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Imaging Case Review

Contralateral hip joint degeneration associated with a cam-type deformity of the proximal femur in a retired chiropractor: 10-year follow-up

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Cam-type deformities of the proximal femur have long been associated with femoroacetabular impingement (FAI); an orthopedic condition recognized in the etiology of early osteoarthritis (OA) in the non-dysplastic adult hip. However, the optimal clinical management (including the long-term prognosis) of patients with cam-type deformities with or without FAI symptoms remains uncertain. In this imaging case review (ICR), we present the 10-year follow-up of a retired chiropractor with bilateral cam-type femoral deformities who initially underwent total right hip joint arthroplasty for advanced hip joint OA, and subsequently developed advanced hip joint OA on the contralateral side.

Examen du cas par imagerie

Dégénérescence controlatérale de l'articulation de la hanche associée à une déformation en came du fémur proximal chez un chiropraticien à la retraite: Suivi sur 10 ans

Les déformations de type came du fémur proximal ont longtemps été associées à un conflit fémoro-acétabulaire (CFA); une affection orthopédique reconnue dans l'étiologie de l'arthrose précoce de la hanche adulte non dysplasique. Cependant, la gestion clinique optimale (notamment le pronostic à long terme) des patients présentant des déformations de type came avec ou sans symptômes du syndrome du conflit fémoro-acétabulaire (CFA) avec ou sans facteur rhumatoïde reste incertaine. Dans cet examen de cas par imagerie (ECI), nous présentons le suivi sur 10 ans d'un chiropraticien à la retraite avec des déformations fémorales bilatérales de type came qui a initialement subi une arthroplastie totale de l'articulation de la hanche droite pour l'arthrose de l'articulation de la hanche avancée, et a développé par la suite une arthrose de l'articulation de la hanche avancée du côté controlatéral.

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Case presentation

Initial presentation

A retired chiropractor (of 42 years) initially presented at age 67 with severe advanced osteoarthritis (OA) of the right hip joint associated with a cam-type deformity and femoroacetabular impingement (FAI) (Figure 1). The details of this case have been previously described.[1] The patient underwent successful total right hip joint arthroplasty and was discharged from orthopedic surgical care following two months of recovery with no complications. At the time of initial presentation, the patient's radiographs exhibited a cam-type (or 'pistol-grip') deformity[2]

Figure 1.

The initial AP pelvis demonstrates a subtle prominence on the anterolateral surface of the femoral head/neck junction and decreased head-neck offset consistent with a pistol-grip deformity indicative of a cam-type morphology. The right femoral acetabular joint reveals a complete loss of joint space with associated subchondral sclerosis, subchondral cysts, osteophyte formation, and superolateral subluxation along with flattening/deformity of the femoral head indicating severe osteoarthritis. The left hip joint exhibits only minimal degenerative changes compared with the right, including mild joint space narrowing and subchondral sclerosis, with no femoral head deformity present.

of the left proximal femur but only minimal degenerative changes involving the left hip joint (see Figure 1). Moreover, the patient's left hip joint was asymptomatic.

10-year follow-up

Six years after undergoing total right hip joint arthroplasty, the patient began to develop insidious onset left hip joint pain. He described the symptoms as a constant stiffness in the gluteal region and lateral hip, which intensified to a "hot, burning sensation" when provoked. The pain severity was graded as a 7-8 out of 10. An intermittent, "twinging" pain would also radiate to the posterior aspect of his left knee. Prolonged standing or sitting (e.g., driving for 10-15 minutes), flexing at the hip (e.g., bending over), and left side-lying (i.e., prolonged left hip joint flexion and adduction) were provocative. Pedalling on an exercise bike for two to three minutes would alleviate the pain in the left hip joint and leg; however, cycling for more than 10-15 minutes (i.e., repeated hip flexion, adduction and internal rotation) would re-aggravate the symptoms. Right antalgic leaning while walking or sitting was palliative. The patient also took over-the-counter naproxen or acetaminophen for pain relief, as needed. He did not pursue chiropractic or other conservative (e.g., physiotherapy) treatment.

