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# Hip Resurfacing for Treatment of Advanced Hip Osteoarthritis in a Patient With Polyostotic Fibrous Dysplasia: Five-Year Follow-Up

## A Case Report

Barbara Kahn ▼ Krissa Cetner ▼ Edwin Su ▼ Mark Figgie

Individuals with fibrous dysplasia, particularly of the proximal femur, present significant challenges to the orthopaedic care team. Higher risks for fracturing and bone resorption make joint replacement a tenuous solution. Underlying associated conditions such as increased vascularity, bone deformity, and neurological and endocrine abnormalities complicate treatment further. Because of the low prevalence, there has not been much written in the literature on joint replacement in the setting of polyostotic fibrous dysplasia. Yet, understanding the physiology of the condition and subsequent care for this population remains important for the orthopaedic nurse caring for these patients.

## Introduction

Fibrous dysplasia (FD) is a type of metabolic bone condition that characteristically affects the cranial structures, ribs, and the proximal femur (Leet et al., 2016). It is caused by a mutation found in skeletal stem cells, particularly of the *GNAS* gene, due to the retention of impaired differentiation of osteoblasts to maturity (Bianco & Robey, 1999; see Figure 1). The mutation allows for expansion of osteoprogenitor cells in bone marrow, causing fibrosis and hematopoietic tissue loss (Turrion-Nieves, Martin-Holguera, Romero-Bogado, & Sanchez-Atrio, 2015). This replaces normal bone with an undermineralized, structurally weakened matrix that is highly vascularized and prone to cyst formation (Riminucci, Robey, Saggio, & Bianco, 2010). It presents as a "shattered glass" appearance on radiographs often accompanied by structural bowing and cystic formation within the cancellous bone. Polyostotic fibrous dysplasia (PFD) can result in thinning of the cortical bone and widening bony dimensions leading to a higher risk of fracture in the weight-bearing bones (Turrion-Nieves et al., 2015).

The diagnosis of FD often occurs before the age of 30 years as the abnormal bone forms in utero (Turrion-Nieves et al., 2015). Considered a benign bone tumor, this condition is found in only 7% of the population and occurs equally in both sexes (American Academy of Orthopedic Surgeons [AAOS], n.d.). The most common type of FD is termed monostotic, as only one bone is involved and therefore does not affect the patient as severely as PFD (AAOS, n.d.).

## Case Study

Mr B., a 65-year-old man, presented to our clinic in August 2011 with bilateral hip pain, left greater than right. He complained of lower back problems at first that became more severe in the hip and groin with loss of mobility. It began 8 years prior and at the time of his first visit he had pain scores on the left side up to 8 and on the right side up to 4. He was diagnosed with PFD in 2009. His alkaline phosphatase levels remained normal, but he had elevations in both C-reactive protein and erythrocyte sedimentation levels on subsequent evaluations. The patient had been a very active male in his youth but could not even walk a block with his cane. He was unable to put his shoes and socks on himself and required a posture-assistive bed to propel him to a seated position at bedside. He could no longer use his left leg for balance and could no longer reciprocate stairs.

On physical examination, the patient presented as a well-nourished male, who stood 6-ft tall and weighed 240 lb. He ambulated with a stiff-legged gait with a compromised stance phase. His posture was flexed at the

Barbara Kahn, RN, ONC, The Hospital for Special Surgery, New York, NY.

Krissa Cetner, MSN, AGNP-BC, ONC, The Hospital for Special Surgery, New York, NY.

Edwin Su, MD, The Hospital for Special Surgery, New York, NY.

Mark Figgie, MD, MBA, The Hospital for Special Surgery, New York, NY.

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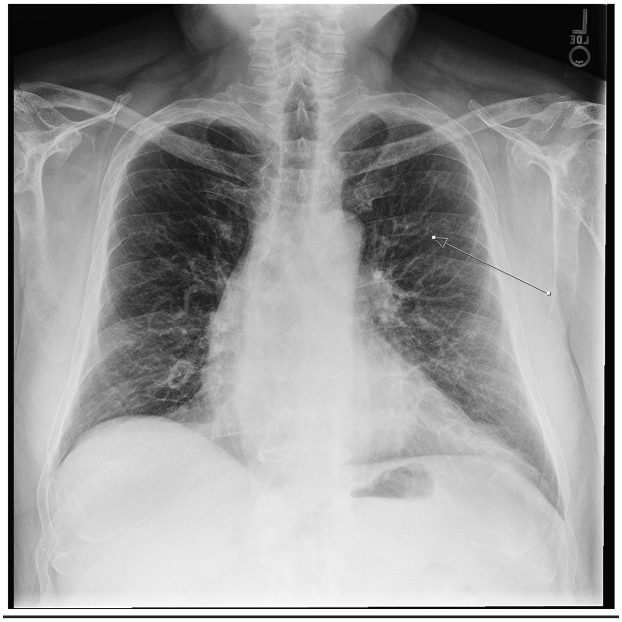

FIGURE 1. Radiograph of the chest presenting severe osteoporosis of the ribs related to polyostotic fibrous dysplasia where cortical bone is demineralized.

