impact component positioning (9), aseptic loosening (10, 11), subsidence (12) and delayed osteointegration (13). Bone health should therefore be considered an important modifiable risk factor in shoulder arthroplasty and should be optimized, when possible, to decrease the risk of periprosthetic fracture.

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Article Author Response

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Article Author(s) to Letter Writer(s)

We would like to thank Dr. Bernatz and colleagues for their letter. It brings to attention an essential matter for all of us as musculoskeletal surgeons: bone health. They cite a recent database study by Casp et al which showed significantly higher rates of post-operative periprosthetic fractures for patients with osteoporosis, compared to matched controls, following anatomic (odds ratio 1.49) and reverse (odds ratio 1.21) total shoulder arthroplasty. Further, it found 14.3% of aTSA and 26.2% of rTSA patients had concurrent osteoporosis (1). As Bernatz et al suggest, improving bone health through the perioperative identification and treatment of osteoporosis and osteopenia could theoretically allow reduction of the risk of periprosthetic fractures following shoulder arthroplasty. Further, they astutely point out that many patients presenting for evaluation for joint arthroplasty meet criteria for osteoporosis screening, making this an opportunity for orthopedists to “own the bone” and plug patients into preventative care systems (2, 3).

In addition to their recommendations, we feel orthopedists should work to encourage bone health in patients of all ages. We have anecdotally noted a decrease in bone quality of otherwise young and healthy fracture patients over the years. A recent meta-analysis of the effects of vegan and vegetarian diets on bone mineral density (BMD) and fracture risk found vegetarians and vegans had lower BMD at the femoral neck and lumbar spine, and vegans had a higher fracture rate (4). While it is important to address bone health around low-energy fragility fractures and elective arthroplasties, addressing nutrition and activity in those younger than 50 years with high risk diets or low levels of impact activity might further allow us to improve the musculoskeletal health of our patients. We thank Dr. Bernatz and colleagues for their germane and timely letter, and express our wholehearted agreement with their views.

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