Case Report
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Staged Bilateral Uncemented Total Hip Arthroplasty for Steroid-Induced Avascular Necrosis of the Femoral Head in a Young Woman

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Abstract

Background: *Avascular necrosis (AVN) of the femoral head is a progressive and disabling condition that predominantly affects young adults. Prolonged corticosteroid exposure is a well-established risk factor, while unsupervised steroid use remains a concern in resource-limited settings.*

Objective: *To report a case of advanced bilateral femoral head AVN in a young woman following prolonged unsupervised corticosteroid use and to describe the outcome of staged total hip arthroplasty.*

Case Summary: *A 19-year-old woman from a low-income rural background in Bangladesh presented with bilateral hip pain for three years and progressive difficulty walking for one year. She had taken oral corticosteroids for approximately four years on the advice of an unqualified practitioner. Examination revealed an antalgic gait, bilateral restriction of hip movements, more pronounced on the left, a positive Thomas test, and 1 cm supratrochanteric shortening of the left lower limb. Pelvic radiographs demonstrated bilateral joint-space narrowing, femoral head distortion, osteosclerosis, and marginal osteophyte formation, consistent with advanced AVN. Screening for tuberculosis and septic causes was negative. Staged uncemented modular total hip arthroplasty was performed through the direct lateral (Hardinge) approach, with the left hip replaced first and the right hip approximately ten months later following preoperative traction.*

Results: *At follow-up, the patient was walking comfortably with satisfactory function of both hip replacements.*

Conclusion: *Unregulated and prolonged corticosteroid use can lead to severe bilateral AVN even in very young patients. Early recognition and appropriate management are essential. Staged total hip arthroplasty can provide satisfactory functional recovery in young patients with end-stage bilateral AVN.*

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Keywords: *Avascular necrosis; femoral head; corticosteroids; total hip arthroplasty; young adult; case report.*

Introduction

Avascular necrosis, also called osteonecrosis, of the femoral head develops when the blood supply to that small, precariously vascularised piece of bone is interrupted for long enough that the bone itself dies. Once the supporting trabeculae give way, the joint surface collapses, arthritis sets in, and a young person who might have expected forty or fifty more years out of that hip is left in constant pain. Trauma is the most familiar cause, but among the non-traumatic causes, corticosteroid exposure is consistently the largest single contributor, whether the steroid was prescribed for a genuine medical indication or, as in the case described here, obtained informally. Estimates of how many steroid-treated patients go on to develop osteonecrosis vary widely across the literature, from roughly 3% to 40%, reflecting differences in the underlying illness, the steroid dose and duration, and probably genetic susceptibility that is still not fully worked out.[1] Higher cumulative dose and longer duration of exposure both raise the risk, though the relationship is not perfectly linear and disease has been reported even after comparatively brief high-dose courses.[1] In South Asia in particular

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weak regulation of over-the-counter and informally dispensed corticosteroids means that patients are sometimes exposed to substantial cumulative doses without any medical supervision or awareness of the risk, a pattern that has been documented repeatedly in Bangladesh and neighbouring countries.2

Bilateral involvement is common in steroid-induced disease, reflecting the systemic nature of the insult, and by the time symptoms bring a patient to hospital the disease has frequently progressed past the point where joint-preserving surgery is realistic. We present the case of a young woman whose hips were destroyed by four years of unsupervised oral steroid use, and who required staged bilateral total hip replacement in her late teens — a stark illustration of how much damage informal medicine can do, and of what can still be salvaged with careful surgical planning.

Case Presentation

A 19-year-old housewife from a rural, low-income household in Karimganj, Kishoreganj, Bangladesh, presented to the department of orthopaedics and traumatology with pain in both hips that had been building for three years and a year of increasing difficulty walking. The pain had begun insidiously on the left side as a mild, dull, intermittent ache that was worse with movement and eased with rest. Over the following two years it spread to involve the right hip as well, and began radiating down into both thighs and knees. By the time of admission, walking and ordinary daily activities had become genuinely difficult for her.

