Need for bilateral arthroplasty for coxarthrosis

1,477 replacements in 1,199 patients followed for 0–14 years

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During the 10-year period 1981–1990, 1,199 patients in the county of South Jutland, Denmark, had 1,477 primary total hip arthroplasties (THA) performed because of primary arthrosis (OA).

The patients were followed until the end of 1994, with a mean follow-up of 5.6 (0–14) years. Bilateral operations were performed on 356 patients, whereas 248 patients had died with only 1 THA.

The cumulated risk of replacement of the contralateral hip was approximately 0.15 1 year after replacement of the first hip, 0.20 after 2 years, 0.29 after 5 years and 0.47 after 10 years, respectively.

During the follow-up period, the demand for a THA of the contralateral hip continued to be approximately 15 times higher than in the general population.

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We analyzed the need for bilateral primary total hip arthroplasty (THA) in 1,199 patients with 1 THA because of primary arthrosis (OA). The time-span between operations and the need for bilateral THA among age and sex groups were analyzed.

Patients and methods

In a previous study, we described the 1,752 primary THAs performed during the 10-year period 1981–1990 in the county of South Jutland, Denmark (Overgaard et al. 1992). In the present study, 275 THAs were excluded; 245 because of secondary OA and 30 cases who already had a contralateral THA performed before 1981. The material thus consists of 1,477 THAs in 1,199 patients (590 women) receiving their first primary THA in the years 1981–1990 because of primary OA. All patients were followed until the end of 1994.

The diagnosis was made with the consensus of specialists in orthopedics and radiology. Primary OA was defined as clinical and radiographic signs of degenerative changes in the articular cartilage and the subchondral bone of unknown etiology.

The date(s) of operation(s), sex, age at time of operation(s) and diagnosis were recorded. The time-span between hip operations on the 356 bilaterally operated patients (168 women) was analyzed with regard to age and sex distribution.

The incidence of THA among patients with primary OA was compared with expected values calculated by indirect standardization for age and sex. In these calculations, we used the THA incidence in the general population in the county and the national age- and sex-specific mortality rates (Danmarks Statistik 1985).

Statistics

The two-sample t-test was used to compare differences in age. The cumulated risk of receiving a contralateral THA was calculated using Aalen-Nelson estimates (Clayton and Hills 1993). Hypotheses concerning differences between groups were tested by the log-rank test. All p-values are two-tailed. Calculations of incidence rates were based on person-years and the number of expected operations were calculated after stratification by age, sex and follow-up time and corresponded to indirect standardization for age and sex. The standardized incidence ratio of THA was then the ratio of the observed to the expected rate. Confidence intervals were calculated at the 95% level, using the log-likelihood method.

Results

The mean age of the patients was 69 (41–89) years (Figure 1). At the time of the first THA, women (mean age 70) were older than men (mean age 68). The mean follow-up time was 5.6 years, ranging from 0 for those 55 patients in whom a bilateral hip re-

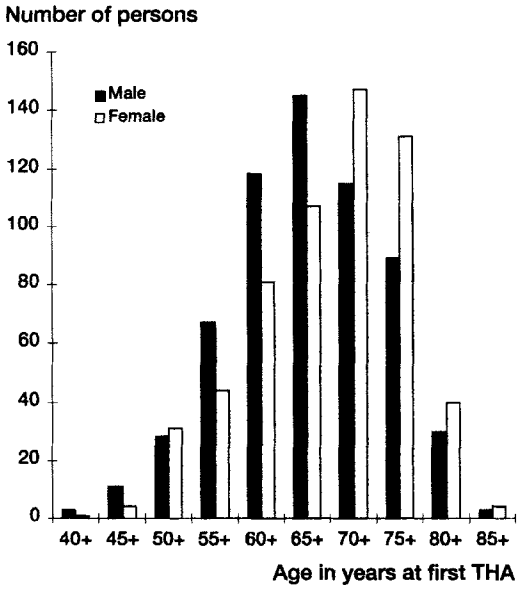

Figure 1. Age at the time of the first THA in 1,199 patients with primary OA.

placement was performed as a simultaneous procedure, to 14 years for some of the patients still alive and without a contralateral THA at the end of the observation period.

In the follow-up period, 356 patients had their contralateral hip replaced. The group of patients who required a contralateral THA and the group who did not and were alive at the end of follow-up had the same mean age of 68 years. The mean age of the 248 patients who died during follow-up was higher, 73 years ($p < 0.001$).

The cumulated risk of undergoing a contralateral THA varied as a function of time (Figure 2). In the first year of follow-up, the risk was very high, but thereafter the curve rose approximately linearly. After 1 year, the cumulated risk was 0.15 and after 2, 5, 10, and 14 years, the cumulated risk was 0.20, 0.29, 0.48, and 0.52, respectively. The log-rank test showed no difference between sexes ($p = 0.2$).

The standardized incidence ratios were 64 and 24 during the first and second years of follow-up, respectively (Figure 3). During the following 7 years, the incidence rate varied around 15, but later the confidence intervals were too broad for interpretation.

Discussion

Lindberg and Sjöstrand (1972) estimated, on the basis of Danielsson's work (1964,1966), that approximately one-third of patients with primary OA affecting the hips would need bilateral surgery. Others have found bilateral disease in 31–52% of the investigated patients (Danielsson 1964, 1966, Jørring 1980,Typpø 1985), but did not evaluate the need for operation.

