Giant Intraosseous Cyst in an Osteoarthritic Knee

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abstract

This article describes osteoarthritis of the knee and a giant intraosseous cyst of the medial femoral condyle in an 83-year-old man that was treated successfully with total knee arthroplasty and autologous bone grafts. The patient presented to the authors’ hospital with a 2-year history of right knee pain. A plain radiograph of the right knee revealed grade 3 medial compartment osteoarthritis with an oval area of radiolucency in the medial femoral condyle. The area of radiolucency seen on the radiograph was larger than that on the radiograph obtained 2 years earlier, with no progression of osteoarthritis. Computed tomography showed a well-defined giant intraosseous cyst adjacent to the medial femoral cortex measuring 3.5×3.5×1.6 cm. A medial femoral cortical defect and a small bone break on the articular surface of the medial femoral condyle, both of which allowed communication between the cyst and the joint, were also detected, along with gases in the cyst. Total knee arthroplasty with bone grafts was performed. Resection of the distal femur revealed that the fatty synovia intruded into the cyst through the medial cortical defect. Two years after the surgery, the grafted bone was well incorporated, without loosening of the prosthesis. Two theories, the synovial intrusion theory and the bone contusion theory, have been proposed for the etiology of cyst formation in an osteoarthritic knee. The current case strongly supports the synovial intrusion theory as the mechanism underlying the development of an intraosseous giant cyst in the osteoarthritic knee. [Orthopedics. 2016; 39(6):e1193-e1196.]

Although intraosseous cystic lesions are common in patients with advanced knee osteoarthritis, occurrence of a giant intraosseous cyst, known as a geode, in an osteoarthritic knee is rare. This article reports a patient who had a giant cyst in an osteoarthritic knee that was treated successfully with total knee arthroplasty. The article also discusses the pathogenesis of cyst growth.

CASE REPORT

An 83-year-old man presented to the authors’ hospital with a 2-year history of pain in the right knee. He had no antecedent trauma. Conservative treatment at the authors’ hospital for a year and at a nearby clinic for another year had failed. The patient was 162 cm tall and weighed 57 kg. Physical examination of the right knee showed tenderness along the medial joint line without palpable joint effusion, redness, or warmth. Range of motion was within normal limits. No anteroposterior or lateral instability was observed. The McMurray test induced pain along the medial joint line. Findings of blood and urine studies were normal. The C-reactive protein level was 0.10 mg/dL, findings for rheumatoid factor were negative, and the anti-cyclic citrullinated peptide antibody level was less than 0.6 U/mL. Plain radiograph of the right knee showed grade...
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3 medial compartment osteoarthritis and a vague oval area of radiolucency in the medial femoral condyle (Figure 1A). The area of radiolucency seen on the radiograph was larger than that in the radiograph taken 2 years earlier (Figure 1B), with no progression of osteoarthritis. Computed tomography (CT) showed a well-defined giant intraosseous cyst adjacent to the medial femoral cortex and measuring 3.5×3.5×1.6 cm (Figure 2A). A medial femoral cortical defect and a small bone break on the articular surface of the medial femoral condyle, both of which allowed communication between the cyst and the joint, were observed, along with gases in the cyst (Figure 2B). Magnetic resonance imaging showed a cystic lesion with hypointensity on T1-weighted images and hyperintensity on T2-weighted images. Synovial proliferation into the cyst through the window of the medial cortex was seen as well (Figure 3).

Knee injury and Osteoarthritis Outcome Scores were as follows: 47.3 points for pain, 53.6 for symptoms, 57.4 for activities of daily living, and 18.7 for quality of life. The patient was diagnosed with a giant intraosseous cyst in the osteoarthritic right knee. Total knee arthroplasty was performed with the patient under general anesthesia. Intraoperatively, the surface of the medial femoral condyle was eburnated, without fissure of the articular surface. Synovial expansion beneath the medial collateral ligament was observed. Resection of the distal femur showed that the cyst contained a yellowish viscous fluid and the fatty synovia intruded into the cyst through the medial cortical defect (Figure 4A). Complete resection of the femoral condyle enabled visualization of the entire cyst (Figure 4B). The cyst was completely curetted and packed with bone chips obtained from the lateral femoral condyle and tibial plateau. Total knee arthroplasty (NexGen Legacy Constrained Condylar Knee [LCCK]; Zimmer, Warsaw, Indiana) with cement was performed. Microscopic examination showed that the cyst capsule consisted of collagen fibers and fibroblasts without lining cells or inflammatory cells, which is inconsistent with rheumatoid arthritis.