She denied any preceding trauma, fever, night sweats, cough, haemoptysis, or unexplained weight loss, which argued against an infective or tuberculous process. Her past medical history was otherwise unremarkable, but on direct questioning she gave a history of taking oral steroids for roughly four years, started on the advice of an unqualified local practitioner for vague "poor health," alongside intermittent non-steroidal anti-inflammatory drugs and anti-ulcer medication obtained through the same informal channel. She came from a low socio-economic background, and there was nothing of note in her personal, immunisation, or family history.

On general examination she looked anxious but was cooperative, mildly anaemic, and otherwise systemically well — normotensive with a pulse of 78 beats per minute, a temperature of 98.4°F, a respiratory rate of 16 breaths per minute, and no jaundice, cyanosis, clubbing, lymphadenopathy, or thyroid enlargement. Locally, she walked with an antalgic gait and could not squat. There was visible wasting of the left thigh compared with the right and an increased lumbar lordosis, but the overlying skin was normal with no sinuses or scars. On palpation, both hips were tender, local temperature was not raised, and the left leg measured one centimetre shorter than the right, with Bryant's triangle confirming this to be supratrochanteric shortening; the left thigh circumference was reduced by about a centimetre in keeping with the visible wasting. The Thomas test was positive, and distal neurovascular status was intact throughout. Movement was restricted in both hips, more severely on the left, as summarized in Table 1.

Movement	Left hip	Right hip	Normal range
Flexion	0°–50°	0°–80°	0°–140°
Abduction	0°–10°	0°–20°	0°–45°
Adduction	0°–10°	0°–10°	0°–35°

Internal rotation (in flexion)	0°–5°	0°–10°	0°–30°
External rotation (in flexion)	0°–5°	0°–10°	0°–45°

Table 1. Range of motion of both hip joints at presentation, compared with the accepted normal range.

Examination of the respiratory, cardiovascular, gastrointestinal, and nervous systems was unremarkable. Taken together, the clinical picture was of a young woman with three years of progressive bilateral hip pain, worse on the left, with mechanical signs of joint destruction, shortening, and a substantial history of unsupervised corticosteroid exposure — findings that pointed strongly towards bilateral avascular necrosis of the femoral heads, while tuberculous arthritis and the sequelae of septic arthritis remained reasonable alternatives to exclude given the sub-acute, indolent course.

Investigations

Baseline blood work showed mild anaemia with a haemoglobin of 9.5 g/dL; inflammatory markers were unremarkable, with a total leucocyte count of 8,000/mm³, an ESR of 30 mm in the first hour, and a C-reactive protein below 6 mg/L, none of which suggested an active infective or tuberculous process. The Mantoux test and rheumatoid factor were both negative, and a chest radiograph showed no active pulmonary disease, further weighing against tuberculosis. Renal function, fasting glucose, hepatitis B surface antigen, and serum calcium were all normal, and an abdominal ultrasound scan was unremarkable. These results are summarised in Table 2. Magnetic resonance imaging, which would have allowed formal Ficat–Arlet staging of the disease, was not available to us in this setting; staging was therefore based on the clinical picture and plain radiographs alone.[3]

Investigation	Result
Haemoglobin	9.5 g/dL
Total leucocyte count	8,000/mm³
ESR (1st hour)	30 mm
C-reactive protein	< 6 mg/L
Mantoux test	Negative
Rheumatoid factor	Negative
Random blood sugar	5.1 mmol/L
Serum creatinine	1.0 mg/dL
HBsAg	Negative
Serum calcium	9 mg/dL

Chest radiograph (PA view)	No active pulmonary lesion
Ultrasonography, whole abdomen	Normal study

Table 2. Summary of laboratory and baseline imaging investigations.

