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Case Report

Intramedullary fixation of a femoral shaft fracture with preservation of an existing hip resurfacing prosthesis

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ABSTRACT

Femoral neck fractures have been reported as a cause for failure in patients with a hip resurfacing arthroplasty. However, the incidence and management of fractures of the femoral shaft with an ipsilateral hip resurfacing arthroplasty is relatively absent in current literature. Although, the gold standard for the fixation of a closed femoral shaft fracture is with the use of an intramedullary nail, this can be a challenge in the presence of a hip resurfacing arthroplasty.

We describe the case of anterograde intramedullary nail fixation for a femoral shaft fracture in a patient with an ipsilateral hip resurfacing arthroplasty in situ.

Introduction

Most simple femoral diaphyseal fractures are usually treated surgically with the use of intramedullary nail fixation, but the presence of a hip resurfacing prosthesis can make management of the injury a challenging decision. Although the "gold-standard" for operative management of a closed femoral fracture is fixation with an intramedullary nail [3,4], there is sparse literature to guide the management of such an injury with pre-existing resurfacing hardware, and insertion of an intramedullary nail with an anterograde or a retrograde approach is a complex surgical decision. Each method can create a stress riser that may potentially result in a subsequent periprosthetic fracture.

Hip resurfacing arthroplasty (HRA) was a popular option utilised for younger patients with osteoarthritis, particularly those with greater functional demands [1,2]. HRA components consist of a metal-on-metal coupling in which the bearing surfaces are made of highly polished cobalt chrome. The femoral component, unlike in traditional total hip replacements (THR), preserves much more of the proximal femoral bone stock and possesses a centering stem that lies with in the femoral neck [5]. The introduction of the HRA aimed to avoid the problems associated with total hip replacements such as volumetric wear, polyethylene debris, osteolysis and loosening [6]. The larger femoral head was also designed to reduce the risk of dislocation, which has been an issue in conventional THRs, especially in the context of younger and more active individuals. The most common cause of failure of the HRA is fracture of the femoral neck [5] usually a subcapital fracture secondary to complications of the surgery, avascular necrosis or a delayed foreign body response to wear [6], with the incidence of these proximal femoral fractures approximately 0.5–4% [2,7–10]. The management of these intertrochanteric fractures have been well described [9,10] and although management of peri-prosthetic fractures are guided by the Vancouver Classification, this classification largely applies to fractures involving a THR or hemiarthroplasty rather than the HRA.

Here we report a case of a traumatic femoral shaft fracture, managed with anterograde intramedullary nail fixation and retention of the existing hip resurfacing arthroplasty.

Case report

A 72 year old female was admitted to the acute Orthopaedic team with a simple fall in her garden after slipping on grass during a tennis match. There were no sinister preceding symptoms as a cause for her fall. She landed towards the right but attempted to twist around during her descent in order to protect the right hip, which had a metal-on-metal resurfacing hip prosthesis in situ. She developed pain in the right thigh immediately after the fall and was unable to bear weight through the leg.

In her past medical history, she had undergone a right-sided Birmingham Hip Resurfacing (BHR) arthroplasty performed by Mr. Derek McMinn himself some 12 years prior to this admission for symptomatic hip osteoarthritis. She also had an open reduction

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and internal fixation for a left ankle fracture 15 years ago. Apart from this surgical history she did not suffer from any other co-morbidities. She was independently mobile and enjoyed playing tennis as a hobby. She was on no regular medications, had no allergies to medications and was a non-smoker. The patient's body mass index (BMI) was 23.7.

On examination, her right thigh was painful, deformed and swollen, with an inability to weight-bear.

Anteroposterior and lateral radiographs of the right femoral shaft confirmed a closed mid-shaft spiral femoral fracture (Fig. 1). Her haemoglobin level was 13.1 g/dl.

The patient was placed in a Thomas' splint for comfort in the emergency department (Fig. 2). After considerable discussion amongst the orthopaedic consultant trauma team, a consensus was reached and the patient was consented for an anterograde intramedullary nail fixation with preservation of the hip-resurfacing prosthesis.

