

Case report

Case report: Total knee arthroplasty polyethylene liner disengagement identified by arthrography



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ABSTRACT

We report a case of total knee arthroplasty polyethylene liner disengagement identified by plain film arthrography and CT arthrography.

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1. Case details

The patient was an 82 year old female who had a Duracon (Stryker) total knee arthroplasty eight years prior at another hospital. She reported that her knee was initially well functioning and that she was happy with her outcome. However, she had experienced gradually increasing knee discomfort over the past year, with a rapid deterioration in her pain and function over the preceding month. There was no recent history of trauma or other antecedent identifiable. No previous radiographs were available.

She had full range of motion and approximately 15° of valgus laxity, though with a firm endpoint. There was no clinical evidence of infection. Her blood white cell count was $9.5 \times 10^9/L$ and C-reactive protein (CRP) was 6.4 mg/L. Knee aspirate was negative for organisms and crystals, and had a normal cell count.

Plain film radiographs demonstrated a valgus deformity, with no radiographic suggestion of prosthetic loosening (Fig. 1). A technetium bone scan showed increased tracer uptake near the medial aspect of the femoral component, but this was not definitive for loosening.

2. CT arthrographic findings

Fluoroscopy guided intra-articular injection of 20 mL of Ultravist 370 was performed, with fluoroscopic spot films obtained. The patient proceeded to CT arthrogram with a dual source 64-slice CT.

Both fluoroscopic spot-films and CT arthrogram demonstrated the polyethylene spacer perched on the anterior flange of the tibial component (Fig. 2). No contrast along the bone–cement or cement–metal interfaces suggestive of loosening was seen.

3. Operative findings

This arthrographic finding was confirmed during the revision operative procedure (Fig. 3). The anterior edge of the Duracon polyethylene liner's locking mechanism was not engaged in the tibial baseplate. There was focal wear of the posterior aspect of the liner, with macroscopic polyethylene debris in the joint.

Histopathology of synovial tissue showed moderate chronic inflammation and foreign body giant cell reaction. Cultures of synovial fluid and tissues were negative. At follow-up assessment, the patient reported marked improvement in her pain symptoms.

4. Discussion

The clinical work-up of a previously well functioning knee arthroplasty that has subsequently developed pain is a challenging task. Both articular and non-articular causes must be considered, however the first priority is to exclude infection [1]. Current guidelines note that normal erythrocyte sedimentation rate (ESR) and CRP are effective in excluding infection, but where either of these markers is abnormal further investigations, including joint aspiration, are indicated [2]. In the case described here, there was no evidence of infection and a mechanical cause was considered the most likely generator of the patient's pain.

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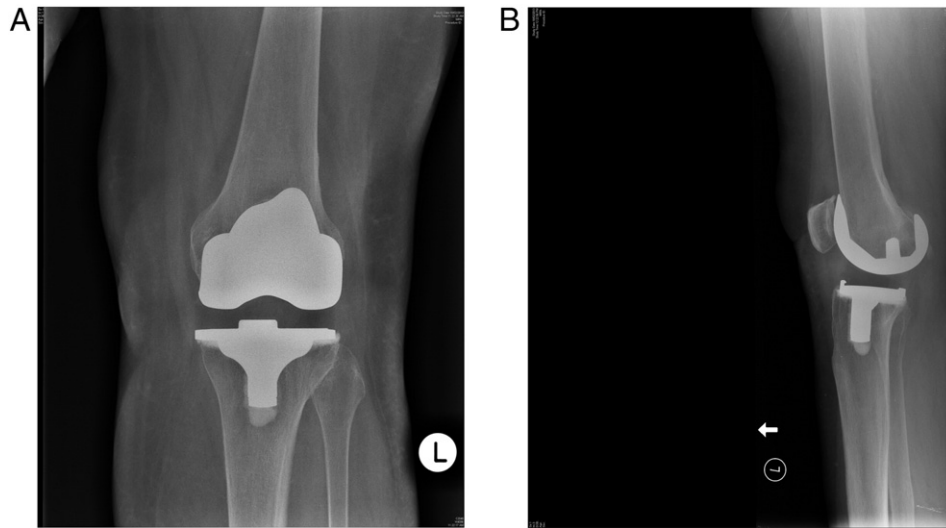


Fig. 1. Pre-operative radiographic series: a) anteroposterior and b) lateral views.

Failure of the locking mechanism is one cause of mechanical failure, though only small case series are described in the literature [3,4]. The changes on plain film radiographs may be very subtle and difficult to identify prospectively [5]. In the case described here, subtle changes in the region of the polyethylene liner may be appreciated but are insufficient to provide confirmation of the nature of pathology. In contrast, arthrography provided dramatic confirmation of the site and nature of the mechanical failure.

Whilst advances in CT, MRI and ultrasound technology have permitted improved imaging around arthroplasty prostheses [6,7], assessment of painful prosthetic joints by mainstream imaging modalities remains difficult due to radio-opacity and metallic artefact from the joint prostheses.

The use of post-arthroplasty arthrography has been previously described, mainly for the workup of painful prosthetic hip and shoulder joints [8]. In the case of total knee arthroplasty, arthrography has mainly been described for identifying component loosening at the bone-cement or bone-prosthesis interfaces [9–11]. Contrast injection may be undertaken following a diagnostic aspiration procedure [12].