The patient's left hip pain progressively worsened over the next four years, resulting in severe limitations to his daily activities (e.g., walking, lifting, bending, driving, and sleeping). Radiographs were ordered by his family physician and revealed severe advanced OA of the left hip joint associated with a cam-type deformity of the proximal femur (Figure 2). Of note, the patient had also participated in high-impact sports (e.g., competitive fast-pitch softball) throughout his childhood, adolescent and early adult years, possibly predisposing his femurs to developing cam-type morphologies. The key imaging features and etiologies of cam-type femoral deformities are listed in Table 1.

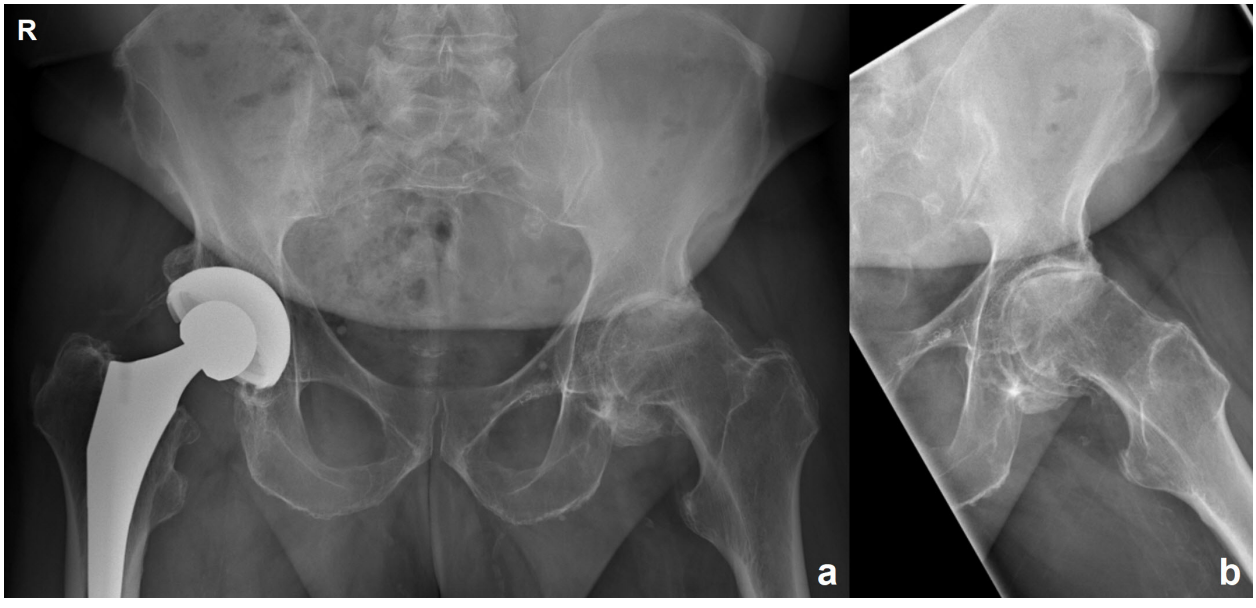

Figure 2.

The AP pelvis (a) and left frog-leg view (b) at 10-year follow-up reveals a total hip arthroplasty of the right femoral acetabular joint with no evidence of hardware failure, loosening, or infection. Additionally, there is mild post-surgical heterotopic ossification, of no clinical significance. The left femoral head/neck junction reveals persistence of the subtle prominence on the anterolateral surface and decreased head-neck offset consistent with a pistol-grip deformity indicative of cam-type morphology. The left femoral acetabular joint also demonstrates severe joint space narrowing, subchondral sclerosis, subchondral cysts, osteophyte formation, and mild flattening and deformity of the femoral head, characteristic of severe osteoarthritis.

