The Effect of Weekly Risedronate on Periprosthetic Bone Resorption Following Total Hip Arthroplasty: A Randomized, Double-Blind, Placebo-Controlled Trial


In this Level I study performed at Danderyd Hospital, Karolinska Institute, Stockholm, Sweden, 73 patients between the ages of 40 and 75 years were randomized into 2 groups. One group was given 35 mg of risedronate orally weekly for 6 months, and the other group was given a placebo weekly for the same time period. Patient characteristics were similar between the 2 groups.

Inclusion criteria were age between 40 and 70 years, primary osteoarthritis of the hip, and a type A or B femur according to the Dorr classification. Patients were excluded if they had a history of hip surgery, received medication that could affect bone metabolism, had hypocalcemia, or had a hypersensitivity to risedronate. All patients underwent a total hip arthroplasty (THA) via a standard posterior approach.

On the second postoperative day, patients were randomized to receive identical tablets containing either 35 mg of risedronate or a placebo. All patients were also given calcium carbonate and vitamin D oral supplements daily.

The primary endpoint was a change in bone mineral density in Gruen zones 1 and 7. Bone mineral density was measured at 2 days and 3, 6, 12, and 24 months postoperatively. Secondary endpoints were vertical migration of the femoral stem, radiographic outcome, clinical outcome, and occurrence of adverse events.

At 6 months postoperatively, bone resorption was significantly lower in the risedronate group than in the placebo group in both zone 1 (9.2% efficacy; \(P < .001\)) and zone 7 (8.0% efficacy; \(P = .003\)). The efficacy in zone 1 was 7.2% at 12 months (\(P = .006\)) and 4.1% at 24 months (\(P = .066\)). The efficacy in zone 7 was 4.3% at 12 months and 0.9% at 24 months, neither of which reached significance.

Risedronate was found to have a protective effect on bone resorption during the entire study period when controlled for sex, age, body mass index, stem size, and preoperative bone mineral density in the operatively treated hip (\(P = .005\) for zone 1 and \(P = .006\) for zone 7). Subsidence did not differ between the 2 groups, nor did mean vertical migration at 24 months postoperatively.

The mean Harris hip score, EQ-5D, and Pain Numerical Rating Scale were all improved compared with preoperative values and did not differ between the groups at any time interval. The incidence of adverse events was similar in both groups, with 4 patients in the risedronate group discontinuing the medication due to adverse reactions.

The study concluded that risedronate taken orally once weekly for 6 months following THA was effective in reducing periprosthetic bone resorption around an uncemented femoral stem for up to 1 year postoperatively.
An excellent commentary by Dr William Hamilton of the Anderson Orthopaedic Research Institute in Alexandria, Virginia, accompanied this article. In it, he points out that bone loss around a cementless femoral stem following THA is a well-described phenomenon, but the clinical importance of this finding is debated. He noted that although no surgeon wants to see substantially diminished bone immediately adjacent to the femoral stem following THA, diffuse resorption in the proximal aspect of the femur as a result of stress shielding may be a favorable finding, indicating that the femoral stem is well fixed distally. Therefore, increasing bone density in this area would be of questionable clinical benefit.

Although bisphosphonates have been associated with a clinically important reduction in hip fracture rates in patients who have not undergone THA, the assumption that this would equate with a reduction in periprosthetic fractures remains unproven. We must also consider the reported increased risk of femoral shaft fractures with long-term bisphosphonate use, as well as significant rate of other adverse events (11% in this series). An issue also exists of whether the decreased resorption rate is maintained over time. It is generally accepted that THA implants have a finite lifespan due to wear and other mechanical factors. Therefore, many patients will require some form of revision procedure if they live long enough.

In this setting, proximal bone stock can be important. If the use of bisphosphonates is able to maintain proximal bone stock over the long term, it may have a beneficial effect on revision strategies. The authors mention in their discussion that the duration of bisphosphonate treatment may need to be lifelong. A follow-up report on these study patients would be beneficial to show whether the decreased resorption rate following 6 months of treatment is maintained over the mid-term (3 to 5 years) or whether the effect dissipates once treatment stops.

The authors were able to demonstrate that reducing bone loss around a cementless femoral stem is possible with oral risendronate, which they consider proof of concept. Further studies are needed to see whether this result is maintained over time and what are the clinically significant benefits, if any.

REFERENCE


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