



## Early repetitive radiography is unnecessary after an uncomplicated cemented hip or knee arthroplasty for osteoarthritis

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**Radiographs are necessary at some early point after a hip and knee arthroplasty. The aim of this study was to assess the value of routine repetitive radiographic examinations and the value of a reading of the images by a radiologist. Data of 200 cemented hip and knee arthroplasties for osteoarthritis were reviewed. In-hospital and outpatient postoperative control radiographs were examined. If post-operative radiographs are of good quality, there seems to be no need for early repetitive radiographs. Neither is a radiologist reading of the radiographs after joint arthroplasty of any benefit.**

**Key words :** total hip arthroplasty ; total knee arthroplasty ; radiological follow-up.

### INTRODUCTION

The expenses of medical care are rising continuously and pressure is increasing to reduce costs and improve efficiency in total joint arthroplasty. Almost 80% of the hospital costs for joint replacement are generated during the first 48 hours of hospitalisation (10). Strategies for controlling the costs should concentrate on this period often including postoperative radiography.

Radiographs are necessary at some early point in the postoperative period, to assess alignment and prosthesis position and for comparison purposes against future radiographs.

As in many countries, in Finland the radiologist reads all in-hospital radiographs. Some have ques-

tioned the need for reading of radiographs by a radiologist in trauma and paediatric orthopaedic cases (3, 18, 21).

The aim of this study was to assess the usefulness of routine radiographic examination at the first clinical follow-up visit after an uncomplicated primary cemented hip or knee arthroplasty for osteoarthritis and to examine if the radiologist report is of any benefit to the patient.

### MATERIALS AND METHODS

In this retrospective study, 250 cases were reviewed in order to assemble 100 hip and 100 knee replacement cases, with a set of preoperative and postoperative in-hospital and follow-up radiographs after two to three months and two years, completed by a radiologist report. The operations were performed in the department of elective orthopaedics during 1997 and 1998. The review was organised in 2002.

Only patients with osteoarthritis were included. Patients needing bone grafting or with severe perioperative complications necessitating restriction of mobilisa-

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tion, such as fractures, were excluded. Bilateral cases, performed separately, were accepted.

The study consisted of 92 hip patients and 88 knee patients adding to 100 operations in both groups. There were 41 male and 59 female hip cases with an average age of respectively 71 years (range : 62 to 83) and 73 years (range : 61 to 87) at the time of operation, and 24 male and 76 female knee arthroplasty cases with an average age of 71 years (range : 55 to 79) and 72 years (range : 59 to 83).

The operations were standardised as much as possible. Only one type of hip prosthesis (Elite Plus, DePuy, Leeds, England) was included. A distal centraliser was used in 60 hips. One type of knee prosthesis was used (AGC V2, Biomet, Bridgend, England). The patella was resurfaced in 16 cases. Cementing technique was as recommended by the manufacturer (Palacos with gentamicin, Schering-Plough). Protocols for antibiotic (Zinacef, Glaxo Smith Kline) and antithrombosis prophylaxis (Fragmin, Pfizer-Pharmacia) were the same in all cases. Full weight bearing with crutches was allowed immediately after the operation.

The author reviewed all the data and re-evaluated the radiographs. No other medical personnel was aware of the study during the treatment or follow-up period. Major deviations in the position of the prosthesis were recorded. Early and late complications and exceptional events were noted from the documents. The quality of the X-ray views and the radiologist report at each time were examined.

## RESULTS

### Hip arthroplasty

Major malposition of the components in hip arthroplasty was not shown. In five cases the acetabulum was slightly vertical (55 to 65°) and in three cases the femoral stem was in a slight varus position (about 10°).

One female patient fell two months after surgery and suffered an avulsion of the greater trochanter. Another female patient had a traumatic dislocation of the prosthesis at one and a half years. In another patient with several co-morbidities, a radiolucent line was noted around the acetabular liner-cement interface (6). She developed haematogenous infection two years postoperatively. One female patient fell two years after the operation and developed

loosening of the femoral prosthesis. In two cases subsidence of the femoral prosthesis was noted, and a prosthesis-cement radiolucency was present in the upper part of zone 1 (1). In five cases loosening was suspected. Six of these seven patients had no symptoms of loosening ; only one patient experienced occasional vague pain in his thigh.