Whilst the routine use of arthrography has not been supported by a study comparing its accuracy with plain radiography or radionuclide

scanning when used non-selectively prior to cases already scheduled for revision [13], it likely has a more focussed role in the assessment of unusual cases.

A recent case report describes the use of plain-film arthrography during the attempted closed reduction of a dislocated mobile-bearing prosthesis, which confirmed that the polyethylene remained rotated out of position [14]. Two case reports have described the use of either arthrography or CT arthrography in detecting a broken tibial post in a posterior-stabilised knee [15,16]. However, a search of the Scopus and Medline databases did not identify any previous reports of liner disengagement identified by arthrography.

5. Conclusion

Arthrography and CT arthrography are useful modalities in helping identify or confirming suspected mechanical problems around a total knee arthroplasty. This case report describes the use of these imaging techniques in identifying polyethylene liner disengagement from the tibial baseplate in a patient with unexplained pain following a previously well-functioning total knee arthroplasty.

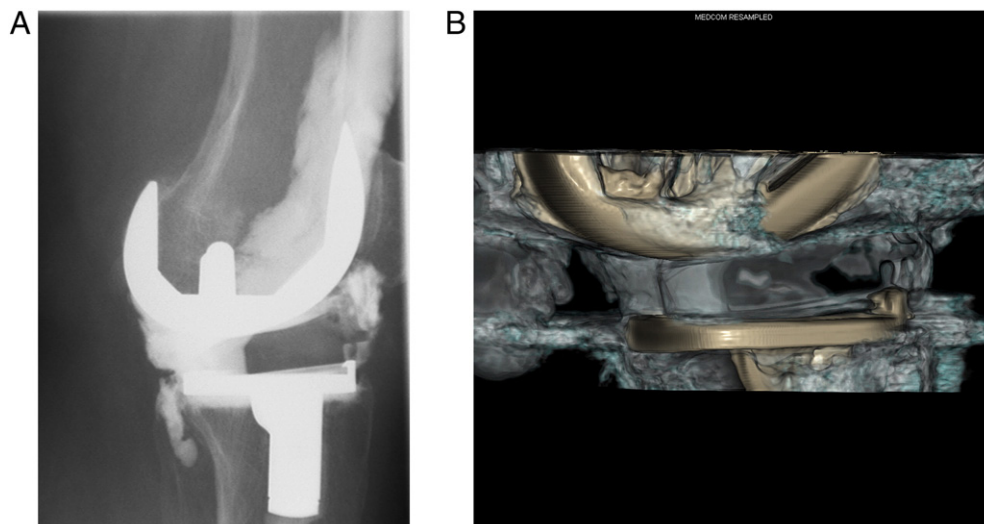


Fig. 2. a) Arthrogram demonstrating detachment of the anterior polyethylene locking mechanism; b) confirmed by CT arthrogram three-dimensional reformation.

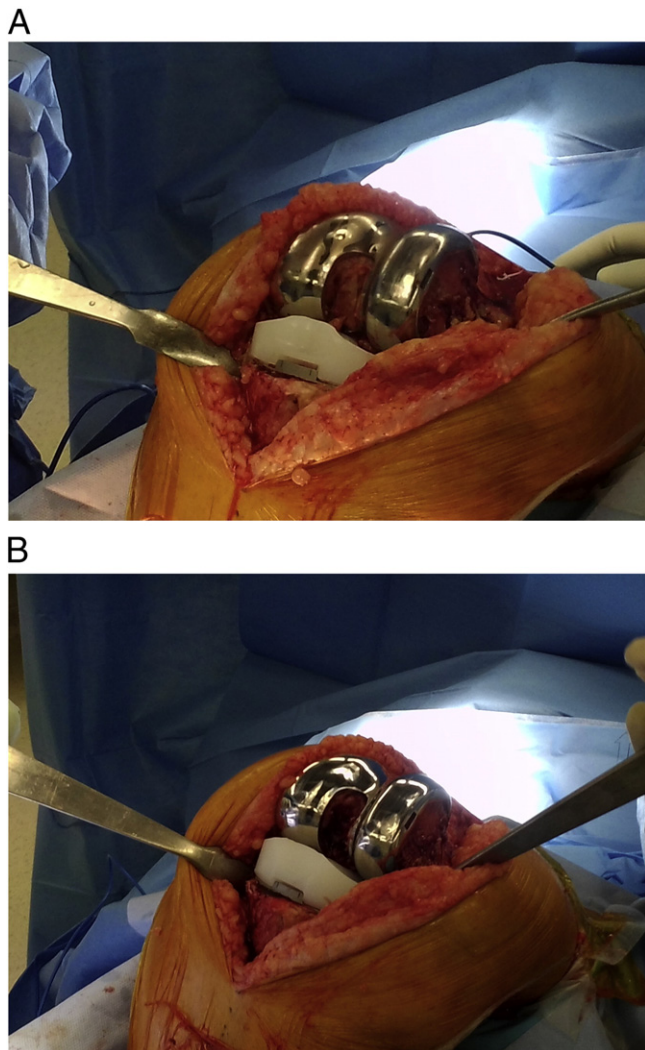


Fig. 3. Intra-operative photographs demonstrating a) the polyethylene liner disengaged from the tibial baseplate; and b) the new polyethylene liner successfully engaged in the tibial baseplate.

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