ST GEORG MODULAR KNEE PROSTHESIS
A TWO-AND-A-HALF TO SIX-YEAR FOLLOW-UP

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The St Georg modular knee replacement has been studied in 59 cases with an observation period ranging from 28 to 73 months. In 47% of the knees both compartments were replaced; five of the six poor results were in this group. These were revised to a hinge arthroplasty or, in one case, to an arthrodesis. Other complications were few and insignificant. There were no infections.

We concluded that unicondylar knee arthroplasty can be recommended when joint involvement is localised to one compartment only. With more generalised joint disease we prefer a semiconstrained total condylar prosthesis.

During the last 30 years many different designs of knee prostheses have been introduced, one of the most controversial being the modular prosthesis. Two of the best-known modular prostheses are the St Georg, which has been in clinical use since 1969, and the Marmor, which has been used since 1972. Some authors (Engelbrecht et al. 1976; Marmor 1976) have achieved good results with these modular prostheses but others, finding that many prostheses became loose, felt that there were no indications for their use (Insall et al. 1976). The St Georg modular prosthesis and its later second generation modification have been used in the Department of Orthopaedic Surgery at Kolding Hospital since 1975. Because of the divergent opinions in the literature about the value of modular prostheses, we decided to review our patients.

PATIENTS AND METHODS

Between January 1975 and December 1980 60 patients had 66 knee arthroplasties using the St Georg modular prosthesis. Of these, 60% were first generation and 40% second generation prostheses. Thirty-three of the arthroplasties were confined to the medial compartment (Figs 1 and 2), 4 to the lateral compartment and in 29 knees both compartments were replaced. There were 49 arthroplasties in women and 17 in men. The median age at the time of operation was 71 years (range 44 to 90 years). The indication for operation was primary osteoarthritis in 88% of the knees, rheumatoid arthritis in 9%, and secondary osteoarthritis after fracture in 3%. The modular prosthesis was used providing there was sufficient ligamentous stability, no more than 20° of varus or valgus malalignment, less than 20° of flexion contracture and more than 70° of flexion.

All the arthroplasties were performed in an ordinary operating room without laminar airflow. A tourniquet was used and was briefly removed before the cementing procedure; it was then replaced. A gentamicin-loaded cement was used. Access to the joint was gained through a medial parapatellar incision in all cases. The joint was resected and the components inserted according to the description by Engelbrecht et al. (1976). A suction drain, inserted intra-articularly, was removed within 72 hours.

On the third postoperative day, flexion-extension exercises were started, and on the ninth day the patient was mobilised with two crutches. All patients were treated with fenprocoumon and all received a course of penicillin and streptomycin for 10 days.

At the time of follow-up six patients had died of causes unrelated to the arthroplasty; one other patient could not be traced. This left 53 patients with 59 arthroplasties for follow-up. Of these, 27 (46%) were replacements of the medial compartment, 4 (7%) were of the lateral compartment and 28 (47%) were replacements of both compartments. There were 43 arthroplasties in women and 16 in men. The median observation time was 54 months, ranging from 28 to 73 months. At follow-up all patients were examined clinically as well as radiographically. The films were examined for signs of prosthetic loosening and dislocation. Special attention was paid to the tibial plateau, which was scrutinised for signs of deformity indicated by breakage of the marking wire.

In assessing the results we used the British Orthopaedic Association assessment chart (Aichroth et al.
1978). In a few patients, however, some pre-operative data were lacking and in these cases the corresponding postoperative data also were omitted. During the observation period five knees were revised and a St Georg hinged knee prosthesis inserted. One patient had an arthrodesis. These six knees are not discussed in the section on “Results”, but will be considered later. The account which followed thus refers to 53 knees except in those cases with insufficient pre-operative data; where the actual number differs from 53 this is indicated.

RESULTS
The most obvious benefit of the arthroplasty is without doubt its pain-relieving effect (Figs 3 and 4). Postoperatively all patients except two had either no pain at all or only slight pain; 64% of the knees were completely painless. Two patients had considerable postoperative pain. One was a 59-year-old woman who for two years had a completely successful arthroplasty, but then sustained a supracondylar fracture of the femur near the arthroplasty. An AO osteosynthesis was performed, followed by primary healing, but the knee became painful; there was no evidence of loosening and we have no explanation for her pain. The second patient, a 66-year-old man with severe rheumatoid arthritis in all major joints, was incapacitated by severe pain in the right knee; after arthroplasty he was satisfied with the result but still had some pain.

With regard to walking (Figs 5 and 6) about 60% of the patients had, after operation, achieved unlimited walking distance without using sticks. Flexion contractures of more than 10° had been present in 15% of the knees before operation; postoperatively only 6% had between 10° and 20°, while the rest had less than 10° of contracture. One patient who had a modular prosthesis despite a flexion contracture of more than 30° nevertheless had a good result. The gain in maximal flexion was only moderate; postoperatively 79% of knees had more than 100° of flexion as against 72% before operation.

