

Late Diagnosis of Femoral Shaft Perforation During Total Hip Arthroplasty: Case Report

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Learning Point of the Article:

Femoral cortical perforation after total hip arthroplasty may remain undiagnosed despite patient ambulation and normal anteroposterior radiographs; therefore, lateral radiographs are mandatory in patients with persistent post-operative thigh pain.

Abstract

Introduction: Femoral shaft fractures are recognized complications of total hip arthroplasty (THA); however, femoral cortical perforation is a rare entity and is most often diagnosed intraoperatively or in the early post-operative period. Delayed diagnosis is uncommon and may result in serious complications. This report presents a case of femoral shaft perforation diagnosed 15 days after primary THA and highlights the importance of two-view radiographic evaluation.

Case Report: A 68-year-old woman presented to our outpatient clinic for routine suture removal 15 days after primary right THA performed at another institution for osteoarthritis. Postoperatively, she complained of a painful bulging mass on the posteromedial aspect of the thigh. Despite persistent symptoms, she had been evaluated twice by orthopedic surgeons, and anteroposterior (AP) radiographs were repeatedly interpreted as normal. She was able to ambulate with full weight-bearing using a walker. Physical examination revealed a tender posterior thigh mass and pain with passive hip motion. Laboratory studies were unremarkable. Repeat AP radiographs showed no obvious abnormality; however, a lateral radiograph demonstrated catastrophic posteromedial perforation of the femoral shaft with protrusion of the femoral stem just below the lesser trochanter, tenting the skin. Revision surgery was recommended, but the patient chose to return to her primary surgeon.

Conclusion: This case demonstrates that femoral cortical perforation after THA may be overlooked despite patient ambulation and normal AP radiographs. Persistent or atypical post-operative thigh pain should prompt thorough evaluation, including lateral radiographs. Routine use of two-view imaging is essential to avoid delayed diagnosis of this rare but potentially serious complication.

Keywords: Femoral cortical perforation, total hip arthroplasty, delayed diagnosis, lateral radiograph.

Introduction

Femoral shaft fractures are among the most common and well-known complications of total hip arthroplasty (THA). Earlier reports described an incidence ranging from 0.4% to 4% [1].

Advances in femoral stem design and improvements in surgical technique were expected to reduce this complication; however, later studies have reported an incidence of 0.1–1% for cemented

and up to 5% for cementless primary THA [2].

Femoral cortical perforation represents a rare subset of femoral shaft fractures associated with hip arthroplasty, with a reported incidence of 0.07–0.3% [3]. Common risk factors include osteoporosis, difficulty with surgical exposure, abnormal proximal femoral anatomy, and iatrogenic causes such as surgeon inexperience, loss of orientation, or application of excessive force

Author's Photo Gallery



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Figure 1: Anteroposterior radiograph of the femur with intramedullary located stem.

during broaching [4].

Most cases reported in the literature are diagnosed intraoperatively or in the immediate post-operative period [4,5,6,7,8]. We present a case of femoral shaft perforation that was recognized 15 days after THA, emphasizing the critical importance of obtaining two-view radiographs for accurate diagnosis.

Case Report

A 68-year-old woman presented to our outpatient clinic for routine suture removal. She had undergone right THA 15 days earlier at another institution. She had no history of prior hip surgery, rheumatologic disease, or systemic illness. The indication for surgery was primary degenerative osteoarthritis of the hip.

Postoperatively, the patient noticed a bulging mass on the posterior aspect of her thigh. An anteroposterior (AP) radiograph of the hip was obtained at the original institution and was reported as normal. The treating physician suspected a post-operative fluid collection at posterior thigh and attempted ultrasound-guided aspiration, which was negative. The patient was reassured and advised routine follow-up.

As her symptoms persisted, she sought evaluation from another orthopedic surgeon. A repeat AP hip radiograph was obtained, which again revealed no apparent abnormality, and observation was recommended. Dissatisfied with the lack of improvement, the patient eventually presented to our clinic for suture removal.

The patient was 167 cm tall and weighed 77 kg (body mass index [BMI]; 28). On inspection, she demonstrated a semi-antalgic gait pattern with full weight-bearing and was using a walker. Although suture removal was her primary request, she

reported mild groin pain and severe, sharp pain localized to the posterior thigh associated with a palpable mass.

Physical examination revealed a longitudinal incision on the lateral aspect of the hip extending over the greater trochanter, consistent with an anterolateral surgical approach. Hip range of motion was limited, and forced passive motion elicited pronounced pain in the posterior thigh. A tender, bulky mass was palpable on the posteromedial aspect of the thigh. Laboratory evaluation for infection was negative.

Repeat AP radiography of the hip demonstrated no obvious abnormalities. The acetabular component was positioned reasonably well, with slightly increased anteversion and inclination. The femoral stem appeared centered within the medullary canal, with no evidence of subsidence or fracture. A small gap between the prosthesis and the lateral cortex was noted, but proximal and medial fit appeared acceptable. The relatively short stem length was initially attributed to implant design (Fig. 1).

