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ARTHROPLASTY OF THE KNEE IN OSTEOARTHRITIS AND RHEUMATOID ARTHRITIS

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147 cases of arthroplasty of the knee were reviewed. Three types of prostheses were used, viz., St. Georg, Geomedic and hinge (Shier and Guépar). Pain was the most common indication for the operation which produced complete or almost complete relief in 90 per cent of the cases. In half of the joints with a mobility of less than 80 degrees preoperatively, the range of movement was increased to more than 80 degrees by the operation. Lack of extension, deformity and instability could be largely corrected. Two cases of deep infection were observed, both in patients treated with a hinge prosthesis. In one of them the complication led to amputation above the knee and in the other to arthrodesis.

Key words: arthroplasty; knee joint; osteoarthritis; rheumatoid arthritis

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In recent years arthroplasty has been used more often in the treatment of osteoarthritis (OA) and rheumatoid arthritis (RA) of the knee. A wide variety of prostheses have been designed and new ones are continually appearing. So far, however, no ideal type of prosthesis for all cases has been developed, the results of which is that a wide range of indications requires a selection of several types of prostheses. This paper reports the indications and results achieved with three different prostheses at the Department of Orthopaedic Surgery in Malmö.

PATIENTS AND METHODS

The clinical material consisted of 147 knees of 119 patients operated upon between 1972 and 1975. By the time of the review six patients (seven knees) had died. The remaining 113 patients (140 knees) were re-examined. Sixty-seven patients (55 women, 12 men) representing 73 knee joints had osteoarthritis (OA), 46 patients (41 women, 5 men) representing 67 knee joints had rheumatoid arthritis (RA). The mean age of the former group was 69 years (range 52–83) and that of the latter 62 years (range 43–77). The mean follow-up of the former group was 21 months (4–40) and of the latter 16 months (4–44). The types of prostheses used in these patients and the follow-up time are shown in Tables 1 a and b. The St. Georg prosthesis was used only in cases of OA in which the medial, and occasionally the lateral, part of the joint was involved (Figures 1 a and b). When the OA had affected the lateral as well as the medial part, and in cases of RA, the Geomedic prosthesis was preferred (Figures 2 a and b). A hinge prosthesis was used (Shiers before March 1973, Guépar after this time) in only those cases with severe instability because of insufficiency of the collateral ligament and/or advanced destruction of the joint (Figure 3 a and b). Recommended