The quality of the immediate postoperative radiographs was acceptable.

The radiologists reported the postoperative changes only twice. The avulsed trochanter was noted. A radiolucency suspected at two months proved to be due to X-ray beam orientation on a later control. All the other radiographic changes mentioned above were not identified by the radiologists.

### Knee arthroplasty

According to the radiographs the prosthesis seemed to be well seated in 87 cases. In six cases there was no detectable cement or no bone contact under the anterior flange in zone 1 of the femoral component (7). In three cases the tibial component was situated too laterally, in another too posteriorly and in one case it was obviously in a varus position. In three cases, there was too much cement at the back of the tibial tray. Poor cementation could be suspected under two tibial implants. The patellar component had a high position in one case.

One patient fell six months after the primary operation and had her patella resurfaced almost two years later.

The quality of the immediate postoperative radiographs was acceptable in 83 cases. In the remaining 17 the X-ray orientation proved to be inadequate and no exact statement on the position of the prosthesis could be made. At two months the radiographs were good in 92 cases, overexposed in one case and in 7 others the X-ray beam incidence was inadequate. At two years the X-ray beam inclination was inadequate in one knee.

The radiologists reported the above mentioned changes only twice. Mal-orientation of the X-ray beam was noted in one case, and one suspicion of radiolucency at two months later proved to be due to projection.

## DISCUSSION

The results of this study convinced us to limit routine radiographs at the first clinical control. Some authors find routine postoperative radiographs unnecessary (9). According to Moskal and Diduch (14) routine postoperative radiographs can be omitted in 98% of knees and can be delayed without compromising patient care until even the initial postoperative office visit. The first radiographs taken during hospital stay are important for the patient and essential for the surgeon as an initial reference, provided their quality is satisfactory. After knee arthroplasty 17% of our radiographs were of poor quality: the leg is inside thick bandages and it may be difficult to orient the X-ray beam correctly. In one study only 36 % of postoperative knee radiographs were of adequate quality (8). Another study revealed 7% of poor films after hip arthroplasty (15). One solution is to take these in-hospital films at a later date, shortly before discharge. In this manner even weight-bearing radiographs become possible (11, 19).

The postoperative protocol habits differ from clinic to clinic and from country to country. Anyway, a reduction in the number of radiographs is possible and cost-effective (13, 20). Additional radiographs should be ordered only to answer specific questions concerning component position and stability.

This study seems to demonstrate that no benefit can be gained from a second reading of the radiographs by a non-specialised radiologist. As it has been shown in other studies, this was not cost-effective (3, 5, 12, 16, 20) and appeared as an unnecessary expense (2). It is difficult to calculate the actual costs, but the average charge billed by the radiology department for radiographs per patient in our hospital in 2003 was approximately € 30. According to the Finnish arthroplasty register, about 14 000 primary hip and knee arthroplasties were performed in 2003, of whom about 8 400 were cemented (17). Assuming that 80% of these can be managed without repetitive radiological control, this would eliminate 6 700 X-ray examinations. If our findings hold for uncemented prostheses, the figure amounts to 11 200. Thus, eliminating one

series of radiographs and radiographic consultation will reduce costs by € 200,000 to € 336,000 per year in Finland. Although perioperative radiology services only account for 1% to 2% of total hospital costs of arthroplasty (9), this is a significant financial saving.

The study did not show any adverse effects that could be attributed to not obtaining radiographs during the first outpatient control.

As a conclusion one can say that the quality and safety of follow-up is not compromised by limiting follow-up radiographs to those with clinical indications. Exposure of the patients and the staff to radiation is reduced, notable savings can be achieved and economic healthcare prescriptions are met (4), if the postoperative radiograph is not assessed by the radiologist and radiographs are not taken at all during the first postoperative visit. Perhaps the results do not apply to all types of prostheses and each prosthesis type should have its own separate analysis. A large randomised study with independent observers is recommended to confirm the results of this study.

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