

Polyethylene failure in a PCA unicompartmental knee prosthesis

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Because of medial arthrosis, a 54-year-old male printer had undergone a right-sided, unicompartmental knee arthroplasty (Howmedica PCA 20-mm femoral and a 7-mm, large tibial component with metal backing) in 1986. Postoperative radiography showed that the prosthesis was placed in the correct position according to the manual. There were no complications, and the patient returned to work 4 months later.

After another year, the patient began to experience medial pain on weight bearing. He had synovitis and effusion, but no radiographic signs of loosening; however, a bone scintigraphy showed

increased uptake under the tibial component. After physical therapy the symptoms decreased, but they recurred 1 year later.

Radiographs showed still no change in position of the components, but moderate patellar arthrosis had developed, and it was decided to revise the knee. The polyethylene insert was found to be deformed by cold flow, with a large defect centrally (Figure 1) from which three fragments had torn off and become embedded in the infrapatellar fat. Both components were firmly fixed to the bone, and there was reactive synovitis. A total knee arthroplasty (PCA New Modular-R) was performed.

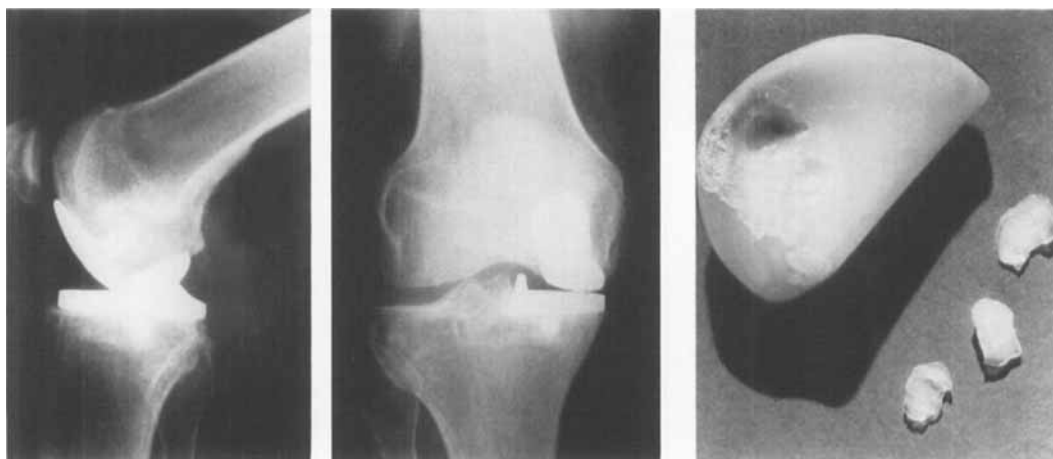


Figure 1. A 54-year-old man with knee arthroplasty. After 31 months, the prosthesis was correctly aligned without signs of loosening. Moderate patellar arthrosis had developed. The knee was explored because of pain.

The polyethylene insert of the tibial component was deformed by cold flow and fractured; the three fragments were found in the infrapatellar fat.

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Discussion

The cause of the fracture in the polyethylene insert in our patient was probably restoration of the physiologic strain on the femorotibial joint and the patient's return to work (Lotke 1981, Gschwend and Wyss 1981). We found a severe synovitis around the three polyethylene fragments. The polyethylene has also been found to have worn thin medially in 3 cases after total PCA arthroplasty (Graham 1988), although this type of prosthesis is designed to withstand uniform strain on the femorotibial components. Graham (1988) ascribes the wear in his patients, who were physically very active, to asymmetric loading while walking, particularly on the medial side.

Our prosthesis was placed correctly. Thus, with the design of the tibial component, which provides a broad contact surface, there should be no high contact pressure in a localized area. The deformity of the polyethylene insert could therefore be due to cold flow. This phenomenon is well known in inserts without metal backing, but has not been seen

in the prototype of the PCA unicompartmental knee (the Lund prosthesis) or the PCA total knee prosthesis (Ryd et al. 1990).

References

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