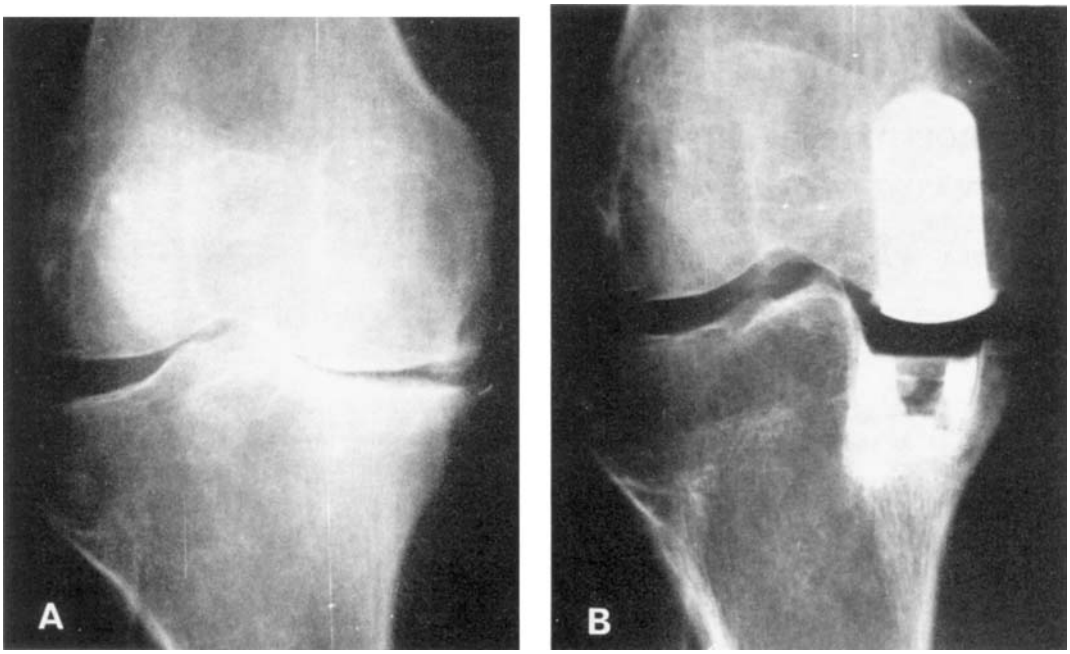

Figure 1. A 73-year-old woman with degenerative arthritis before and after arthroplasty of her right knee with a St. Georg prosthesis.

standard surgical techniques were used (Engelbrecht 1971, Coventry et al. 1972, Alnot et al. 1971). The operation was performed with a tourniquet above the knee. It was removed before the parts of the prosthesis were cemented. Suction drainage was used for 48 hours after the operation. The leg was placed in a plaster splint for 10 to 14 days. The splint was removed a few hours every day to permit exercise of the quadriceps and gentle movement. Loading of the leg with the splint was allowed from the second postoperative day. To prevent infection the patient was given Ekvacillin® (1 g/day) for the first postoperative week. Thromboembolic prophylaxis in the form of 500 ml 6 per cent Dextran 70 was given during the operation and again on the second postoperative day.

All the patients were then examined by one (B.L.) of the authors. The examination included both clinical and roentgenologic evaluation of the knee. The clinical examination comprised assessment of pain, mobility, stability, and deformity, as well as walking capacity and the patients' opinions of the results of treatment. Pain was classified according to Freeman et al. (1973) as absent, mild (pain which is not spontaneously complained of and which does not require medication), moderate (pain which is spontaneously complained of but which is relieved by simple analgetics) and severe (any other pain). The stability of the joint was examined with the patient in the supine position and the knee slightly flexed. Both lateral and sagittal instability were classified as absent, moderate or severe. Notes were also made of any complications.

Table 1 a. Types of prostheses.

	St. Georg	Geomedic	Hinge	Total
Osteo-arthritis	40	25	8	73
Rheumatoid arthritis	0	58	9	67
Total	40	83	17	140

Table 1 b. Follow-up time.

Months	St. Georg	Geomedic	Hinge	Total
4–12	2	42	4	48
13–24	15	28	6	49
> 24	23	13	7	43
Total	40	83	17	140