Table 1.
Key imaging features and etiologies of cam-type femoral deformities [a]

Key imaging features
• Osseous 'bump' formation at the anterolateral femoral head-neck junction
• A pistol handle appearance to the femoral neck (i.e., 'pistol-grip' deformity) characterized by a decreased or absent femoral head-neck offset
• Alpha angle > 55°
Proposed etiologies[3,4]
• Malunion of a femoral neck fracture
• Slipped capital femoral epiphysis
• Legg-Calvé-Perthes' disease
• Genetic predisposition
• Repetitive, aggressive hip loading (e.g., high-impact sports [b])

[a] Source: adapted and modified from Emary and Taylor.[1]

[b] The patient in our case had been a pitcher in competitive fast-pitch softball throughout his childhood, adolescent and early adult years.

Discussion

Cam-type deformities of the proximal femur have long been associated with FAI, an orthopedic condition recognized in the etiology of early OA in the non-dysplastic adult hip.[2-4] Impingement between an abnormally shaped proximal femur (cam-type) or acetabulum (pincer-type), or both (i.e., 'mixed' FAI), results in repetitive microtrauma and early damage to the cartilage and labrum of the hip joint.[3,4] Originally described in young adults by Ganz *et al*.[2] in 2003, FAI has since been described in cases and observational studies involving middle aged and older adults.[5-8] Regardless of age, the clinical management (e.g., etiology, natural history, diagnostic accuracy, and efficacy of conservative versus arthroscopic or open surgical joint-preservation procedures) in patients with FAI remains uncertain.[2,3,9] The association between cam-type femoral deformities in patients with asymptomatic hip joints and the subsequent development of pain and/or OA is also controversial.[10,11]

Risk of contralateral hip joint degeneration

A 2022 cohort study of 150 patients (mean age = 30.5 years; range, 13-58) with hip joint morphologies consistent with FAI (i.e., cam or combined cam/pincer) treated with hip preservation surgery found that, after 10 years, the contralateral hip had significant symptoms in 52% of cases and 23% had progressed to surgery.[6] One-third (36/111) of patients without contralateral hip symptoms at initial presentation went on to develop significant contralateral hip symptoms within five to 11 (mean = 7.1) years.[6] A 2016 cohort study of 398 patients with a mean age of 54 ± 8 years who underwent total hip joint arthroplasty for unilateral hip OA found that 41% (95% CI, 35 to 47) developed contralateral hip symptoms and 19% (95% CI, 15 to 25) required an arthroplasty on the contralateral hip by 10-year follow-up.[7] The risk of developing OA in the contralateral hip was 86% higher (hazard ratio = 1.86; 95% CI, 1.23 to 2.79) among those with acetabular over-coverage combined with a reduced femoral head-to-neck ratio (i.e., radiographic findings consistent with 'mixed' cam/pincer FAI).[7] A 2013 cohort study found that patients aged 45-65 years with moderate to severe cam-type deformities (i.e., alpha angle > 60° to 83°) and early OA symptoms were between 3.7 and 9.7 times more likely to develop end-stage hip joint OA by five years.[8]

In our case, the patient developed progressively worsening symptoms in his originally asymptomatic contralateral hip, with resultant end-stage OA at 10-year follow-up. It is possible that altered hip biomechanics and compensatory changes, particularly during the years leading up to his right hip joint arthroplasty, contributed to early contralateral hip joint degeneration and subsequent end-stage OA development.[12] However, it is also possible that his hip joint OA was primary (idiopathic) in nature.[11] At age 77, the patient underwent successful left hip joint arthroplasty and attained full recovery within six months. For more information on the pathophysiology, diagnosis, treatment and prognosis of patients with cam-type deformities of the proximal femur with or without FAI symptoms, we refer readers to other publications.[3-11]

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Key Messages

- Current literature suggests that approximately half of patients with cam-type femoral deformities and FAI symptoms will go on to develop progression of OA and significant symptoms in the contralateral hip joint within approximately five to 10 years; however, less than one in four patients will require surgery
- Older adults with severe cam-type deformities may be predisposed to faster progression to end-stage OA
- The most effective clinical management (including the long-term prognosis) of patients with cam-type deformities with or without FAI symptoms remains uncertain

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