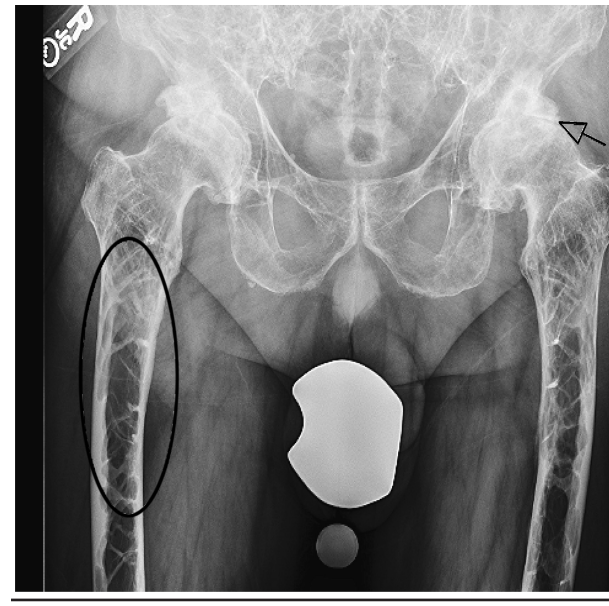

FIGURE 2. Radiograph of the pelvis and both hips in a patient with polystotic fibrous dysplasia. The arrow designates advanced osteoarthritis of the hip joint. The "shattered glass" appearance of the femoral shaft with bowing related to the polystotic fibrous dysplasia is shown within the circle.

hips bilaterally. Range of motion of the left hip revealed a 20° flexion contracture, with further flexion to 60°, 20° of abduction, 0° of adduction, −30° of internal rotation with a 30° external rotation contracture that was fixed; no further external rotation was achieved. His right hip had slightly better range of motion, with a 20° flexion contracture, hip flexion to 80°, abduction of 30°, 0° of adduction, and −20° of internal rotation. He had an external rotation contracture of the right hip of 20° with further external rotation to 45°. All other joints of the upper and lower extremities moved throughout a painless and full range of motion. Neurovascular status was intact with no deficits, and dorsalis pedis pulses were 2+ bilaterally.

Radiographic evaluation of the hips and pelvis was done. Interpretation of radiographs by a radiologist as well as the orthopaedic surgeon confirmed severe degenerative arthrosis of both hips with diffuse trabecular prominence and lucency, bone remodeling, and fibrocystic changes consistent with PFD (see Figure 2).

## Treatment Plan

### Traditional Methods

Staged hip replacement surgery was discussed with the patient along with conservative measures including intra-articular injections, nonsteroidal anti-inflammatory medications, and further activity modification. The patient had been taking acetaminophen and ibuprofen with little to no benefit. He began using a cane regularly and asking for assistance with activities of daily living.

The patient was evaluated by an orthopaedist specializing in metabolic bone disease. His medical management was optimized. He then presented to an orthopaedic joint replacement surgeon who discussed hip replacement with the patient, as conservative management had failed. The options presented would include long-stemmed cemented hip replacement, standard stemmed (range = 102–170 mm) with bone grafting of cystic areas, or strut grafting of the cortical bone. Because of the extensive PFD present in both femurs, long-stemmed prosthetics would be difficult due to the femoral bowing of the diaphysis bilaterally. In addition, revision surgery would be extremely complex due to the fragility of the bone and vascularity.

### Hip Resurfacing

Another surgical option was presented to the patient that could potentially remove the arthritic joint while limiting the complication of total hip replacement as previously mentioned. Hip resurfacing, done in a staged surgical setting under combined spinal/epidural anesthesia, was explained in detail. On December 3, 2012, the patient underwent a left hip resurfacing procedure with a BHR size 56 cup and a 50-mm head. On April 28, 2014, he had the same procedure for the right hip with a BHR size 56 cup and a 50-mm head. Procedure time was 98 minutes; a posterolateral incision was made, and an absorbable suture closure was utilized.

The patient was discharged home with a cane and began physical therapy. Forteo (teriparatide [rDNA origin] injection) was started by another practitioner, and the patient maintained his oral vitamin D. He had an uneventful recovery after each surgery. The only setback the patient experienced was a compression fracture in his spine in 2015. This was unrelated to his surgeries.

