

The Natural History of Osteoarthritic Bone Cysts After Uncemented Total Hip Arthroplasty

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Abstract: This study quantified the radiographic changes of osteoarthritic acetabular bone cysts after uncemented total hip arthroplasty (THA). Ten-year follow-up radiographs from 130 primary THAs were reviewed. Forty-one cysts were identified on immediate postoperative radiographs. Two-dimensional cyst size was measured postoperatively and on long-term radiographs. Mean initial cyst size was $1.0 \pm 0.9 \text{ cm}^2$. Four (10%) of the 41 cysts expanded over time. The average increase in cyst size was $5.1 \pm 8.6 \text{ cm}^2$ which equated to a mean size increase of 713%. Twenty-seven cysts (66%) shrank, and the remaining 10 cysts (24%) did not change with time. Because cysts located in zone II, near the dome hole of the cup, were statistically more likely to progress, we hypothesize that these cysts communicated with the joint space via these holes. We propose that placing the acetabular component to seal an osteoarthritic cyst from the joint space during THA can help prevent its subsequent progression and the risk of associated osteolysis. **Key words:** natural history, osteoarthritic bone cysts, uncemented total hip arthroplasty, zone II. © 2007 Elsevier Inc. All rights reserved.

The etiology of subchondral bone cysts in the osteoarthritic hip remains uncertain. Theories on osteoarthritic cyst pathogenesis include that they originate from intrusion of synovial fluid into the bone at the joint surface, initiate in areas of bone necrosis, or are confined to pressure segments in the femoral head and acetabulum [1-4]. Regardless of their etiology, however, subchondral bone cysts are generally thought to develop in bone adjacent to highly degenerated joint surfaces [4] and, as a

result, are frequently found in weight-bearing areas of the osteoarthritic hip joint at the time of total hip arthroplasty (THA). Operatively, they are either dismissed as insignificant, or, if large and easily accessible, often treated by curettage.

At our institution, subchondral acetabular bone cysts are generally regarded as benign radiographic findings and are seldom treated at the time of hip arthroplasty. Although our long-term radiographic follow-up demonstrates that many of these cysts regress or disappear over time, we have observed hips in which aggressive osteolytic lesions seemingly originate from the site of a preoperative osteoarthritic cyst. In addition, when preoperative and immediate postoperative radiographs are not available, it is important to be able to identify osteoarthritic cysts and recognize their natural progression. As a result of our anecdotal findings, and of the paucity of literature on the natural history of osteoarthritic cysts after hip arthroplasty, we sought to study this phenomenon more closely. The

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purpose of this study was, therefore, to quantify the radiographic changes in osteoarthritic acetabular bone cysts after uncemented THA. Specifically, we sought to (1) determine the percentage of cysts that progress in size with long-term follow-up and (2) examine clinical variables that might be correlated with cyst growth.

Methods

For this retrospective study, we identified 675 patients from our database who had a diagnosis of osteoarthritis and had undergone a primary THA with an uncemented Duraloc cup (DePuy, a Johnson & Johnson Company, Warsaw, Ind) and an uncemented femoral component (DePuy) between May 1990 and May 1994. Ninety-seven of these patients were deceased and did not have 10-year follow-up. Four hundred thirty-three hips were further excluded for lack of required preoperative, immediate postoperative, and minimum 10-year follow-up radiographs. Patients with screws, structural bone graft, any previous hip surgery on the arthroplasty side or a revision before 10-year follow-up were excluded from the study. A total of 130 hips (122 patients) with a mean follow-up of 11.5 ± 1.1 years (range, 10.0-14.3 years) matched all of the eligibility criteria and were

included in the study. Seventy-two hips were implanted with Duraloc 100 cups (DePuy) and 58 with Duraloc 1200 cups (DePuy). Both the Duraloc 100 and Duraloc 1200 cups have a single central dome hole used for implantation, the same cup geometry, and polyethylene locking mechanism. The only difference between the cups is that the Duraloc 1200 has 12 peripheral screw holes that the Duraloc 100 lacks.

For this study, an osteoarthritic cyst was defined as a localized area of bone loss surrounded by a sclerotic border, which was visible on both the preoperative and immediate postoperative radiographs. Using a method previously described [5], one author (MK) reviewed all anteroposterior pelvic radiographs and outlined any cystic defect with a pencil. The 2-dimensional size of each cyst was measured using a computer-assisted radiograph technique with correction for magnification (Hip Analysis Suite, University of Chicago Medical Center, Chicago, Ill). The change in cyst size between the immediate postoperative radiograph and the last follow-up radiograph was used to determine whether the cyst regressed or progressed in size. If the cyst increased its immediate postoperative area by more than 50% or more than 1 cm^2 , we defined the cyst as having progressed. If the cyst decreased by more than 50% of its immediate postoperative area, or more than 1 cm^2 , we defined

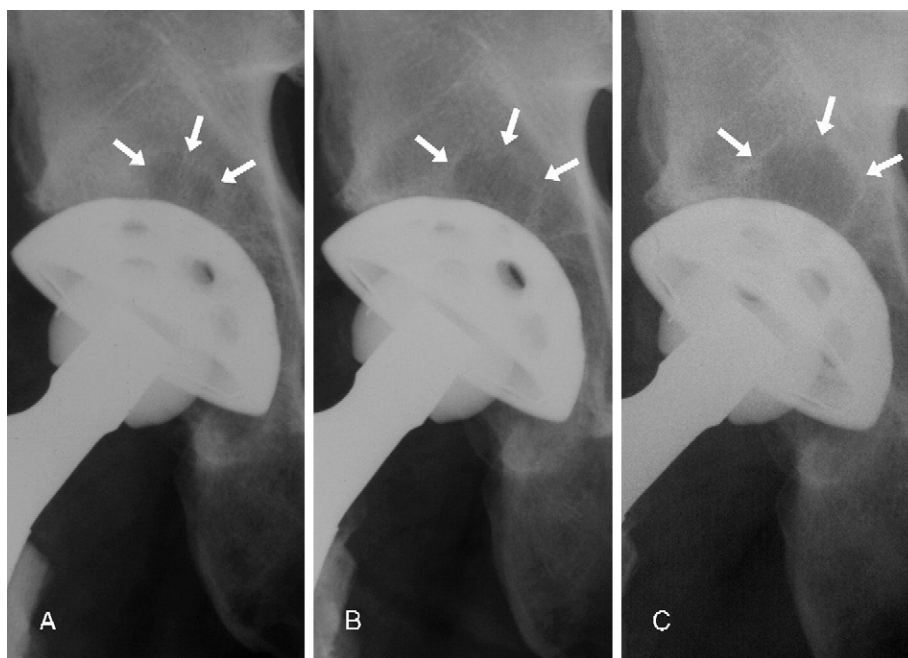


Fig. 1. A 55-year-old man with a Duraloc 1200 acetabular component had an osteoarthritic cyst that measured 105 mm^2 immediately post right THA (A). The cyst progressed in size, as seen 6.83 years postoperatively (B) and 12.7 years postoperatively, where it measured 238 mm^2 (C).

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