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## Case report

# Peri-prosthetic fracture neck of femur following metal-on-metal Birmingham hip resurfacing treated by internal fixation

Praveen Mereddy\*, Hamad Malik, Nicholas Geary

Department of Trauma and Orthopaedics, Wirral University Teaching Hospital, Upton, Wirral CH49 5PE, Merseyside, UK

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## 1. Introduction

Hip resurfacing arthroplasty has continued to increase in popularity over the past decade as a treatment option for young, active patients with osteoarthritis.<sup>4,7,11</sup> Complications associated with hip resurfacing include femoral neck fracture, osteonecrosis, increased metal-ion levels and metal hypersensitivity.<sup>8,9</sup> Peri-prosthetic fracture involving the femoral neck is usually sub-capital and it has been reported as the most common complication associated with hip resurfacing.<sup>3</sup> Various reports of non-operative treatment<sup>5,6</sup> and revision surgery<sup>1,10</sup> have been published. Aning et al.<sup>2</sup> and Weinrauch and Krikler<sup>12</sup> reported successful internal fixation of peri-prosthetic proximal femoral fractures (extracapsular) following hip resurfacing with cephalomedullary nail and angled blade-plate, respectively. We describe to our knowledge, the first case of successful internal fixation for a peri-prosthetic intracapsular (basi-cervical) fracture neck of femur after Birmingham metal-on-metal hip resurfacing.

## 2. Case report

A 69-year-old gentleman presented with pain in the right hip and difficulty in weight bearing following a fall. His right hip was resurfaced 15 months prior to the injury for osteoarthritis at a different hospital. Patient denied any hip pain prior to the fall and there was no delay in presentation to the emergency department. His medical history included ankylosing spondylitis and personal history revealed smoking and excessive alcohol consumption. Painful limitation of range of movement in the right hip was the only positive finding on clinical examination. Antero-posterior and lateral radiographs of right hip revealed an undisplaced basi-cervical fracture with Birmingham metal-on-metal resurfacing in

situ (Figs. 1 and 2) (Midlands Medical Technologies, Birmingham, UK). The senior author's decision was to internally fix the fracture to prevent further displacement.

Under GA and peripheral nerve blocks with prophylactic intravenous Cefuroxime (1.5 g) on induction, patient was positioned supine on a fracture table and image intensifier screening did not reveal any further displacement of the basi-cervical fracture. Three percutaneous guide wires were inserted with image intensifier guidance (inferior, antero-superior and postero-superior) in an inverted triangular configuration. Three AO cannulated cancellous screws (75, 70 and 65 mm) were inserted through stab incisions and every precaution was taken to avoid contact between the stainless steel screws and the cobalt chrome stem. After confirming the satisfactory position of the fracture and screws, the stab wounds were closed with non-absorbable sutures. The patient received intravenous Cefuroxime (750 mg) at 8 and 16 h post-operatively.

The patient was advised to mobilise non-weight bearing for 6 weeks. He was non-compliant and commenced weight bearing on the second post-operative day. Clinical and radiographic reviews were conducted at regular intervals (2, 6, 12 and 24 weeks, 1, 2, 3 and 5 years).

At 6 months follow-up, patient was asymptomatic, mobilised normally and played regular snooker. Clinically, patient had good range of movement in his right hip. The fracture line was not visible on the radiographs with the cancellous screws and Birmingham metal-on-metal resurfacing prosthesis in situ.

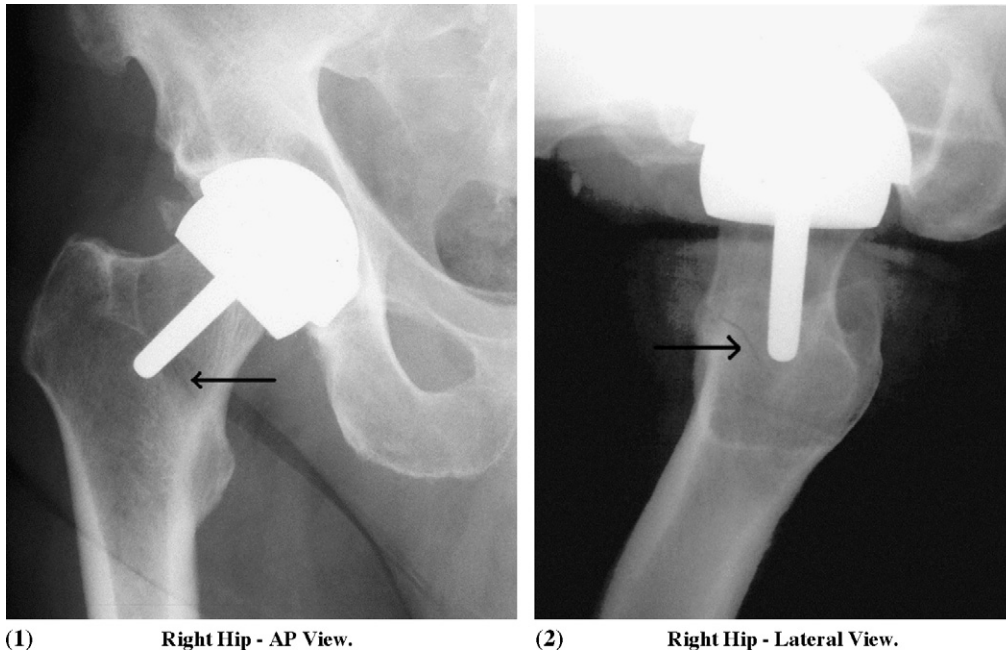
At 4 years follow-up, patient remained symptom free and radiographs revealed the cancellous screws in situ without any lucency around the prosthesis (Figs. 3 and 4).