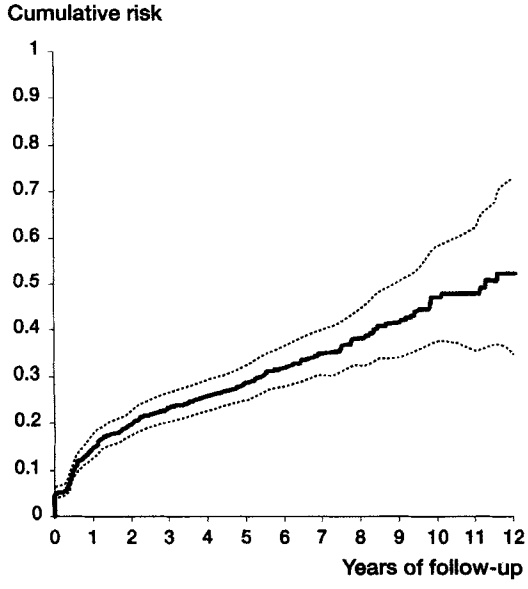

Figure 2. Aalen-Nelson estimated curve showing the need for a contralateral THA as a function of time from the first THA in 1,199 patients (95% CI indicated by dotted lines). The curve stops after 12 years, since only 25 patients were followed for a longer period.

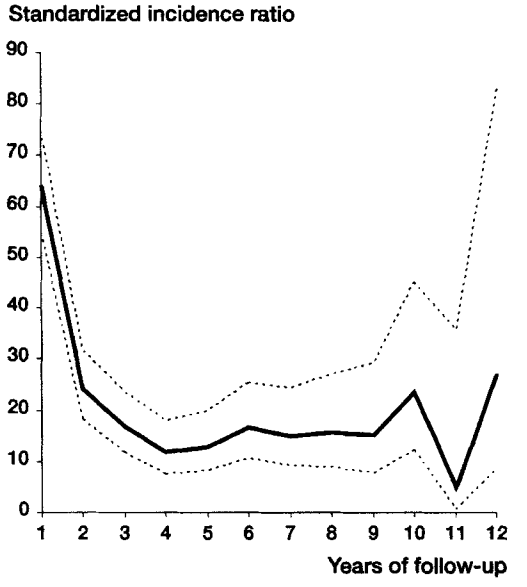

Figure 3. Standardized incidence ratio of contralateral THA as a function of time from first THA in 1,199 patients (95% CI indicated by dotted lines).

Using these figures, a maximum of 17% of the patients with bilateral OA of the hips would be expected to need bilateral THA. However, in our investigation, the cumulated risk of replacement of both hips because of primary OA was 0.5 after 14 years of follow-up. We would expect this proportion to increase only slightly if all patients were followed until death, because most patients needing bilateral THAs will have the contralateral hip replaced within 10 years. After that time, most of the patients will be too old to undergo a new operation. The high standardized incidence ratio during the first year represents patients with both hips affected at the time of the first operation. Some of these underwent a bilateral operation in one procedure and some had the new operation during the following few months. For the following years, the standardized incidence ratio was fairly constant at 15 until the number of new operations became too small to make reliable estimates. This could be interpreted as a continuing tendency in patients with arthrosis in 1 hip to develop arthrosis in the other hip as well. If this were true we would expect the standardized incidence ratio to stay constant until an age is reached when no operations are performed. A contribution to the incidence ratio could also be the lower threshold of patients with 1 THA to undergo a contralateral operation.

Radiographic studies have shown that patients suffering from primary OA can have minor underlying anatomic abnormalities of the hip (Solomon 1976, Harris 1986, Wedge et al. 1991). The hypothesis that all patients with primary arthrosis affecting 1 hip will eventually—if followed over a sustained period of time—develop bilateral disease has been put forward (Harris 1986). In contrast, Solomon (1976) suggested that the underlying abnormality causing OA may be severe in 1 hip and slight in the contralateral hip, without causing any distress. Our findings seem to support the first hypothesis.

Gofton (1971) has demonstrated different radiographic findings in unilateral and bilateral OA associated with primary hip OA. He found that loss of articular cartilage in the superolateral area of the joint was associated with unilateral primary hip arthrosis, whereas loss of cartilage in the medial area was usually seen in bilateral arthrosis. This suggests that different entities of OA exist. In our study, no difference in age at first THA was found among the bilaterally operated patients and patients who remained unilaterally operated during the time of observation. This indicates—different entities or not—that there is no difference in the progression and the age at which the end-point is reached leading to THA in the patients with primary OA affecting both hips compared to patients with unilateral disease.

However, sex might influence the progression rate of OA. Gabriel et al. (1994) found that men are younger than women at the time of operation and that men have radiographically more advanced arthrosis of the hip than women at the same age. We found that men were 2 years younger than the women at the time of operation in both unilaterally and bilaterally operated patients. This is statistically significant, but of little clinical relevance. Our incidence rates may be influenced by the geographical and population characteristics of the county. 11% of the inhabitants in the County of South Jutland are farmers who may have an increased incidence of hip arthrosis (Danmarks Statistik 1988, Thelin 1990, Vingård et al. 1991).

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