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Case Report

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Bilateral femoral avascular necrosis in a 28-year-old male: a case report

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ABSTRACT

This case report discusses bilateral avascular necrosis, or osteonecrosis, of the femoral head in a 28-year-old male lacking associated risk factors. This condition is marked by insufficient blood supply to the femoral head, which can lead to joint collapse, necessitating total hip arthroplasty (THA), as in our patient. Our case presents a challenging diagnosis, emphasizing the need for comprehensive understanding of the presence, or absence, of risk factors, and the role of early detection in optimal patient outcomes. Treatment options range from conservative modalities to surgical interventions, with THA as a definitive solution. We also consider potential complications of treatments, particularly the unique challenges brought on by THA performed in younger patients.

Keywords: Avascular necrosis, total hip arthoplasty, orthopedic surgery, avascular necrosis of the femoral head

INTRODUCTION

Osteonecrosis of the femoral head (ONFH) occurs due to inadequate blood supply to the femoral head, leading to osteocyte death. This process can result in the collapse of the femoral head and progressive deterioration of the joint, making ONFH a prevalent cause of hip arthroplasty in young patients.[1] About 10% of all total hip arthroplasties (THAs) in the United States are associated with this diagnosis. The incidence of ONFH in the United States is between 20.000 to 30.000 new cases annually, primarily affecting men between 30 and 50 years old.[2,3] Bilateral presentations are not uncommon, with a higher prevalence in males, as the contralateral hip may be involved in approximately 55% of patients within 2 years.[4] Many of these patients present with groin pain that radiates to the knee, restricted range of motion, pain with abduction and internal rotation, and tenderness to palpation of the hip.

The causes of ONFH and the pathophysiological mechanisms behind them are frequent subjects of ongoing research. ONFH etiologies are classified as traumatic or non-traumatic. Traumatic etiologies include fractures and dislocations of the hip, causing an interruption in femoral head blood supply. On the other hand, non-traumatic cases are often associated with corticosteroid use, alcoholism, HIV, sickle cell disease and Gaucher's disease, where impairment of vascular supply occurs in the absence of trauma.[1,5] This paper highlights a unique case involving bilateral, non-traumatic ONFH (NONFH) in a patient who lacks the associated risk factors.

CASE

A 28-year-old male presented to the emergency department for persistent left hip pain that left him unable to ambulate without crutches. Computed tomography (CT) of the pelvis taken at the time showed signs of bilateral ONFH that was much worse on the left, including femoral head collapse and subchondral bone flattening (**Figure 1**). The patient was referred for MRI and an orthopedic surgeon consultation for further evaluation.

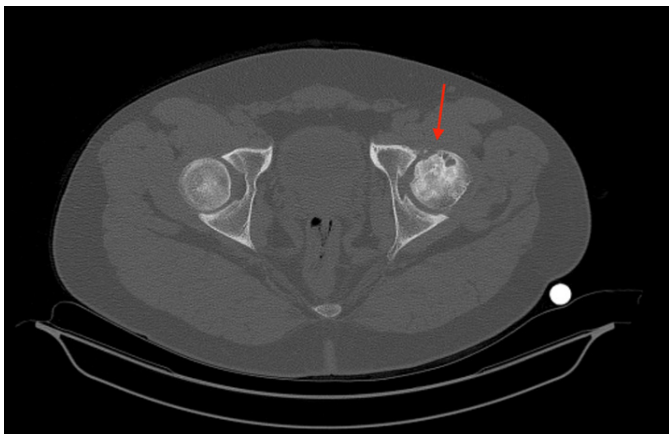

Figure 1. CT showing osteonecrosis of the left femoral head

One month later, he presented to the orthopedic surgeon complaining of bilateral hip pain, with worse pain in the left hip. The patient's MRI showed bilateral ONFH that was worse

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in the left hip. The patient believed the pain was related to a soccer injury 3 years prior, but it never required a hospital visit. His pain progressively worsened for 2-3 years since onset, culminating in his inability to walk without crutches. The patient's past medical history included iron deficiency anemia and hypothyroidism, for which he was taking iron supplements and levothyroxine, respectively. He was slightly overweight and had no history of prolonged corticosteroid use or any additional systemic conditions. The patient stated that he consumed alcohol occasionally and denied smoking tobacco but did admit to smoking marijuana occasionally. On physical examination, the patient had a significantly antalgic gait while walking without crutches. The anterior left hip was tender to palpation and had. restricted internal rotation. Both Stinchfield and log roll tests were positive for both hips, and the left hip was found to be impinged. The right hip was not nearly as symptomatic and showed no signs of impingement or restricted range of motion. Distal neurovascular exam revealed intact sensation and reflexes bilaterally.

After discussion with the orthopedic surgeon, the patient agreed to undergo an anterior approach total hip arthroplasty (THA) of the left hip. Two months after orthopedic surgery consultation, he underwent a successful THA and did not experience any intraoperative or postoperative complications (**Figure 2**).

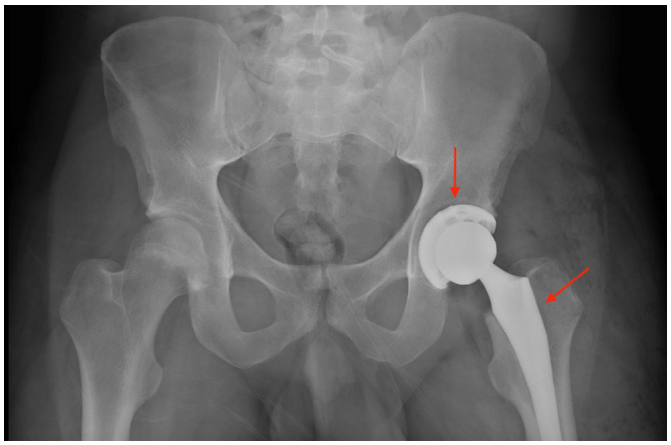

Figure 2. Total left hip arthroplasty in anatomic alignment

The patient was seen for a postoperative follow-up visit 2 weeks after surgery and is progressing well in his recovery. He reports diminished left hip pain and improved range of motion. He was advised by the orthopedic surgeon to return for evaluation if he develops worsening symptoms in his right leg.