Surgical procedure

Surgical fixation was performed under general anaesthetic and a femoral nerve block. After positioning of the patient and reduction of the fracture on a fracture table under fluoroscopic control (Fig. 3), an incision was made over the greater trochanter area and a guide wire was passed via an entry point at the tip of the greater trochanter. Care was taken to ensure the guidewire was advanced lateral to the stem tip of the BHR (Fig. 4). The shaft was reamed to 14 mm and a Stryker T2 femur system intramedullary nail (Schönkirchen, Germany) (12 mm by 400 mm) was inserted (Fig. 5). The position was confirmed with fluoroscopy and one fully-threaded locking screw (5 mm × 45 mm) was inserted proximally and two were inserted distally (5 mm × 50 mm and 5 mm × 40 mm) (Fig. 6).

The patient had an uneventful post-operative recovery and was allowed to partially weight-bear post-operatively and further radiographs were obtained to confirm the position (Fig. 7). She was discharged on the 6th post-operative day after assessment and discharge from the inpatient physiotherapy service.

On follow-up at six weeks in the outpatient clinic pain had settled well, wounds had healed satisfactorily and she had a good range of motion in the right hip on examination. She had been partially weight-bearing with the use of one walking stick and engaging well with physiotherapy in the community. Repeated radiographs demonstrated good callus formation around the fracture site.

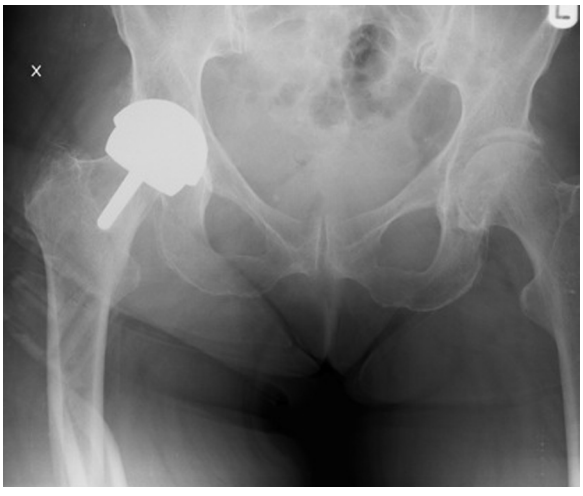

Fig. 1. Right femoral shaft fracture on admission.

Fig. 2. Right femoral shaft fracture in Thomas' splint.

At 12 weeks the patient was allowed to fully weight-bear and by 16 weeks, she had returned to playing tennis and her Oxford Hip score was 47 out of 48 (Fig. 8).

Discussion

Traumatic fractures of the femoral shaft with the presence of a hip resurfacing arthroplasty are rare. Treatment options can be operative or non-operative. Operative approaches include the use of a Mennen plate or femoral locking compression plates with or without cable systems, a reconstruction nail with cerclage wires [6], a trochanteric cephalomedullary nail [12] or revision to a long-stemmed total hip replacement if feasible [5]. The choice of

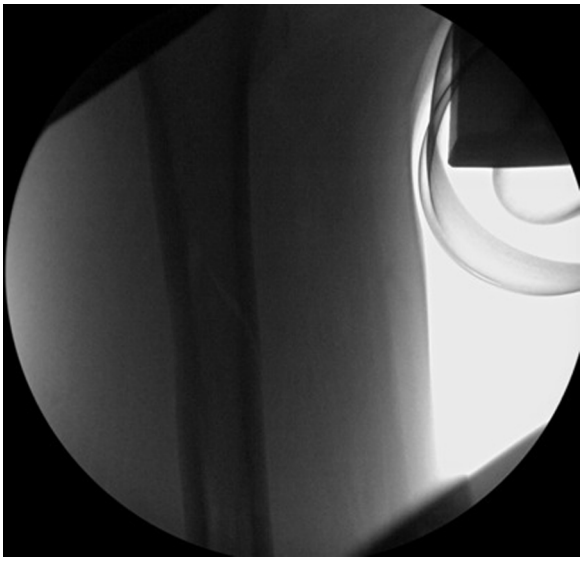

Fig. 3. Reduction of fracture under fluoroscopic control.