## 3. Discussion

Peri-prosthetic fractures after resurfacing could be a result of late component failure or acute trauma. Late component failure is usually due to loosening/osteonecrosis and it is not advisable to attempt salvage in this situation. In acute traumatic fractures, the

\* Corresponding author at: 9 St Brides Court, Ingleby Barwick, Stockton-on-Tees, TS17 5HF, UK. Tel.: +441642767040; fax: +441914452833.

E-mail address: [mpkr3@yahoo.com](mailto:mpkr3@yahoo.com) (P. Mereddy).



(1) Right Hip - AP View.

(2) Right Hip - Lateral View.

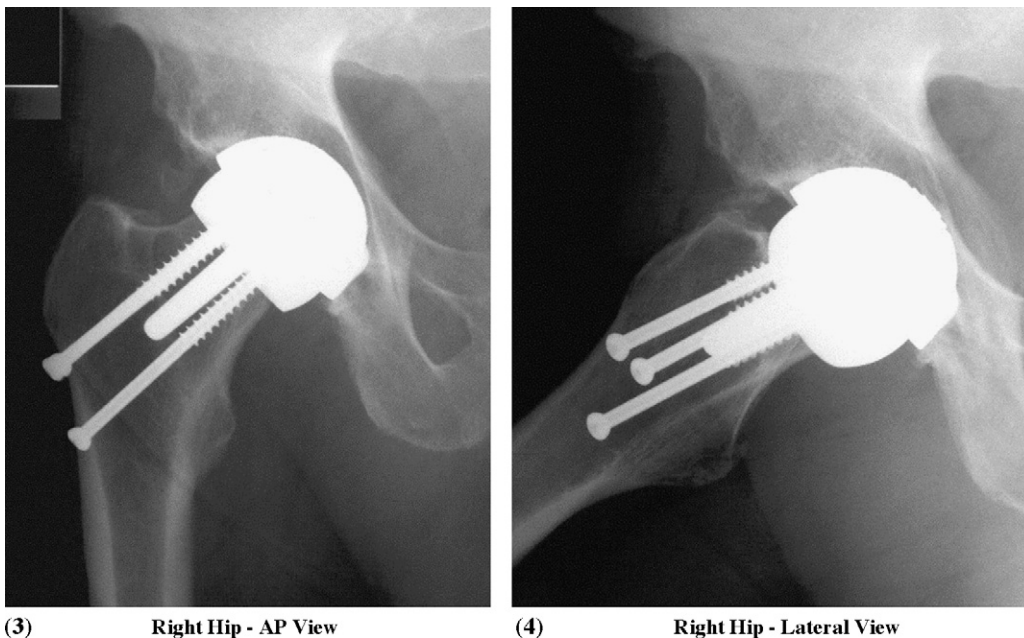
**Figs. 1 and 2.** Radiographs demonstrating the undisplaced basi-cervical peri-prosthetic fracture.

majority are displaced sub-capital/trans-cervical and because of the high chance of non-union/osteonecrosis with fixation, are revised to a stemmed modular component. According to Shimmin et al., peri-prosthetic fracture of the femoral neck is the most common complication of resurfacing arthroplasty (1.46%) and its cause is multifactorial, including patient selection, surgical technique, and post-operative management.<sup>9</sup> The aetiology of the peri-prosthetic basi-cervical fracture in the current case could be the history of fall and stress protection of the sub-capital area by the prosthesis. Excessive alcohol consumption and smoking may have contributed to the fracture.

