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Case Report

Severe osteolysis in a patient with Legg-Calvé-Perthes disease 32 years after primary total hip replacement: A case report

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ABSTRACT

This article presents a case report of a 73-year-old woman with Legg-Calvé-Perthes disease (LCPD) which developed late-onset osteolysis after a primary total hip replacement (THR). LCPD is a complex childhood hip disorder that can cause bone necrosis, deformation, and premature osteoarthritis with an increased risk of osteolysis after primary THR and therefore a higher risk of revision surgery. The acetabular component was unstable, with pronounced polyethene wear, and mechanical deformation and loosening of the acetabular component. The case was managed with the revision of THR using a non-cemented acetabular and femoral component, polyethene insert and ceramic head, which resulted in a smooth postoperative period. The article also discusses the incidence of LCPD and its association with osteolysis, highlighting the importance of considering medical history to manage complications after primary THR.

1. Introduction

Legg-Calvé-Perthes disease (LCPD), also known as Perthes disease, is a complex childhood hip disorder that disrupts the blood supply to the femoral head, leading to bone necrosis, deformation, and premature osteoarthritis[1] and leads to total hip replacement (THR) later in life. Osteolysis is one of the most significant complications after THR, leading to implant failure and revision surgery. Patients with LCPD have an increased risk of early-onset osteoarthritis and, therefore, a higher risk of revision surgery,[2,3] as well as a significantly higher prevalence of osteolytic changes than patients without LCPD.[4] In this article, we present a clinical case report of a 73-year-old woman with LCPD and late-onset osteolysis after primary THR. The study was carried out at the Hospital of Traumatology and Orthopaedics (Rīga, Latvia).

2. Case Report

A 73-year-old woman (BMI 23.5) was hospitalised for complaints of chronic and worsening pain in the left hip joint in the last three months, more pronounced during physical activities, and night pain. Daily medications include non-steroidal anti-inflammatory drugs (aceclofenac and diclofenac) and antihypertensive drugs. It is known she has had Perthes disease from seven years of age and had primary arthroplasty 32 years ago (at 51 years) with a cementless endoprosthesis, which reduced the twenty-year-long period of hip pain. Two months before admission to the hospital, the left hip radiograph did not reveal any signs of instability of the prosthesis or other pathological processes.

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Bone densitometry was also performed and revealed the mineral density of the right femur corresponding to osteopenia.

Objective examination revealed a limited range of motion in the left hip joint. The left hip (Figure 1) showed an osteolytic zone around the acetabular component (0.3 cm), pronounced polyethene wear, and mechanical deformation and attrition of the acetabular component. Computed tomography (CT) (Figure 2) additionally revealed an 3-4 mm long osteolytic zone and non-homogeneous tissue mass along m. iliopsoas with chondral bone particles and gas inclusions in total size around 5.5 cm.

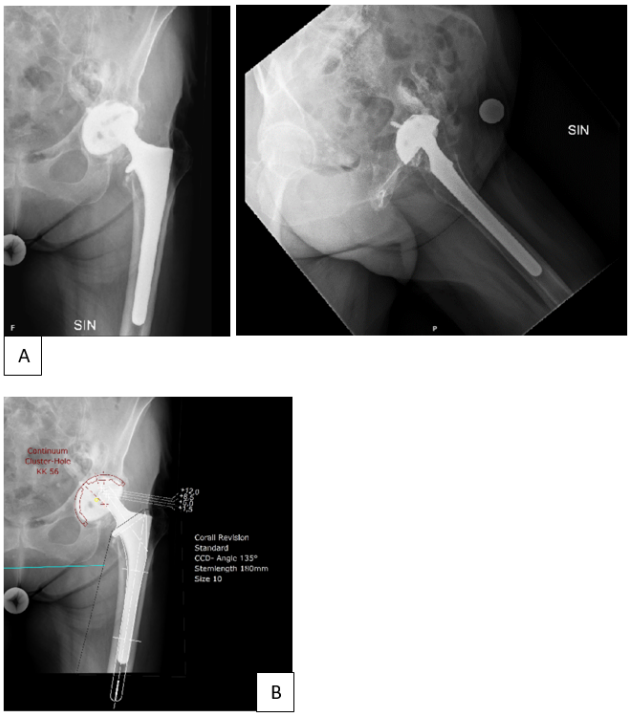

Figure 1: (**A**) Pre-operative x-ray of the left hip joint; (**B**): X-ray of the preoperative planning of THR