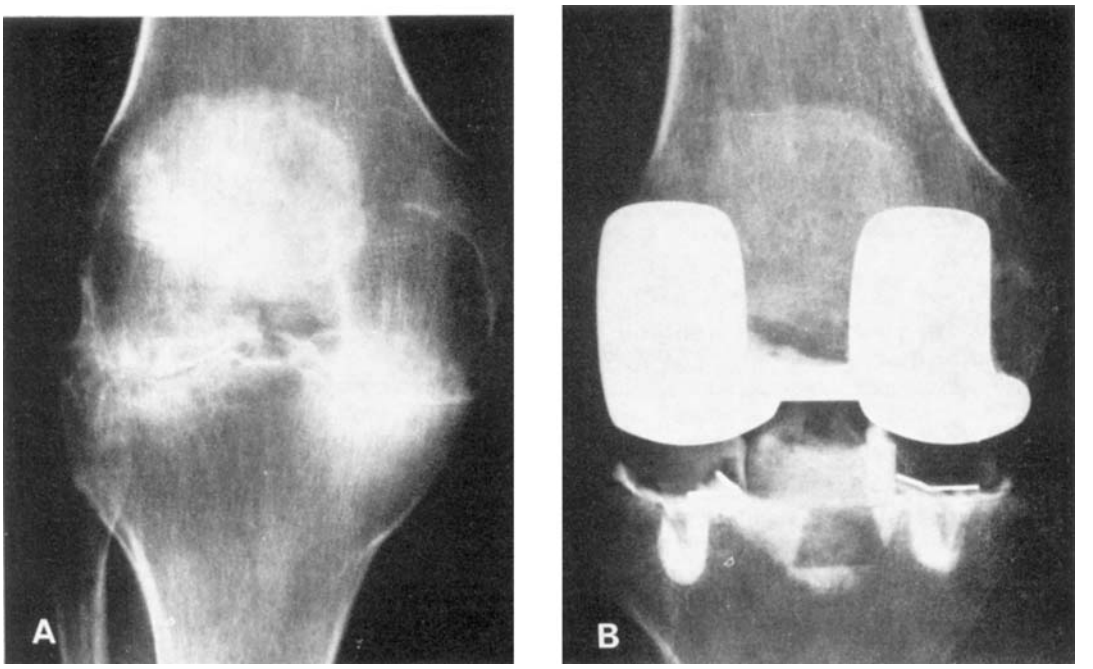

Figure 2. A 46-year-old woman with rheumatoid arthritis before and after arthroplasty of her right knee with a Geomedic prosthesis.

RESULTS

The effect of the arthroplasty on pain, range of movement, and deformity was assessed by comparison between the pre- and postoperative state of the knee, according to Freeman et al. (1973) (Figures 4, 5 and 6). Complete or almost complete relief of pain was obtained in 90 per cent of the cases. Persistent pain was referable to the patellofemoral joint in most cases. Twelve knees in the OA group and 12 in the RA group were excluded from Figure 5 because the preoperative data were insufficient. In all these cases except one OA case, the postoperative range of movement was 80 degrees or more. In those patients in whom the preoperative mobility of the joint was more than 80 degrees this remained the same after the operation. In half of the cases in which the mobility was less than 80 degrees it increased to 80 degrees or more as a result of the operation. In

Figure 3. A 63-year-old woman with rheumatoid arthritis before and after arthroplasty of her left knee with a Guépar prosthesis.

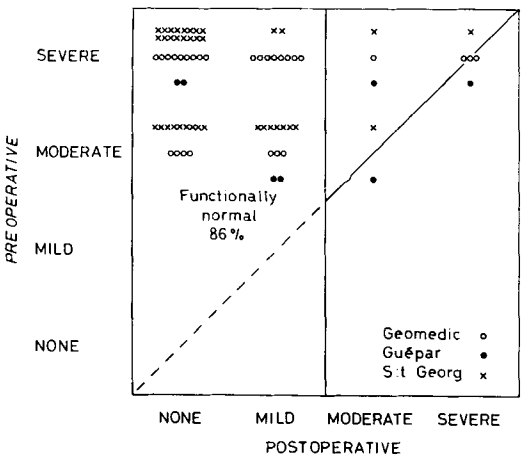

Figure 4 a. Pain. Osteoarthritis

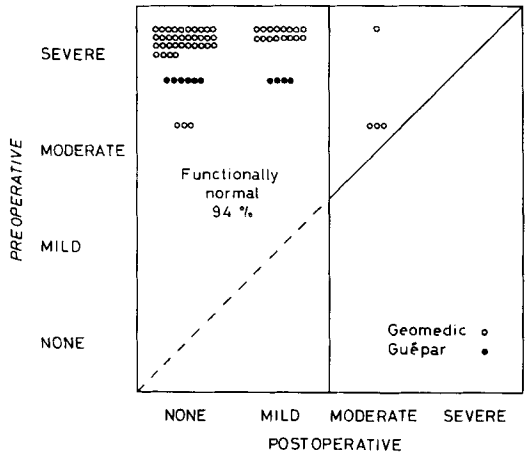

Figure 4 b. Pain. Rheumatoid arthritis.