## Discussion

A retrospective study conducted on patients with PFD at the National Institution of Health from 1998 to 2010 where allograft/autograft with strut or morselized bone

graft of the femur was used during surgical procedures was conducted on a large cohort of patients (52 bone grafting procedures with a mean follow-up of 19.6 years). The results indicated that the majority of bone grafts placed either reabsorbed or failed to incorporate on radiographic evaluation. Graft failure was noted radiographically in 39 of 52 patients at a median follow-up of 14.5 years (range = 2.4–47.0 years; Leet et al., 2016). A case report done on a patient with monostotic FD of the thoracic spine reported the high risk of pathological fracture occurrence with vertebroplasty and poor cement fixation for chronic back pain. This would be the standard procedure but because of the FD, the patient required a complex vertebral resection with anterior and posterior incisions, mesh, and bone grafting (Kai et al., 2016). These two studies demonstrate how conventional methods have high failure rates for patients with FD.

## Results

The patient returned for a follow-up visit on December 21, 2017. Radiographs of both hips were obtained and showed bilateral hip resurfacing in excellent alignment (see Figure 3). Bilateral hip range of motion on examination was hip flexion to greater than 100°, abduction of 50°, adduction of 20°, internal rotation of 20°, and external rotation to 30°. There were no flexion or external rotation contractures noted, and the patient ambulated independently with a normal gait and stride. He was able to function at a high activity level and was only limited by pain in his thoracic spine where he continued to sustain compression fractures intermittently. He maintained taking oral vitamin D and in 2016 was prescribed Aredia (pamidronic acid or pamidronate disodium).

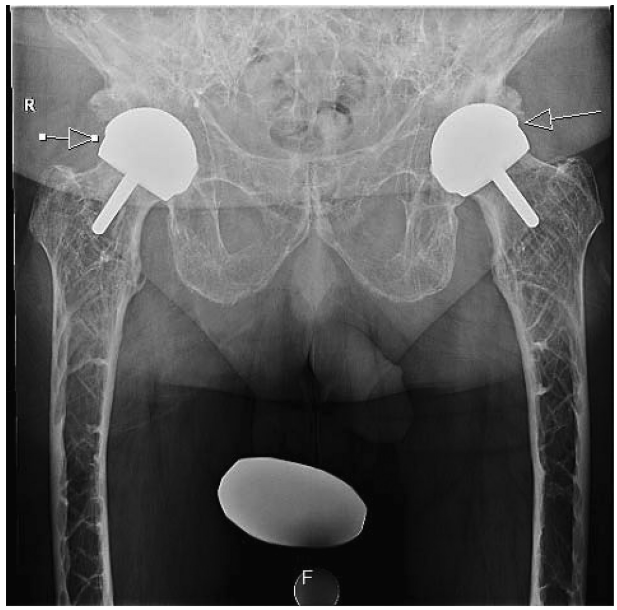


**Figure 3.** Radiograph of the pelvis and both hips postoperatively at 5- and 3-year follow-up visit showing bilateral surface replacements in situ.

Overall, the patient had considerable improvement in his quality of life and ability to return to independent daily living activities. Five-year follow-up of the left hip and greater than 2-year follow-up of the right hip demonstrate that hip resurfacing is a viable option to consider for patients with PFD. The benefits of this procedure are demonstrated in this case report. There is a decreased risk for femoral shaft fracturing and hemorrhage. The ability to use standard sized implants as opposed to custom-made implants needed to accommodate the femoral bowing and wider bony diameters can be avoided. The patient therefore does not have to undergo preoperative computed tomography and circumvent extended waiting periods for the implants to be made prior to surgery. A cost-saving benefit may also be established as a custom-made implant has a higher cost than a standard implant. Postoperative complications can also drive cost increases.

## Nursing Considerations

Nursing considerations for this patient and all patients with FD focus on hemodynamic stability, fracture avoidance, and hormonal management if endocrine abnormalities are involved. Routine postoperative hip replacement management including anticoagulation, early mobility, good pain control, fluid and electrolyte balance, and incisional care would still be warranted for patients with surface replacements and PFD. Postural alignment and fall avoidance would be a high priority for the nursing staff. Placing the patient in a bed near to the nursing station would help prevent complications.

## Conclusion

Patients with FD often live with debilitating pain because risks of surgical intervention are too high to consider safe and efficacious in this patient population. If surgery is an option, standard procedures do not always compensate for the bone alteration, therefore requiring more invasive procedures with higher failure or complication rates. Based on this case report, our findings suggest that surface replacement may be a valuable surgical intervention for patients with PFD and advanced, debilitating hip arthritis while decreasing postoperative risks.

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