Registration of arthroplasties in Finland

A nationwide prospective project

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Data on hip and knee arthroplasties have been compiled on a nationwide basis in Finland since 1980. Forty-five major departments contribute to the study providing data on the type of operation, the implant used, the diagnosis, and the 1-year clinical results. In the case of revision, new data are sent to the register, enabling survivorship analysis.

Between 1980 and 1988, 25,966 operations were reported. Fifty-six percent had been made for primary osteoarthrosis, 22 percent for rheumatoid arthritis, 6.3 percent for secondary arthrosis, and 0.5 percent for CDH. In 1988, the total number of arthroplasties was 4,628: about two thirds hip and one third knee replacements. The annual incidence of primary total hip arthroplasties in 1988 was 58 per 100,000 inhabitants and that for the knees 25 per 100,000 inhabitants. More than 40 percent of the patients were under 65 years of age. In the whole series, primary thromboembolic complications occurred in 1.4 percent, luxations in 1.4 percent, infection in 0.9 percent, and evacuated hematoma in 0.6 percent. The annual frequency of rearthroplasty increased between 1980 and 1988 from 9.8 to 13.6 percent, indicating an increasing orthopedic work load in the future.

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Although the prevalence of coxarthrosis has not changed during the last few decades (Danielsson et al. 1984), the total number of arthroplasties has steadily increased, mainly due to a growing proportion of elderly in the population.

Approximately 80,000 hip and 40,000 knee joints (TKA) were replaced in the United States as early as 1976 (Hori et al. 1978), and it is estimated that in 1980 between 300,000 and 400,000 total hip arthroplasties (THA) were performed worldwide (Levy et al. 1985).

This is an interim report on a nationwide registration program in Finland, which was initiated in 1980 by the Finnish Orthopedic Association, and which is presently being adapted and developed under the authority of the National Board of Health.

Patients and methods

In January 1980, The Finnish Orthopedic Association started a nationwide total joint replacement register known as the Finnish Register of Arthroplasty. The goal was to report all the arthroplasties, their early and late complications, and the 1-year results of the operation. The data were accumulated and processed at the Helsinki University Central Hospital, but since 1988 at the National Board of Health.

The project is intended only for registration purposes, and has no authority over participating departments. Hence, the hospitals use their own indications for arthroplasty, choice of type of the prosthesis and criteria, and timing of the revisions. The program resembles the nationwide registration of knee prostheses in Sweden (Knutson et al. 1986).

The data obtained contain information on the indication of the operation, the type of prosthesis, the cementation technique, and the postoperative complications during the hospital stay. These data are reported when the patient is discharged from the hospital. Each patient is reexamined 1 year after the operation, with assessment of complications, as well as subjective and objective results.

In the case of revision, a new report of the operation is sent to the register and is added to previous data on the patient. Arthroplasties are recorded as failures if one or more prosthetic components have been added, removed, or replaced. Forty-five orthopedic departments have joined the program. The number of operations reported includes 95 percent of all the total joint replacement procedures in the country. Each hospital gets a report of the results of their total joint replacement surgery in addition to data from the whole country.

Table 1. The number of arthroplasties and revisions performed in Finland 1980–1988

	Hip arthroplasties			Knee arthroplasties			Other arthroplasties		
		Revisions			Revisions			Revisions	
Year	N	n	%	N	n	%	N	n	%
1980	1,124	110	9.8	300	24	8.0	79	2	2.5
1981	1,528	119	7.8	445	28	6.3	82	3	3.7
1982	1,836	146	7.9	463	36	7.8	83	3	3.6
1983	1,721	147	8.5	426	23	5.4	79	4	5.0
1984	1,912	182	9.5	516	36	6.9	89	8	8.9
1985	2,110	247	11.7	580	32	5.5	84	3	3.6
1986	2,779	413	14.9	784	53	6.8	128	6	4.7
1987	3,036	465	15.3	1,018	49	4.8	137	9	6.6
1988	3,220	437	13.6	1,233	49	3.9	174	5	2.9

Results

By the end of 1988, data had accumulated on 25,966 operations (Table 1). During the whole period, 56 percent of the operations were made for primary arthrosis, 22 percent for rheumatoid arthritis, 6.3 percent for secondary arthrosis, and 0.5 percent for CDH. During the last year (1988), the numbers were 64, 10, 6.6, and 1.5, respectively. Fifteen of the hospitals reported more than 200 arthroplasties, six more than 500, seven more than 1,000, and two more than 2,000.

The total number of arthroplasties performed annually has constantly increased, rising to 4,627 operations in 1988. That year, two thirds were total hip replacements, one third were knee replacements, whereas the number of operations made for other joints was small (Table 1). The annual incidence of primary total hip arthroplasties (THA) in Finland in 1988 was 58/100,000 inhabitants and that of the total knee operations (TKA) 25/100,000 (population 4.8 million).