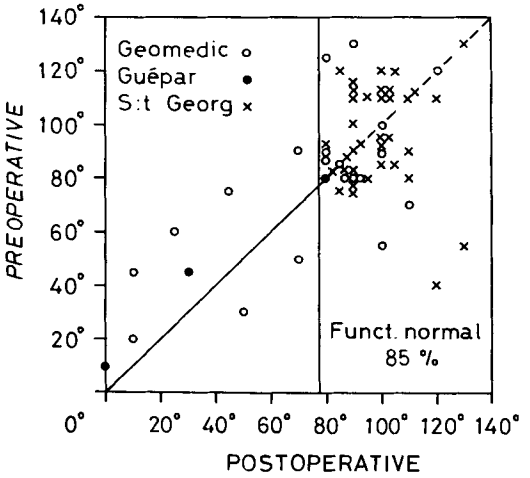

Figure 5 a. Range of movement. Osteoarthritis.

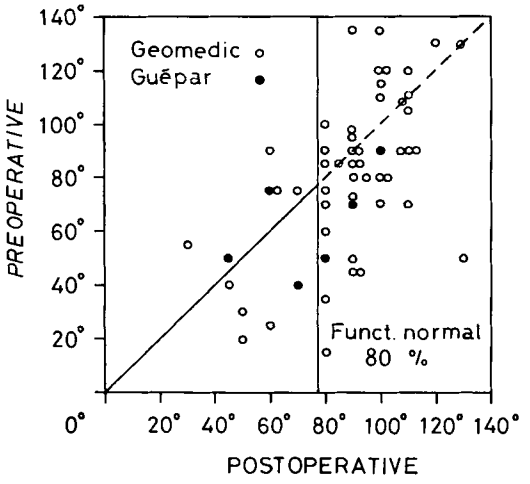

Figure 5 b. Range of movement. Rheumatoid arthritis.

eight cases in which mobilisation of the joint was difficult postoperatively, redressment under anaesthesia was made two to four weeks after the operation. Of greater importance than the total range of movement was the fact that in most of the cases extension defects and deformities could be corrected. This was most obvious in the RA patients, who were often severely disabled preoperatively. In Figure 6, nine OA and four RA cases were excluded because of insufficient preoperative data. None of these cases had any flexion deformity postoperatively.

Moderate sagittal instability occurred in five of the 40 knees treated with a St. Georg prosthesis and in two of the 58 RA knees treated with a Geomedic prosthesis. Moderate lateral instability was noted in 10 and was severe in one of the 40 patients with a St. Georg prosthesis. Of the 25 patients with OA and treated with a Geomedic prosthesis, moderate lateral instability was observed in 10. The corresponding figure for the 58 RA knees was 14, plus four in whom the instability was severe. The data about the

Table 2. Patients' opinion.

	Satisfied	Improved	Unchanged	Worse	Total
Osteoarthritis	45	19	1	8	73
Rheumatoid arthritis	60	5	0	2	67
Total	105	24	1	10	140

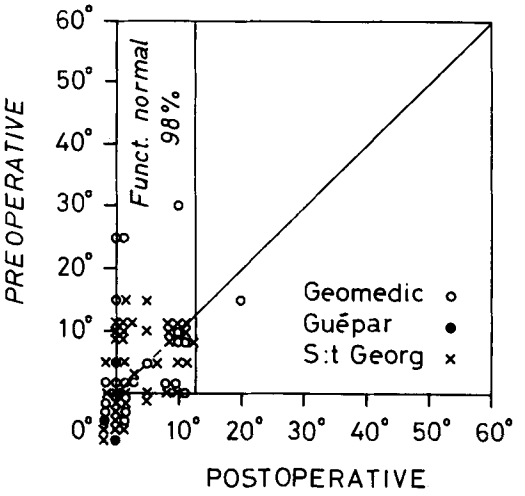

Figure 6 a. Flexion deformity. Osteoarthritis.