An antero-posterior radiograph of the pelvis including both hip joints was the key diagnostic study. It showed narrowing of the joint space, distortion of both femoral heads, shortening of both femoral necks, osteosclerosis, marginal osteophyte formation, and acetabular involvement bilaterally — a pattern of advanced, end-stage change in both hips rather than early, potentially salvageable disease.

Figure 1. Pre-operative antero-posterior radiograph of the pelvis (11 March 2024) showing advanced bilateral avascular necrosis of the femoral heads, with joint-space narrowing, femoral head distortion, osteosclerosis, and marginal osteophyte formation on both sides.

Differential Diagnosis

Before the radiographic findings and the steroid history came together, we considered three possibilities: avascular necrosis of the femoral head, tubercular arthritis of the hip, and the sequelae of septic arthritis. The absence of fever, night sweats, weight loss, or a raised ESR and CRP argued against an active infective or tuberculous process, and the negative Mantoux test made tuberculosis still less likely. The bilateral, symmetrical pattern of joint destruction, together with the clear history of prolonged steroid exposure, was far more in keeping with steroid-induced avascular necrosis, which became the working and, ultimately, the confirmed diagnosis: steroid-induced bilateral avascular necrosis of the femoral head.

Treatment

Given the advanced radiographic changes in both hips, joint-preserving options such as core decompression were not realistic, and operative treatment was planned from the outset. She was first placed in bilateral surface traction for two weeks to settle the soft tissues and pain before surgery. She then underwent staged uncemented modular total hip replacement, the left hip first, on 14 March 2024, followed by the right hip on 22 January 2025,

roughly ten months later. Both procedures were carried out through a direct lateral (Hardinge) approach, which splits rather than detaches the anterior fibres of gluteus medius and vastus lateralis and gives reliable access to the acetabulum and proximal femur while keeping the dislocation risk low.4 The diseased femoral heads were excised, the acetabula and femoral canals were prepared, and modular uncemented components were implanted on each side in the standard fashion.

Outcome and Follow-up

Post-operative radiographs of both hips after each stage showed well-positioned, well-seated prostheses with no evidence of loosening or malalignment. Recovery from each procedure followed an unremarkable course, and staging the two operations roughly ten months apart allowed her to rehabilitate one hip before undertaking surgery on the other. At subsequent review she was mobilising independently and comfortably, without the antalgic gait or shortening that had brought her to hospital, and clinical and radiographic follow-up of both hips has been continued in the outpatient department.

Figure 2. Close-up post-operative radiograph of the left hip following uncemented modular total hip replacement, showing a well-fixed femoral stem and acetabular component secured with screws, with no radiographic evidence of loosening.

Figure 3. Antero-posterior pelvic radiograph (12 January 2025), obtained shortly before the second-stage procedure, showing the well-seated left total hip prosthesis in situ alongside persisting osteonecrotic change in the native right hip, which subsequently underwent total hip replacement.

Discussion

The single most striking feature of this case is not the surgery but the road that led to it: a healthy teenager given four years of unsupervised oral corticosteroids by an unqualified practitioner for nothing more specific than "poor health." It is a pattern that has been well documented in Bangladesh and across South Asia, where potent steroids can often be obtained without prescription from pharmacists, quacks, or other non-specialist providers who are frequently unaware of the systemic harm they can cause.2 The mechanisms linking corticosteroids to osteonecrosis are still incompletely understood, but the leading explanations converge on impaired perfusion of the femoral head — through fat embolism and marrow fat hypertrophy that raises intraosseous pressure, a hypercoagulable state that favours microvascular thrombosis, direct injury to the vascular endothelium, and increased apoptosis of osteoblasts and osteocytes — all of which ultimately choke off the blood supply that the femoral head depends on.1

What made this particular case severe was less the dose at any one time than the sheer duration of exposure and the complete absence of monitoring: nobody was tracking cumulative dose, watching for early hip pain, or thinking to order imaging before the disease had already progressed to joint-space narrowing and femoral head collapse on plain radiographs. This mirrors reports of adolescents and young adults elsewhere in the region who have developed osteonecrosis, growth disturbance, and other features of steroid excess after years of self-medication or informal prescribing, and it underlines why regulation of over-the-counter steroid access, and public and provider education about their risks, remain pressing public-health priorities rather than abstract policy concerns.5