All authors declare that informed consent was obtained from the patient for publication of this case report and accompanying images.

DISCUSSION

The occurrence of bilateral NONFH in a patient without associated risk factors is a rare and intriguing clinical presentation. While the exact etiology remains unclear, genetic predisposition, vascular factors, and undiagnosed systemic conditions should be considered in the evaluation of such cases.

Due to its prevalence and potential complications, ONFH poses a significant clinical challenge. Reports indicate between 300.000 and 600.000 people in the United States experience this condition, with varying rates worldwide, making it a substantial public health concern.[6] Idiopathic cases of ONFH, occurring without identifiable risk factors such as the case discussed above, present a challenge in diagnosis and understanding. The etiology and pathogenesis behind NONFH are not entirely clear, potentially involving multifactorial origins or genetic predisposition.[3,7] One primary risk factor for identified NONFH cases is prolonged corticosteroid use. However, the spectrum of other factors contributing to the development of disease is not entirely clear. Various guidelines and publications highlight the importance of early diagnosis and effective treatment, emphasizing the need for a comprehensive understanding of prevalence and incidence to improve patient outcomes.[7]

Early detection of ONFH is crucial as the disease, if left untreated, often leads to joint collapse, affecting younger, active individuals between 20 and 40 years old.2 Diagnosing this condition involves a combination of X-rays, CT scans, MRI, and scintigraphy. Confirmatory diagnosis of ONFH involves initial X-rays or CT followed by MRI, which is considered the most accurate benchmark.[8] Once diagnosis is confirmed, the various treatments for ONFH focus on delaying disease progression, relieving symptoms, and preventing collapse of the femoral head, aiming to preserve joint function and avoid total hip replacement if possible.

Conservative treatment might be effective in early-stage NONFH, improving pain and functional outcomes. These treatments include physical activity modification, medication, hyperbaric oxygen treatment, and electrical stimulation. However, these options are limited in halting disease progression, helping patients achieve full recovery, and their long-term effectiveness.[2,5]

Nonconservative interventions offer a spectrum of options for different stages of ONFH. The effectiveness of these procedures is mainly dependent on the stage of the disease. Current surgical interventions for ONFH range from prevalent core decompression for symptomatic pre-collapse stages to total hip replacement in post-collapse stages. Joint-preserving surgeries such as core decompression, corrective osteotomy, and joint resection have shown promise in the early stages of ONFH, but require further research on their long-term effectiveness. Additional treatments include vascularized and non-vascularized bone grafts, hemi-arthroplasty, osteotomy, and arthrodesis. Advanced cases require THA, as it is considered a definitive treatment.[2,7]

A study of the long-term effectiveness of THA has shown excellent outcomes for up to 10 years in patients younger than 30 years old. However, all patients in the study required a revision at some point after surgery due to aseptic loosening.[9] Younger patients who undergo THA, as in the above case, have been shown to experience higher rates of revision than older patients.[10] The underlying factors contributing to this observable difference include higher activity level and a higher proportion of younger candidates with inflammatory arthritis and congenital hip disease.[11,12] Our patient, a 28-year-old, will require thorough follow-up to ensure appropriate survival course of the implants and determine the necessity of revision.

While many effective treatment options exist for patients with ONFH, it is still important to consider the diverse complications associated with the management of this condition. Surgical interventions especially pose inherent risks. Complications can include infection, implant loosening, blood clots, nerve or blood vessel damage, and improper wound healing.[5,13]

Early detection of ONFH is crucial for initiating effective treatments and preserving joint function, thereby preventing further joint damage. Early identification also allows for a thorough evaluation for the presence or lack of risk factors, aiding in the implementation of appropriate interventions. Prompt intervention prevents further hip joint deterioration and lessens the necessity for invasive treatments such as joint replacements.[7] This early detection and intervention could also enhance treatment responses by minimizing pain and preserving hip function, subsequently giving patients a better quality of life.[5] Given the benefits of early detection, it is imperative for clinicians to maintain a heightened level of suspicion in cases where symptoms persist without apparent risk factors, as this leads to timely detection and treatment.[7]

CONCLUSION

Our young patient with bilateral NONFH and no identifiable risk factors provides a unique clinical scenario. With complex etiological origins and substantial incidence rates, this condition is a significant health concern not only in the U.S., but worldwide. Treatment options range from conservative measures to more invasive, surgical interventions, with THA as a definitive solution for advanced cases like ours. Although effective, THA in younger patients may require thorough long-term follow-up to assess for revisions or impaired implant survival. The case underscores the importance of early detection and suspicion as both are paramount for prompt treatment, joint preservation and maintaining quality of life.

ETHICAL DECLARATIONS

Informed Consent

Written informed consent was obtained from the patient(s) included in this report. Signed consent forms are retained by the authors and are available upon request.

Peer Review Process

This report underwent external peer review.

Conflict of Interest

The author declare no conflicts of interest.

Financial Disclosure

This case report did not receive any financial support.

Author Contributions

The author is solely responsible for the conception, data collection, analysis, and writing of this manuscript.

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