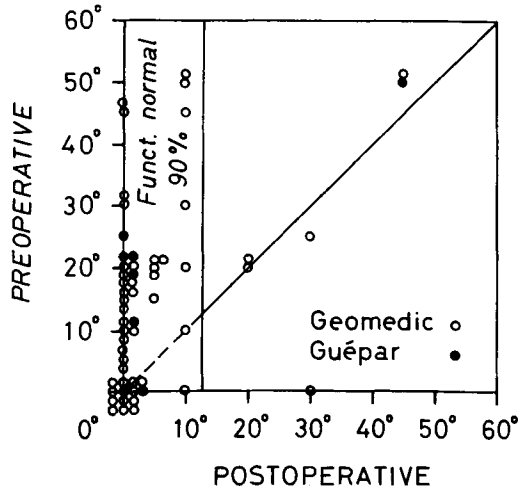

Figure 6 b. Flexion deformity. Rheumatoid arthritis.

preoperative condition of the knees were not sufficient to warrant a reliable comparison between the state of the knees before the operation and at the review.

In the RA group, however, both sagittal and lateral instability were predominant and were sometimes severe. Those patients with moderate instability at the review had no clinical symptoms since correction of valgus or varus deformity had resulted in a favourable distribution of the weight placed on the joint and the joint had been stable when fully extended. The patients' opinions of the results of the operation are given in Table 2.

Complications

A 79-year-old women died from pulmonary embolism two weeks after the operation. The other five deaths occurred long after the operation and were not related to it. The local complications are summarised in Table 3.

Table 3. Local complications.

St. Georg (40 knees):
3 loosening of tibial part (replaced by Geomedic).
2 malposition of tibial part (corrected).
1 suspected infection (antibiotics).

Geomedic (83 knees):
2 loosening of tibial part (replaced by Guépar).
1 instability (replaced by Shier).
1 suspected infection (antibiotics).

Shier (6 knees):
1 infection (above-knee amputation).
1 loosening of the axes (corrected).

Guépar (11 knees):
1 infection (arthrodesis).

The most common local complication was loosening of the prosthesis which occurred in five cases. In all of these it was the tibial part that had loosened.

These patients were re-operated upon six months to two years after the primary operation. Deep infection occurred in two patients, both operated upon with a hinge prosthesis. One of these, a 52-year-old man with a Shier prosthesis, required amputation above the knee. The stump healed well and the patient has a prosthesis that functions well. The other patient, an elderly woman with a Guépar prosthesis, had an arthrodesis. Two cases of suspected infection were treated with antibiotics. No signs of infection were seen at the review. Neither rupture of the wound nor marginal necrosis was seen in any of the patients.

DISCUSSION

The different types of prostheses available for replacement of half of the joint are so alike that it seems immaterial which type is chosen. The reason why the Geomedic prosthesis was preferred to the double St. Georg prosthesis was because it was thought to be technically easier to obtain a good fit between two parts than between four. In addition, the Geomedic prosthesis has the advantage that its design prevents sagittal instability and lateral or medial dislocation, an advantage of great importance in the treatment of patients with RA.

The hinge prosthesis was used only in cases of a severe instability and deformity. During the former part of the period covered by the investigation the Shier prosthesis was used, but this was gradually superseded by the Guépar prosthesis which requires less resection of the bone and leaves the patella intact. The hinge prosthesis requires opening of the tibial and femoral medullary cavity and in the event of complicating infection, the prospects of securing arthrodesis are not as good as after the use of other types of prostheses.

The follow-up time was, in about one third of the cases, 4 to 12 months and in about another third more than two years. No significant difference in the results was observed related to period of follow-up time. However, the possibility of further complications such as late infection and loosening must be stressed. All complications observed in this series were diagnosed within 2 years after operation. A direct comparison with other materials is difficult because these usually deal with only one type of prosthesis.

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