Once the disease has reached the stage seen on this patient's radiographs — joint-space loss, femoral head distortion, and secondary acetabular change — head-preserving procedures such as core decompression or osteotomy no longer have much to offer, and total hip arthroplasty becomes the treatment of choice, exactly as it is in older patients with end-stage osteonecrosis.6 The concern with performing this operation in a patient still in her teens is longevity: implants in young, active patients with osteonecrosis have historically shown higher rates of loosening and revision than in older patients with straightforward osteoarthritis, which is why cementless fixation, chosen here, is generally favoured in this age group — modern uncemented components rely on bony ingrowth for long-term fixation and have performed well in mid- to long-term follow-up studies of young patients with avascular necrosis.6,7 A follow-up study of patients under 40 who underwent total hip arthroplasty for avascular necrosis reported good survivorship at five to nineteen years with modern implants and technique, and a mid-term series from a comparable South Asian setting using uncemented components for osteonecrosis of the femoral head showed marked functional improvement with a low complication rate — findings broadly in keeping with the good early outcome seen in our patient.6,7

The choice to stage the two hip replacements roughly ten months apart, rather than operate on both hips at once, reflected both the severity of her disease on each side individually and practical considerations around rehabilitation, blood loss, and recovery in a young patient who needed to be able to fully rehabilitate one hip before undergoing a second major operation. The direct lateral Hardinge approach was selected for its low reported dislocation rate and reliable exposure, both useful properties in a young patient for whom implant survival and stability over decades, rather than years, is the real measure of success.4

This report has the usual limitations of a single case: the absence of pre-operative magnetic resonance imaging meant that formal Ficat–Arlet staging could not be applied, and follow-up so far, while reassuring, is still relatively short in a patient whose implants will need to last for many decades. Longer follow-up will be needed to know how these particular components perform over the course of her life. Even so, the case illustrates two points

worth carrying into clinical practice: first, that unsupervised, prolonged corticosteroid use — however innocuous it might seem to the person prescribing or taking it — carries a real and sometimes devastating risk of avascular necrosis, even in patients without any other risk factor; and second, that with careful staging and modern implants, even very young patients with end-stage bilateral hip disease can be given back a functional, pain-free gait.

Conclusion

Steroid-induced avascular necrosis of the femoral head should be considered in any young patient presenting with progressive, bilateral hip pain, particularly where there is a history of prolonged or unsupervised corticosteroid use, and a careful drug history — including medicines obtained informally or without prescription — is essential to reaching the diagnosis. In this patient, staged uncemented total hip arthroplasty through the Hardinge approach restored pain-free mobility despite advanced bilateral disease at presentation, reinforcing that age alone should not deter surgeons from offering definitive arthroplasty when joint-preserving options are no longer viable. The case also serves as a caution about the orthopaedic cost of unregulated steroid dispensing in resource-limited settings, and argues for stronger public awareness and prescribing oversight.

Patient Consent

We are certifying that we have taken all appropriate patients' consent form. In the forms, the patient given her consent for use of her images (both photographic and radiological) and clinical information to be published both in electronic and print form. The patient understand that her name, and initials will not be published and due efforts will be made to hide her identity.

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Author Contribution

Dr. Avishek Bhadra: Conceptualization, case diagnosis and management, clinical supervision, data collection, and manuscript review. Dr. Ashikur Rahaman: Clinical management, data collection, literature review, and manuscript preparation. Dr. Md Abdur Rouf: Clinical assistance, data collection, literature review, and manuscript preparation. Dr. Md Ikbal Fahim: Clinical assistance, data collection, literature review, and critical revision of the manuscript. All authors: Participated in the preparation and review of the manuscript, approved the final version, and agreed to be accountable for all aspects of the work.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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