During the period of observation, the mean age of the patients has increased from 63 (1980) to 65 years (1989) and the median age from 65 to 67 years. More than 40 percent of all the patients operated on are in the working age.

The number of primary complications has been on the same level throughout the survey (Figure 1). Thus, in the whole series, thromboembolic complications occurred in 1.4 percent (1.2 in 1988), luxations in 1.4 percent (2.4), infections in 0.9 percent (0.7), and hematoma necessitating operative treatment in 0.6 percent (0.4). One year postoperatively, the frequency of infection, loosening of the components, or death during the follow-up of 1 year was less than 1 percent (Figure 1).

The number of revisions after THA operations increased from 9.8 to 13.6 percent during the period of

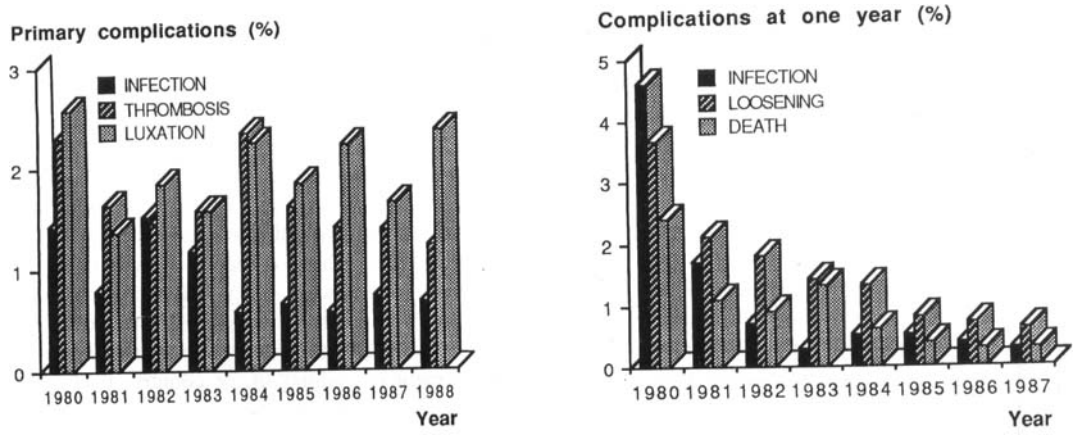

Figure 1. Number of primary complications of arthroplasties and the number of complications at 1 year postoperatively.

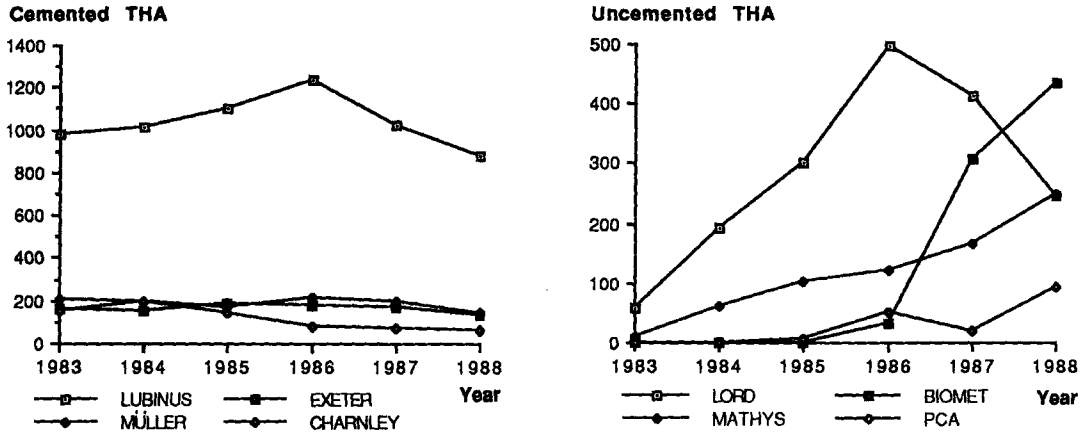

Figure 2. The "four-on-top" models of hip prostheses with and without cement fixation.