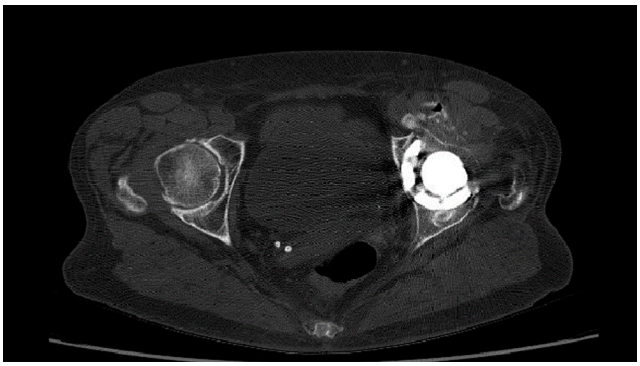

Figure 2: Preoperative CT of the pelvic region

THR was performed using a noncemented acetabular and femoral component, a polyethene insert, and a ceramic head. During surgery, severe metallosis, attrition, and fracture of the acetabular component were observed, along with wear of the polyethene insert. An osteolytic metallosis lesion was also identified near the psoas tendon within the tissue margins. Jet-Lavage rinse was performed, and the acetabular component was replaced with an artificial acetabular component fixed with four screws. The synovial fluid examination revealed an elevated cell count (450; <200 cells/μl) and neutrophil leukocytes (44; <25%). The sonification method of the femoral and acetabular components did not reveal any positive microbiological culture. Similarly, hip joint aspiration and tissues from the capsule and acetabulum were negative. The postoperative period was without complications and the postoperative radiograph (Figure 3) did not show pathological signs. Several months after surgery, the patient feels well and does not complain of hip pain.

Figure 3: X-ray of the left hip joint post-operatively (one week after the surgery)

3. Discussion

LCPD causes avascular necrosis of the femoral head and can cause hip deformities and arthritis,[1] which can require THR later in life. The incidence of LCPD varies between countries, but is more pronounced in boys between 5 and 7 years, correlated with inheritance.[1] Our patient also developed LCPD at seven years of age, but there is no available information on relatives with LCPD. In severe cases, THR may be necessary to relieve pain and

improve mobility and has been shown to provide good long-term results. Patients with LCPD are known to have an increased risk of early-onset osteoarthritis and a higher risk of primary and revision surgery due to a higher incidence of osteolysis.[2,3] Primary arthroplasty for patients with LCPD is usually done earlier, around 40 years,[3] and in most cases, the main reason for revision surgery is aseptic acetabular loosening or attrition,[2] as was also in our case. Although THR is a common treatment option for end-stage Perthes disease, there is limited evidence of long-term outcomes and possible complications of this procedure. Despite the disorder and having a primary THR at such an early age, the complaints began only more than thirty years later and can be evaluated as a good long-term result. Previous studies have reported an increased risk of osteolysis and attrition of the acetabular component in patients with Perthes disease who undergo THR, although the exact mechanisms underlying these complications are not fully understood,[1,5] and it remains a significant challenge in THA and can be caused by various factors, including implant wear, implant design, and patient factors such as genetics and bone mineral density (BMD). LCPD patients can have a decrease in BMD compared to healthy individuals, which can affect implant fixation and osseointegration,[6] which was also observed also in our patient. Using prosthetic materials with a low wear rate has been shown to reduce the risk of osteolysis, but patients with LCPD may still be at higher risk.

Radiographically, radiolucency is mostly detected in the acetabular component, further following osteolysis and loosening of the acetabular component.[2,7] However, it should be considered that silent osteolysis is missed in many radiographs, and therefore CT scans are superior,[1] especially for patients with LCPD. Furthermore, there has been reported to be a higher incidence of osteolytic changes around the acetabular component in patients with LCPD compared to a control group. LCPD patients may also be at increased risk for periprosthetic fractures due to altered bone morphology and decreased bone mineral density.[4,8]

4. Conclusion

Although the prevalence of LCPD is not high, it requires attention to monitor early-onset osteoarthritis. These patients may have an increased risk of implant-related complications, such as osteolysis, and this should be closely monitored during the postoperative period. Considering that the osteolytic process cannot always be seen on radiographs, especially in the early stages, CT should be performed. Careful preoperative planning, implant selection, and long-term monitoring are essential to optimise outcomes in this population of patients, highlighting the importance of monitoring the joint status of patients with LCPD and especially after THR.

5. Source of Funding

None.

6. Conflict of Interest

The authors declare no potential conflict of interest.

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