Various reports of peri-prosthetic fractures after hip resurfacing with successful non-operative treatment have been published.<sup>5,6</sup>

Aning et al. described a complex comminuted proximal fracture treated with a cephalomedullary reconstruction nail and two proximal interlocking screws on either side of the resurfacing femoral stem.<sup>2</sup> Weinrauch and Krikler reported an intertrochanteric femoral fracture distal to the hip resurfacing implant treated successfully with an angled blade-plate.<sup>12</sup> Revision to a stemmed modular component is more frequently performed for a displaced sub-capital/trans-cervical peri-prosthetic fracture neck of femur following metal-on-metal resurfacing.<sup>1,10</sup>

It is important to individualise treatment depending on the fracture location and configuration, patient characteristics and surgeon's experience. In the current case, with the fracture being basi-cervical the possibility of better fracture union and survival



(3) Right Hip - AP View

(4) Right Hip - Lateral View

**Figs. 3 and 4.** Radiographs showing the united fracture with the prosthesis and cancellous screws in situ.

rate of the femoral head was considered. The option of minimally invasive percutaneous fixation with little risk in comparison to a more complex revision lead the senior author to attempt internal fixation rather than a revision.

In a national review of 50 femoral neck fractures following Birmingham hip resurfacing, Shimmin and Back report a failed attempt to fix a sub-capital femoral neck fracture intra-operatively with a cannulated screw by one of the participating surgeons in their study.<sup>10</sup>

Undisplaced traumatic peri-prosthetic fractures following hip resurfacing are rare. To the best of our knowledge, this is the first case of peri-prosthetic intracapsular (basi-cervical) fracture neck of femur after metal-on-metal resurfacing that has been treated successfully by internal fixation with cannulated cancellous screws.

The current case is unique for two reasons. Firstly, it is an acute traumatic undisplaced basi-cervical peri-prosthetic fracture neck of femur that was fixed internally and secondly, it confirms that successful salvage is possible with cannulated cancellous screw fixation in this situation. This method of fixation may be worth attempting in an undisplaced sub-capital or trans-cervical peri-prosthetic fracture but the incidence of non-union and osteonecrosis would be greater. Further studies to determine the various fracture patterns and explore the treatment options for peri-prosthetic fractures following hip resurfacing would be useful.

## References

1. Amstutz HC, Campbell PA, Leduff MJ. Fracture of the neck of the femur after surface arthroplasty of the hip. *J Bone Joint Surg [Am]* 2004;86:1874–7.
2. Aning J, Aung H, Mackinnon J. Fixation of a complex comminuted proximal femoral fracture in the presence of a Birmingham hip resurfacing prosthesis. *Injury* 2005;36:1127–9.
3. Australian Orthopaedic Association. National Joint Replacement Registry, annual report 2003.
4. Back DL, Dalziel R, Young D, Shimmin A. Early results of primary Birmingham hip resurfacings: an independent prospective study of the first 230 hips. *J Bone Joint Surg [Br]* 2005;87:324–9.
5. Cossey AJ, Back DL, Shimmin A, Young D, Spriggins AJ. The non-operative management of peri-prosthetic fractures associated with the Birmingham hip resurfacing procedure. *J Arthroplasty* 2005;20:358–61.
6. Cumming D, Fordyce MJF. Non-operative management of a peri-prosthetic sub-capital fracture after metal-on-metal Birmingham hip resurfacing. *J Bone Joint Surg [Br]* 2003;85:1055–6.
7. Daniel J, Pynsent PB, McMinn DJ. Metal-on-metal resurfacing of the hip in patients under the age of 55 years with osteoarthritis. *J Bone Joint Surg [Br]* 2004;86:177–84.
8. MacDonald SJ. Metal-on-metal total hip arthroplasty: the concerns. *Clin Orthop* 2004;429:86–93.
9. Shimmin AJ, Bare J, Back DL. Complications associated with hip resurfacing arthroplasty. *Orthop Clin North Am* 2005;36:187–93.
10. Shimmin AJ, Back DL. Femoral neck fractures associated with hip resurfacing: a national review of 50 cases. *J Bone Joint Surg [Br]* 2005;87:463–4.
11. Treacy RC, McBryde CW, Pynsent PB. Birmingham hip resurfacing arthroplasty. *J Bone Joint Surg [Br]* 2005;87:167–70.
12. Weinrauch P, Krikler S. Proximal femoral fracture after hip resurfacing managed with blade-plate fixation. *J Bone Joint Surg [Am]* 2008;90:1345–7.