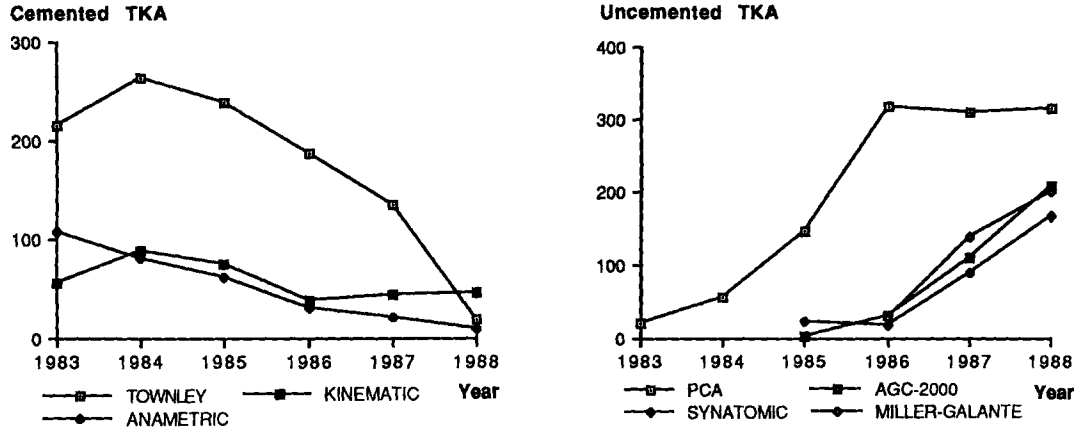

Figure 3. The "four-on-top" models of knee prostheses with and without cement fixation.

registration. Of the reported 2,639 revisions, 2,266 were done on the hip, 330 on the knee, and 43 on other joint prostheses. The cumulative failure rate during the same period steadily increased. About one third of all reoperations were registered during the last 2 years (Table 1).

From 1980 to 1988, the five most popular models of total hip prosthesis were Lubinus SP I (41 percent), Lord (9.3 percent), Müller straight stem (7.4 percent), Charnley (6.8 percent), and Exeter (5.5 percent). These five models accounted for 70 percent of all the artificial hip joints implanted during these years (Figure 2). When, in every single year, only the four-on-top models of hip implants were included, they accounted for more than 80 percent up to 1986, but only 55 percent in 1988. This reflects the increasing number of implants on the market.

The share of uncemented hip implants has continuously increased. During the last 2 years, the three most popular uncemented hip models (Lord, Biomet-APF, and Mathys) comprised 24 percent of the annual implantation rate (Figure 2).

Similar trends were observed as regards total knee arthroplasties (TKA). The annual number of cemented condylar types decreased, while the number of uncemented models increased (Figure 3).

Discussion

There are few reports on nationwide registration of arthroplasties. The Scandinavian countries seem to be pioneers in this field of research. Information on the

number and types of primary THAs performed in Sweden has been reported since 1967 (Ahnfelt 1986). Since then, 85,500 primary THAs have been performed on approximately 70,000 patients. Herberts et al. (1989) recently published the results of revision hip arthroplasties in Sweden between 1979 and 1986. Finally, the results of a nationwide investigation of 8,000 knee arthroplasties in Sweden have been published by Knutson et al. (1986).

In Norway a nationwide registration of the total arthroplasties started at the end of 1987, with 60 hospitals performing operations participating. By September 1989, a total of 8,857 operations had been registered (Sudman, personal communication).

The increasing cumulative incidence of rearthroplasties during the observation period tallies with earlier reports. Based on available survival curve reports, the incidence of rearthroplasty was expected to double by the year 1990 in many centers (Morscher and Schmassmann 1983). Loosening is a cumulative problem, and permanent fixation of the implant to bone has yet to find a definite solution. In the light of the present series, there is a tendency to use more and more uncemented implants. Follow-up periods of more than 5 years for the femoral stem and more than 8 years for the acetabular components are necessary before an assessment can be made as to the superiority of one fixation method over another (Morscher 1983).

The number of patients in a group subjected to arthroplasties will approach zero after about 30 years of implantation, if the indications from the 1970s and 1980s are respected. However, more operations are performed on younger and active patients. In this series, about 40 percent of the patients were under 65 years of age.

In Sweden, the revision rate for aseptic loosening at 9 years was 6 percent. This is half of the total number of revisions registered in the present material. The difference is partly due to the exclusion of the Christiansen prosthesis in the Swedish series (Herberts et al. 1989).

The need for collecting results on large numbers of patients subjected to implant surgery can be illustrated by the following calculation. In order to illustrate a difference in the loosening probability within 5 years between two types of prostheses, assuming a probability of failure of 5 and 3 percent, respectively, data on 2,960 patients are required to obtain a significance level of 0.05 (Herberts et al. 1989).

When assessing the results of artificial joint surgery, survivorship analysis has gained increased interest (Dobbs 1980, Tew et al. 1982, Knutson et al. 1986, Herberts et al. 1989). It should be noted that the real life span of most of the modern types of endoprosthesis is shorter than the time needed to gain accurate information on their longevity. Continuous compilation of data is therefore mandatory.

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