# Life expectancy after hip arthroplasty

## Case-control study of 1018 cases of primary arthrosis

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**The long-term survival of 1018 total hip arthroplasty (THA) patients (237 McKee-Farrar, 449 Brunswik and 332 Lubinus patients) operated on for primary arthrosis was compared with pair-matched controls (i.e., patients operated on for other orthopedic indications) and with a normal population. The 10-year survival after surgery for the McKee-Farrar patients was 85 percent, for the Brunswik patients 82 percent, for the Lubinus patients 82 percent and for the orthopedic control patients 84 percent, respectively. The 10-year survival after 65 years of age for the THA patients was 78 percent and for the normal population 73 percent.**

**The long-term life expectancy of our patients with a cemented THA was equal to that of our orthopedic control group and better than the life expectancy of the Finnish population.**

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The life expectancy of the patient is valuable knowledge in planning joint replacement surgery. Using Kaplan-Meier survivorship analysis, we compared the survival of patients who had had total hip arthroplasty (THA) for arthrosis with that of a control series of orthopedic patients and with the life expectancy in the general population in Finland.

## Patients and methods

The basic material comprised 1863 patients over 50 years of age who had undergone a THA for primary coxarthrosis in 1967–1985 at the Orthopedic Hospital of the Invalid Foundation. The control patients were selected from 2026 candidates over 50 years of age operated on in 1973–85 at the same hospital for other common orthopedic indications, using the hospital discharge registry. For each THA patient an age- (within 1 year's exactness) and sex-matched control patient was selected. Only complete pairs were included in the study. Thus, the final study material comprised 1018 THA and orthopedic patients (Table 1). At the time of the operation the mean age of the 630 male patients was 61 years and of the 1406 female patients 63 years. The McKee-Farrar whole chrome cobalt prosthesis was used in 1967–75, the Brunswik chrome cobalt polyethylene prosthesis in 1972–81, and the Lubinus chrome cobalt polyethylene prosthesis in 1977–85. 138 of the matched control patients were operated on for knee menisci, 395 for lumbar spinal conditions (spinal stenosis and herniated intervertebral disc), and 485 for hallux valgus.

The follow-up of the control patients was started in 1973, because computerized data were available only after 1972. It was ensured by the social security number that none of the control patients later received a joint prosthesis or any other metallic implant. 2 of the THA patients and 1 of the control patients died within 4 weeks after the operation. These patients were included in the series.

The Kaplan and Meier (1958) analysis was used to estimate the survival of the studied groups. The first surgical intervention (date and type of the prosthesis) was regarded as a starting point and the follow-up ended on December 31, 1990. The mean follow-up time for the THA patients was 12 years and for the orthopedic control patients 11 years. September 1976 (June 1976 for the THA and June 1978 for the control patients) was the median year of the surgery for both groups.

The survival of the THA patients and orthopedic controls was compared to that of the normal population from 65 years of age for the next 10 years. The life expectancy estimate of the THA patients and controls from the 65th birthday was calculated by the

Table 1. Analyzed control and THA patients by age and sex

| Patients and type of prosthesis | n | Mean age years | Percent women |
|---|---|---|---|
| Control patients | 1018 | 62.0 | 69 |
| McKee-Farrar | 237 | 60.4 | 73 |
| Brunswik | 449 | 62.0 | 68 |
| Lubinus | 332 | 63.1 | 68 |
| Total | 2036 | 62.0 | 69 |

Table 2. 10-year survivorship of the THA and orthopedic control patients

| Patients | Percent alive | 95% of CI | n |
|---|---|---|---|
| Controls | 84 | 82–86 | 646 |
| McKee-Farrar | 85 | 79–89 | 202 |
| Brunswik | 82 | 78–85 | 367 |
| Lubinus | 82 | 77–86 | 133 |

Kaplan-Meier method and that of the normal population was obtained from the life tables constructed in 1981–85 at the Central Statistical Office of Finland (1987). These years were selected because the patients reached their 65th year in 1982 on an average and the follow-up was started from their 65th birthday.

Statistical significance of the proportions of the surviving persons was evaluated using 95 percent confidence limits.

## Results

During the follow-up period, 251 control patients and 319 THA patients died. There were no differences in the mortality between the patients with the different types of hip prostheses, between the THA nor the control patients. 10 years after surgery 84 percent of the control patients and 82–85 percent of the THA patients were alive (Table 2). The 10-year survivorship for the THA men was 77 percent and for the women 86 percent.

The 10-year survival of the THA patients after the 65th birthday was 78 percent (men 69, women 83), of the control patients 83 percent (men 74, women 88) and of the normal population 73 percent (men 62, women 80).

## Discussion

Only patients with primary coxarthrosis were included in this study. Only the first THA was taken into account. The THA of the other hip and later revisions were excluded to obtain an overall view of the mortality of the THA patients. In fact, the patients with prosthetic failure in Surin and Sundholm's (1983) series carried a very low risk of death compared with the rest of the population. The 0.2 percent in-hospital mortality of the THA patients had no significant influence on the long-term survivorship. White et al. (1990) reported a similar 0.3 percent hospital death rate in the THA for arthrosis.

We could not demonstrate any differences in the long-term survival of the patients with other prostheses. Holmberg (1992) reported a 15 percent 6-year cumulative mortality for the patients with a THA for primary arthrosis and with a mean age of 67 years at the operation. This figure corresponds well to our observations.

Mortality of the unoperated patients with primary coxarthrosis has not been shown to differ from the mortality of the standard population (Danielsson 1964). The 10-year life expectancy of the THA patients with primary OA was, however, longer than that in a general population. This observation was consistent with Surin and Sundholm's (1983) and Holmberg's (1992) series. Whether the improvement of the patient's mobility due to THA will reduce the mortality, compared with the unoperated patients, needs further studies.

The longer survival of the THA patients can be explained by the selection of the patients for elective surgery. Their mortality rate did not differ from that of the patients operated on for other orthopedic indications. The selection was demonstrated in a series consisting of some of the same patients in a cancer incidence study (Visuri and Koskenvuo 1991). The THA patients achieved a normal population's cancer incidence 8 years after surgery; the first-year cancer incidence was only 27 percent of the corresponding general population rate (Visuri and Koskenvuo 1991).

A particular feature of Finnish mortality has been a large difference between men and women, compared to other countries (Koskenvuo et al. 1986). This difference was still large in our THA patients (13 percent) vs. the population (18 percent). THA seems to benefit males a little more in respect of patient survival than females, in comparison with the general population.

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## References

Danielsson L G. Incidence and prognosis of coxarthrosis. Acta Orthop Scand (Suppl 66) 1964.

Holmberg S. Life expectancy after total hip arthroplasty. J Arthroplasty 1992; 7 (2): 183–6.

Kaplan E L, Meier P. Non-parametric estimation from incomplete observations. J Am Stat Assoc 1958; 53: 457–81.

Koskenvuo M, Kaprio J, Lonnqvist J, Sarna S. Social factors and the gender difference in mortality. Soc Sci Med 1986; 23 (6): 605–9.

Life tables 1981-85. Central Statistical Office of Finland, Helsinki, 1987.

Surin V V, Sundholm K. Survival of patients and prostheses after total hip arthroplasty. Clin Orthop 1983; 177: 148–53.

White R H, McCurdy S A, Marder R A. Early morbidity after total hip replacement: rheumatoid arthritis versus osteoarthritis. J Gen Intern Med 1990; 5 (4): 304–9.

Visuri T, Koskenvuo M. Cancer risk after McKee-Farrar total hip replacement. Orthopedics 1991; 14 (2): 137–42.