

Should patients with periprosthetic fracture around the hip or knee be screened, and treated, for osteoporosis?

Mortazavi SMJ, Kajiyama S, Choon D, Palmer A, Cabrita H, Caglar O, Campagnoni R, Kalantar SH, Soltani Farsani A

Response/Recommendation: Although it is a known fact that patients with osteopenia or osteoporosis are at an increased risk of developing periprosthetic fracture (PPFx) around the hip or knee, there is no definitive literature demonstrating that screening these patients and treating them for underlying bone disease makes a difference in the rate of PPFx.

Level of Evidence: moderate

Rationale: PPFx can occur at any age following THA and TKA, but the incidence of PPFx tends to be higher in postmenopausal women and men over 50, in whom osteoporosis may be more common and contribute to this complication (1). Due to the latter principle, the Bone Health and Osteoporosis Foundation (BHOFF) recommends osteoporosis prevention, risk assessment, diagnosis, and treatment in postmenopausal women and men aged 50 years and older (2). The prevention of PPFx after THA and TKA has been the focus of many previous studies, with some suggesting that low T-score on DEXA scan and low bone density around the implant can predict the development of PPFx (3, 4). Additionally, the prophylactic use of anti-osteoporotic agents has been explored as a potential preventive measure. Bisphosphonates, which are FDA-approved, have been extensively studied for their effects on bone density and have shown promising results in improving bone density around implants (5, 6). However, a comprehensive meta-analysis found that prophylactic administration of bisphosphonates for at least six months, before or after surgery

did not significantly reduce the rate of PPFx compared to the control group, that received no therapy or only 500 mg of calcium (REF).

We also conducted a comprehensive review of the literature. After a thorough screening and review of published papers from 2000 onwards, 16 studies were selected and included in our systematic review. Among these eight were randomized controlled trials (RCTs) and the remaining 8 were cohort studies. Larger cohorts that included information from smaller cohorts were chosen for the final analysis to minimize data overlap. Four separate meta-analyses were carried out to further investigate the impact of prophylactic use of bisphosphonates. In one grouping of studies, two meta-analyses were performed to compare the rate of PPFx between groups in RCTs and cohorts. The analysis indicated no significant difference in the rate of PPFx in RCTs (RR = 1.08, CI: 95% [0.15; 7.66], P = 0.94). Interestingly and surprisingly, in cohorts comprising over 126,000 patients, the PPFx rate was higher in the treatment group compared to the control group (RR = 2.56, CI: 95% [0.73; 9.03], P = 0.14). In the second grouping of studies, two meta-analyses were carried out to compare the rate of PPFx observed in studies employing prophylaxis before surgery and those employing prophylaxis after surgery. Similarly, there were no significant differences in the rates of PPFx observed in the preoperative prophylaxis group (RR = 2.56, CI: 95% [0.72; 9.03], P = 0.14) or the after-surgery prophylaxis group (RR = 1.08, CI: 95% [0.15; 7.66], P = 0.94).

Although PPFxs can occur at different time points after surgery, they most commonly occur within two years after the procedure. Namba et al. conducted a study involving over 34,000 patients over 40 and reported that the mean time to event for PPFx cases was 1.8 years (7). Additionally, atypical femur fractures, which exhibit unusual radiologic features and occur with minimal trauma, are more likely to occur in patients on long-term bisphosphonate use (8). The exact rate of atypical femur fractures was not evident in the included studies, and the differentiation of insufficiency

fractures from the latter fractures was also not established. However, most patients included in the analysis had used bisphosphonates for a short period (up to six months).

In conclusion, while bisphosphonates have been shown to improve bone mineral density, their positive impact on the incidence of PPFx is not proven. Patients receiving prophylactic bisphosphonates appear to have a similar rate of PPFx compared to those receiving no treatment of mere 500 mg of calcium supplements. The available literature suggests that the rate of PPFx around the hip for certain, is influenced by the use of uncemented components that may increase the rate of PPFx during the early postoperative period and also later by creating stress shielding and reduction of bone mineral density (9, 10).

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