The ability of the arthroplasty to correct or compensate for varus or valgus deformity is good, providing there is no more than 20° to 30° of malalignment pre-operatively. The ability to climb stairs had improved considerably: pre-operatively 73% were either not able to do so at all or only with great difficulty; after operation only two patients were completely unable to climb stairs. In both these cases the cause was severe atherosclerosis, which in one of the patients had led to a below-knee amputation on the same side as the arthroplasty; she also had a hemiparesis in the other leg. Only 8% of patients could rise from a chair without difficulty before operation while almost 70% were capable of doing so after it.

Subjective assessment. The patients were asked to assess the result of the arthroplasty themselves; 60% were very satisfied, 34% satisfied and 6% were disappointed with the result.

Results in relation to compartment replaced. We also analysed the pain relief and the subjective assessment in relation to the compartment replaced. The results of operations involving the medial compartment only were
superior to those where both compartments were replaced, though it should be remembered that the latter had more severe degeneration pre-operatively. All the knees in which only the medial compartment was replaced were either completely painless (73%) or had only slight pain; 91% of the knees in which both compartments had been replaced were either completely painless (57%) or had only slight pain. In the subjective assessment there was no significant difference between the two groups.

There were four replacements of the lateral compartment only; two of these were completely painless and the patients very satisfied, the other two had only slight pain.

Overall result. In an attempt to reach a general assessment we have classified the results into four groups. An excellent result implies a knee with no pain and more than 95° of flexion; a good result is a knee with only slight pain and flexion of more than 80°. A knee with moderate, but reduced pain and flexion of more than 60° we consider a fair result. Knees without reduction in pain and/or 60° of flexion, as well as knees which have undergone revision or arthrodesis, are considered to have a poor result. According to this grading the result in 30 knees (51%) was excellent, in 20 (34%) it was good, in 3 (5%) it was fair and 6 knees (10%) had a poor result; only one of the six with a poor result had had a unicompartmental arthroplasty.

COMPLICATIONS

Only a few early complications were seen. There were two cases of thrombophlebitis, both without sequelae. One patient had a pneumomediastinum during intubation; this resolved uneventfully. One patient developed a suture granuloma, which was excised two months post-operatively. There have been no difficulties with wound healing, no superficial or deep infections and no cases of peroneal nerve palsy.

In a considerable number of the knees the radiographs showed a small osteolytic zone around both the femoral and the tibial components. In six knees the marking wire in the tibial component was broken and in one knee it was deformed but not broken.

Five knees had been revised because of persistent pain, but we could not detect any signs of loosening in the radiographs taken before revision. In three of these five the collateral ligaments were inadequate, and in two
cases this resulted in subluxation; in one case the cause of the pain was osteoarthritis of the patellofemoral joint; in the fifth case we found no explanation for the pain.

One patient had a modular prosthesis in both compartments because of secondary osteoarthritis following a condylar fracture of the femur. The arthroplasty was not successful and an arthrodesis was performed; this healed well but the knee remained painful.

DISCUSSION

Our results in general agree well with those obtained by others. Engelbrecht et al. (1976) had 85% good results in 226 St/Georg modular arthroplasties; Marmor (1976) reported 52% excellent and 36% good results in 126 modular arthroplasties; and Kolstad and Wigren (1982) found that 86% of 66 modular arthroplasties were painless or had only slight pain.

Among our patients one has undergone arthrodesis and five have been revised. In one patient who had the medial compartment replaced a little degeneration was found in the lateral compartment at operation. Because of persistent pain this lateral compartment also was replaced shortly afterwards, resulting in a painless knee. This patient should really have had both compartments replaced primarily and in our assessment he has been grouped with those who were so treated.

We had 15% poor and fair results. This seems unacceptable when compared with Insall’s results for total condylar prostheses (Insall, Tria and Scott 1979); in this review of 461 cases there were only 8.5% poor and fair results, while 68% were excellent and 23.5% good. Our poor results, however, with one exception, were all in patients who had had both medial and lateral compartments replaced. Among the 31 knees with a unicompartmental arthroplasty, there were only 3% poor results; 32% were good and 65% excellent. Larsson and Ahlgren (1979) had 91% good, 9% fair and 1% poor results, in 75 unicompartmental arthroplasties.

We found seven tibial components with breakage or deformation of the marking wire, all in the early type of tibial-plateau component. There was no instance of breakage in the later more anatomically designed second-generation plateau, which rests more securely on the tibial cortex. Breakage of the wire is taken to be an expression of prosthetic loosening, but clinically five of the knees were excellent and two were classified as good. In knees with osteoarthritis and rheumatoid arthritis, replaced with the Richards modular prosthesis, Knutson et al. (1981) found similar changes in one-fifth and one-third of the knees, respectively; they advised against the use of a 6 mm tibial component.

Conclusion. The modular arthroplasty has, in many centres, been replaced by total resurfacing prostheses of the semi-constrained type. Our results, however, show that unicompartmental arthroplasty with the St/Georg modular prosthesis is indicated when the changes are confined to one compartment. It is a relatively small operative procedure with very few and insignificant complications. The results are comparable to those obtained by means of other types of arthroplasties. In our department we use both the modular prosthesis and the semi-constrained total condylar prosthesis, each for its own indications.

REFERENCES


