

Case Report

Catastrophic Failure of the Femoral Condylar Prosthesis in Total Knee Arthroplasty

Simon M. Thompson and Gil Railton

Chelsea and Westminster NHS Trust, 369 Fulham Rd, London SW10 9NH, United Kingdom
Address correspondence to Simon M. Thompson, s.m.thompson96@imperial.ac.uk

Received 6 October 2015; Revised 23 March 2016; Accepted 14 April 2016

Copyright © 2016 Simon M. Thompson and Gil Railton. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract The failure of total knee prosthetic components is a rare event, and has been most commonly reported around the polyethylene insert of tibia or the tibial prosthesis. The isolated fracture of a femoral component is a rare event. A review of the literature has reported a very similar failure in the same device in the same region of the medial femoral condyle, implanted in the same year, but in a different geographical location in the UK. Issues with polyethylene fracture and subsequent base plate failure are already documented, but those of the femur have not. We recommend timely revision of total knee arthroplasty where component failure is suspected, as this may prevent further damage.

Keywords arthroplasty; prosthesis; component failure; femoral condyle

1. Introduction

The failure of total knee prosthetic components is a rare event, and has been most commonly reported around the polyethylene insert of tibia or the tibial prosthesis. We report a case of a fractured femoral component, not commonly seen in our practice nor reported in the literature.

2. Case report

A 53-year-old male presented to Accident and Emergency Department, with a painful swollen right knee. He had been helping to push a broken down car on a highway and felt something “give” in his right knee. This resulted in a mobile, weight bearing, swollen knee which was painful at night only.

The patient had bilateral knee replacements in 1999, 15 years previously, due to rheumatoid arthritis. A PFC SIGMA Cruciate Retaining device had been implanted (DePuy Orthopaedics, Warsaw, IN, USA); Size 5 femoral component and tibial component with an 8 mm tray had been implanted on the right. There were no immediate or late complications following surgery. The right knee had performed well until 2012, when the patient noticed intermittent pain medially. The left knee was revised in 2013 due to polyethylene wear. He had been reviewed at



Figure 1: Plain AP radiograph 2013.



Figure 2: Plain AP radiograph 2014.

a national tertiary referral center, where no cause for his ongoing right knee pain was found.

He was otherwise fit and well, with no local or systemic features of sepsis. He had a past medical history of rheumatoid arthritis treated with Prednisolone, Methotrexate, and Enbrel injections.

On examination, the patient weighed 82 kg with a BMI of 36. He had a swollen knee with an effusion. His range of movement was 0–120 degrees of flexion. He was able to walk, but had occasional discomfort anteriorly and medially.

Radiographs of the right knee performed over the period 2012–2015 revealed marked polyethylene wear; see Figures 1, 2, and 3. Radiographs from the original hospital were reviewed. A knee series taken at the time of presentation to Accident and Emergency Department revealed significant polyethylene wear and a minimally displaced fractured medial femoral component; see Figures 4 and 5. Routine blood tests and inflammatory markers were normal.



Figure 3: Plain lateral radiograph 2014.



Figure 4: Plain AP radiograph 2015.



Figure 5: Plain lateral radiograph 2015.

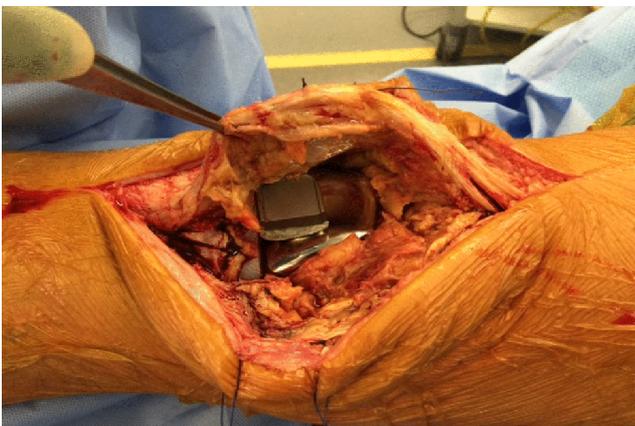


Figure 6: Intraoperative photo showing knee in extension fractured medial femoral condyle sat in the patella-femoral joint.

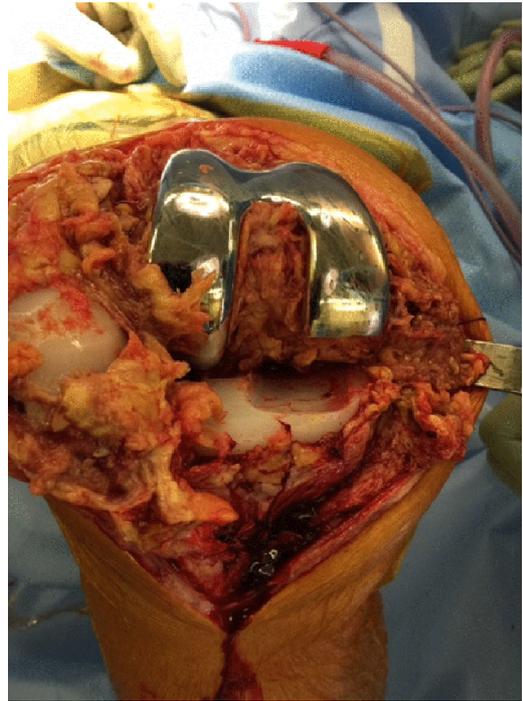


Figure 7: Intraoperative photo showing knee in flexion with the fractured medial femoral condyle visible.



Figure 8: Explanted femoral device.