However, the lateral radiograph revealed a catastrophic finding: the femoral stem had perforated the posterior cortex and protruded posteromedially just inferior to the lesser trochanter. The stem tip was tenting the skin, producing a visible and palpable protuberance on the posteromedial thigh (Fig. 2).

The diagnosis and treatment options were explained to the patient, and revision surgery was strongly recommended. She elected to return to her primary surgeon and declined revision surgery at our institution.

Discussion

Proximal longitudinal fractures during uncemented hip



Figure 2: Lateral radiograph demonstrating posteromedial cortical perforation by the femoral stem.

arthroplasty are not uncommon and have been reported to occur in approximately 0.58% of primary hip arthroplasties; however, femoral cortical penetration is rare, with an incidence of only 0.07% [9]. Intraoperative femoral perforation during THA usually occurs during femoral canal preparation or insertion of the femoral component. Wade et al. identified two main risk factors for femoral perforation: Abnormal proximal femoral anatomy and difficulty with surgical exposure [7]. A BMI >40 has been defined as a criterion for difficult exposure.

In the present case, the patient had no history of previous hip surgery or proximal femoral deformity that could have led to erroneous stem guidance and subsequent femoral perforation. The patient's BMI was 28, effectively excluding obesity-related difficulty with exposure. Posterior femoral perforation is not unexpected when an anterolateral approach is used. A broach starting point too close to the anterior cortex may redirect the instrument posteriorly. In addition, excessive lateralization near the greater trochanter in an attempt to avoid varus implantation may create an anterolateral-to-posteromedial force vector, predisposing the femur to posteromedial cortical perforation.

Osteoporosis and poor bone quality are associated with reduced cortical thickness and an increased risk of fracture. Patients with osteoporosis have been shown to have a 2.4-fold higher risk of fracture compared with those without osteoporosis [10]. The canal-to-bone ratio is a validated method for assessing proximal femoral bone quality on plain radiographs [11]. Based on this ratio, Dorr et al. classified proximal femoral morphology into three types, with Dorr type C femurs demonstrating a two- to five-fold increased risk of intraoperative periprosthetic fracture [12]. Although bone mineral density was not measured in the present patient, proximal femoral morphology was consistent with Dorr type A, making severe osteoporosis and a high fracture risk unlikely.

Most cases of femoral perforation complicating THA are detected either intraoperatively or in the early post-operative period [4,5,6,7]. Cortical perforation secondary to redirection of the femoral stem due to a previously implanted fibular strut graft has been reported [6]. In that case, hip instability with easy dislocation raised suspicion, and intraoperative posteromedial femoral stem perforation was confirmed using portable radiographs; revision surgery was performed after removal of both the stem and the fibular strut graft. In a retrospective study of 3,973 THAs, 16 patients (0.4%) sustained femoral

perforation during broaching, all of which were diagnosed intraoperatively [4]. Wade et al. reported four cases of femoral perforation, all detected early due to severe pain during ambulation, and all were revised before plan hospital discharge [7]. In all reported cases, AP radiographs appeared normal, and the diagnosis was established exclusively on lateral radiographs.

In the present case, femoral perforation occurred despite the absence of recognized predisposing factors such as obesity, severe osteoporosis, or previous femoral deformity. Surgeons should therefore remain vigilant for this potential complication in all cases. Palpation of the cortical walls using an intramedullary suction tip or curette following broaching may facilitate early detection of cortical violation. When there is any intraoperative doubt, two-view radiographic evaluation should be obtained. In this case, the patient was able to ambulate with support for 15 days postoperatively and was evaluated by two orthopedic specialists; however, femoral perforation was overlooked due to reliance on the patient's ability to ambulate and the normal appearance of AP radiographs. This case underscores the importance of routine two-view radiographic assessment in patients undergoing THA, particularly those presenting with persistent pain, regardless of the presence of classic risk factors.

Conclusion

Femoral cortical perforation during THA is a rare but potentially catastrophic complication that may remain unrecognized despite preserved ambulation and unremarkable AP radiographs. This case highlights that the absence of classical risk factors does not preclude the occurrence of femoral perforation. Surgeons should maintain a high index of suspicion in patients presenting with persistent or atypical post-operative thigh pain. Routine use of two-view radiographic evaluation, including lateral imaging, is essential both intraoperatively when doubt exists and postoperatively to ensure early diagnosis and prevent serious morbidity.

Clinical Message

Persistent or atypical thigh pain after THA should raise suspicion for femoral cortical perforation, even in patients who are able to ambulate and have normal AP radiographs. Routine use of two-view radiographic evaluation, including a lateral view, is essential for the early diagnosis and prevention of catastrophic complications.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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