Range of motion and full weight bearing were permitted 2 days after surgery. Examination 2 years after surgery showed that the grafted bone was well incorporated, without loosening of the prosthesis (Figure 5). The patient had no limitation of range of motion in the knee and no difficulty performing activities of daily living. Compared with preoperative scores, Knee injury and Osteoarthritis Outcome Scores improved to 70.0 points for pain, 75.0 for symptoms, 82.4 for activities of daily living, and 56.2 for quality of life.

**DISCUSSION**

Giant geodes, or cysts, of the knee accompanied by rheumatoid arthritis...
have been reported by several authors. However, a giant cyst in an osteoarthritic knee treated with total knee arthroplasty has not been reported in the English literature. Two theories have been proposed for the etiology of cyst formation in an osteoarthritic knee. The synovial intrusion theory claims that fissures on the articular cartilage caused by degradation or damage allow influx of joint fluid into the bone marrow space. The bone contusion theory claims that local subchondral bone necrosis as a result of repeated microdamage after the impact of 2 opposing articular surfaces leads to cyst formation. Longitudinal studies comparing magnetic resonance imaging with mean findings at 17-month and 30-month intervals supported the latter theory for the etiology of subchondral bone cysts in osteoarthritic knees.

In the current patient, although obvious fissures on the surface of the medial femoral condyle were not observed during surgery, preoperative CT showed that the giant intraosseous cyst communicated with the joint cavity through a tiny break in the articular surface. Moreover, synovial proliferation into the cyst through the window of the medial wall and the intracystic gases detected on preoperative CT suggested an influx of joint fluid into the cyst. These findings strongly support the synovial intrusion theory for the development of a giant intraosseous cyst in the current patient. Landells indicated the fissures on the articular cartilage that might allow influx of joint fluid into the bone marrow in the case of a relatively large cyst in the femoral head. However, subchondral bone cysts that were noted after a bone marrow edema-like lesion or necrosis were small. In the current case, progressive loss of cartilage created a fissure on the medial femoral condyle that allowed influx of joint fluid into the cyst. An increase in intracystic pressure caused by the rise in intra-articular pressure on knee flexion.
performed daily could result in expansion of the cyst and thinning and breakage of the medial femoral cortex. The cyst grew because of the influx of joint fluid into the cyst through the cortical defect of the medial wall. The bone contusion theory explains the etiology of small subchondral cysts in the osteoarthritic knee; however, the synovial intrusion theory could be the key to the etiology of the giant intraosseous cyst. Comparison of 2 radiographs taken 2 years apart (Figure 1) showed that the bone cyst had grown gradually, without progression of osteoarthritis. The radiographic findings further support the synovial intrusion theory for the origin and progression of the cyst rather than the bone contusion theory, which is closely associated with progression of osteoarthritis.

Intraosseous giant ganglia also have been reported around a knee with no osteoarthritis. It is difficult to differentiate a giant intraosseous cyst secondary to osteoarthritis from a primary intraosseous ganglion preceding osteoarthritis because the pathologic findings are identical. However, radiographic features, including a well-defined lytic lesion adjacent to the cortex accompanied by osteoarthritis in the medial compartment and an elliptical shape with the long axis in the sagittal plane, could differentiate the current case from a tumor.

**CONCLUSION**

Curettage followed by bone graft, including artificial bone or total knee arthroplasty, is a common treatment strategy in the elderly. For a large bone defect, as seen in the current patient, total knee arthroplasty with a long-stem prosthesis can achieve excellent long-term results.

**REFERENCES**