The patient was consented for single stage revision knee replacement. The previous midline incision was used. On completion of the arthrotomy, the fractured femoral component was located in the patellofemoral joint; see Figure 6. Synovial specimens were sent for histology and culture which confirmed polyethylene wear and metallosis. No infection was present.

The femoral component was loose and the medial condyle fractured without attached cement or bone involvement; see Figures 7, 8, and 9. Fibrous tissue was found at the prosthesis bone interface globally around the

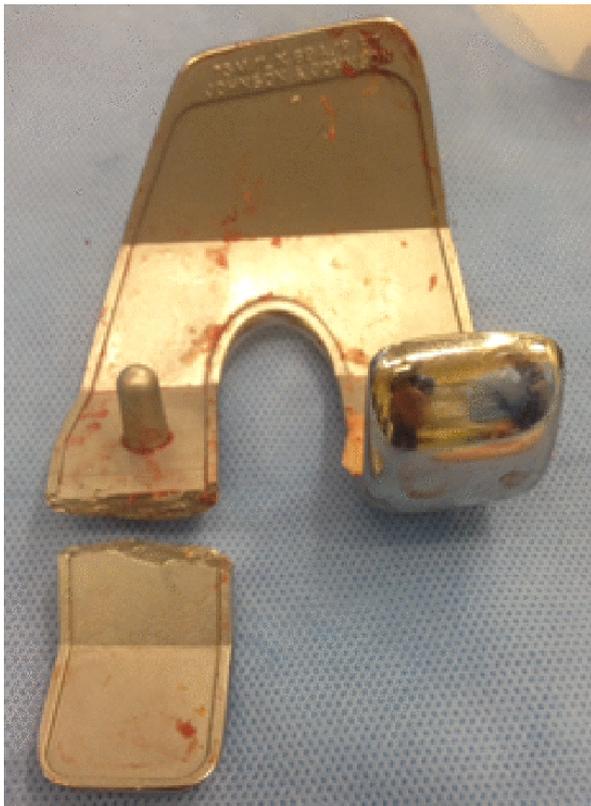


Figure 9: Explanted femoral device.



Figure 10: Massive wear of the tibial tray.

femoral component; the cement mantle on the femoral side was found to be grossly incomplete. The tibial component was well fixed, with the tibial tray demonstrating marked polyethylene wear; see Figure 10. A single-stage stemmed revision was undertaken; see Figures 11 and 12.



Figure 11: AP postoperative radiographs.

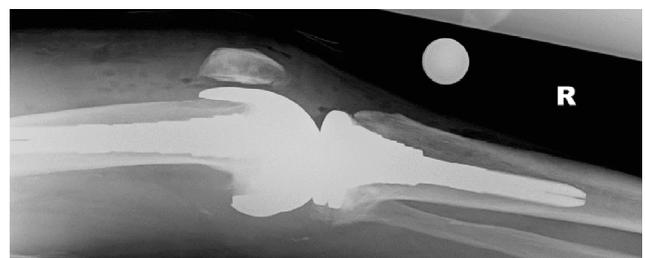


Figure 12: Lateral postoperative radiograph.

3. Discussion

The isolated fracture of a femoral component is a rare event. A review of the literature has reported a very similar failure in the same device in the same region of the medial femoral condyle, implanted in the same year, but in a

different geographical location in the UK [1]. Issues with polyethylene fracture and subsequent base plate failure are already documented [2,3,4,5,6].

It was felt at the time of revision that the cause for failure in this instance was poor cement technique, resulting in the ingress of fibrous tissue between bone and prosthesis. The subsequently loose prosthesis fatigued and progressively mechanically failed over a three-year period. The component catastrophically failed on one episode of extreme exertion. This case report highlights the need of proper cement techniques, and the suspicion of failing components with appropriate investigations in the light of radiographical changes to the underlying polyethylene. We recommend timely revision of total knee arthroplasty, where component failure is suspected, as this may prevent further damage.

Conflict of interest The authors declare that they have no conflict of interest.

References

- [1] G. N. Swamy, C. Quah, E. Bagouri, and N. P. Badhe, *Nontraumatic fracture of the femoral condylar prosthesis in a total knee arthroplasty leading to mechanical failure*, *Case Rep Orthop*, 2014 (2014), 896348.
- [2] C. S. Lee, W. M. Chen, H. C. Kou, W. H. Lo, and C. L. Chen, *Early nontraumatic fracture of the polyethylene tibial post in a NexGen LPS-Flex posterior stabilized knee prosthesis*, *J Arthroplasty*, 24 (2009), 1292.e5–1292.e9.
- [3] B. S. Bal, D. Greenberg, S. Li, D. R. Mauerhan, L. Schultz, and K. Cherry, *Tibial post failures in a condylar posterior cruciate substituting total knee arthroplasty*, *J Arthroplasty*, 23 (2008), 650–655.
- [4] P. J. Abernethy, C. M. Robinson, and R. M. Fowler, *Fracture of the metal tibial tray after kinematic total knee replacement: A common cause of early aseptic failure*, *J Bone Joint Surg Br*, 78 (1996), 220–225.
- [5] R. D. Scott, F. C. Ewald, and P. S. Walker, *Fracture of the metallic tibial tray following total knee replacement: Report of two cases*, *J Bone Joint Surg Am*, 66 (1984), 780–782.
- [6] G. Flivik, P. Ljung, and U. Rydholm, *Fracture of the tibial tray of the PCA knee: A case report of early failure caused by improper design*, *Acta Orthop Scand*, 61 (1990), 26–28.