Total Hip Arthroplasty in Ankylosing Spondylitis: Outcome in 340 Patients

SIOBHAN SWEENEY, RAJIV GUPTA, GORDON TAYLOR, and ANDREI CALIN

ABSTRACT. ***Objective.*** The longterm outcome of total hip arthroplasty (THA) in ankylosing spondylitis (AS) remains unclear. Concern has been expressed regarding joint survival, given that recipients are young and active. We present outcome data on 340 THA after a mean followup of 14 years.

Methods. The 6.7% of patients (n = 309: 237 contactable) who had undergone THA were identified from our database of 4569 subjects. Responses were received from 166 subjects (112 men, 54 women, M:F = 2:1) who were assessed for employment status and outcome [i.e., pain, mobility, satisfaction, disease activity (BASDAI), function (BASFI), and global well being (BAS-G)]. A non-THA AS control group was matched for age, sex, and disease duration.

Results. The mean age at AS disease onset for THA recipients was 19.5 yrs compared to 24.4 yrs for the total database ($p < 0.05$). The mean age at the first THA was 40.0 yrs. Of the 340 THA, 276 were primary (bilateral in 66%) and 64 were revisions. The mean followup for THA was 14.0 yrs (range 1–52). Overall, for the 340 THA, the patients considered outcome to be very good in 85%. In relation to the matched control group, THA patients were comparable for BASDAI, but had poorer function ($p < 0.05$) and lower global well being ($p < 0.05$). Of the 80 men under 60 years of age, 39 (49%) were employed compared to 49 (68%) of the control group ($p < 0.01$). Survival of original THA and revisions after 10, 15, and 20 yrs was 90%, 78%, 64%, respectively (originals), and 73%, 55%, 55%, respectively (revisions).

Conclusion. The longterm outcome of THA in AS is outstanding. THA recipients have a younger age at onset than nonrecipients. The longterm survival characteristics of THA in young patients with AS is excellent. (J Rheumatol 2001;28:1862–6)

Key Indexing Terms:
ANKYLOSING SPONDYLITIS TOTAL HIP REPLACEMENT OUTCOME

Hip arthropathy is country related and occurs in 10–50% of cases in ankylosing spondylitis (AS)[1,2], often affecting both joints. The earlier the onset of AS, the greater the likelihood of total hip arthroplasty (THA)[3]. However, concern has been expressed regarding longterm outcome in young patients and we still hear of orthopedic surgeons advocating postponement for as long as possible. The main complication of THA is mechanical failure. Despite this pessimistic view, accumulating evidence suggests that THA is a reliable therapeutic intervention with good outcome. Bisla and colleagues[4], for example, retrospectively reviewed the results of THA in 34 patients with AS with an average followup period of 42.5 months. Baldursson, *et al*[6] reported successful outcome of THA in 18 patients with AS, and comparable results were achieved in other small studies with short followup[5,6].

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In 1989[3], we published a review of the patients' perception of outcome in 87 subjects with AS (150 THA) after a mean followup period of 7.5 years. The importance of longer followup periods was stressed. Here we report longterm data in a large cohort of patients operated on by different surgeons in many units across the United Kingdom. Moreover, we looked at the patient's perceptions of outcome rather than relying on individual surgeon's opinions. Patients were assessed by a validated self-administered questionnaire.

MATERIALS AND METHODS

This is a retrospective study in which the THA recipients were identified from our database of 4569 members who were outpatients of the Royal National Hospital for Rheumatic Diseases (RNHRD) or members of the National Ankylosing Spondylitis Society (NASS). Patients referred to the RNHRD had their diagnosis confirmed according to the New York criteria. All NASS members who completed our AS database questionnaire were further assessed only if they had radiological confirmation of AS. The initial AS database questionnaire was directed toward demographic data, personal and family history, date of onset of symptoms, date of diagnosis, major spinal, extra spinal, articular and extraarticular symptoms, functional outcome, and therapeutic modalities, including medication and surgery. The data were validated by (1) a random cohort of 50 patients (confirmed in 98%); (2) an analysis of subjects who had seen a hospital specialist; and (3) where necessary by review of radiographs and source data from general practitioners and hospitals.

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In total, 309 THA recipients were identified from our database of 4569 (6.7%) members. Of this total the 237 who had known addresses and complete data were sent a questionnaire focusing on the year and age at onset of disease and hip symptoms, the date of each THA [left, right, revision(s)] and on degree of pain and mobility in each hip, and opinion on outcome of surgery. Pain, mobility, and overall satisfaction of THA were each scored on a 5 point scale (Table 1). To achieve a mean score for each scale, patients' responses were scored from 0 to 4. The best outcome for mobility, pain, and overall success (very good movement, no pain, very good overall) scoring 0 and the worst outcome scoring 4. Where revision(s) had been carried out, the scores given were those of the most recently revised hip, and the initial hip replacement was considered a failure by definition. To compare short and longterm followup, patients were divided into 5 year cohorts according to duration of followup, and survival probabilities were calculated for the original and revised THA.

To assess the effect of THA on employability, the work status of male patients aged 60 years or less was reviewed and compared with a control group of randomly selected male patients with AS matched for age at onset and age at review, who had not received any surgical intervention related to their AS.

Finally, we assessed the disease activity [Bath Ankylosing Spondylitis Disease Activity Index[7] (BASDAI)], disease function [Bath Ankylosing Spondylitis Functional Index[8] (BASFI)], and global well being [Bath Ankylosing Spondylitis Patient Global Score[9] (BAS-G)] of all THA patients and compared them with a control group matched for age, disease duration, and sex.

RESULTS

Of the 309 NASS members identified as having undergone THA we present results of 166 patients who replied (54%). Of 309 THA recipients, 72 were not contactable because we had a written notification of death (19) or they had changed address (28) or had not supplied full information (25) on the initial questionnaire. Of the 237 contactable database members, 166 patients replied (70%, 112 men, 54 women). The mean age at disease onset for THA recipients was 19.5 years compared to 24.4 years for the total database ($p < 0.05$).

Table 1. Scoring system for questionnaire answers.

Pain	Score
Questionnaire answer	
No pain	0
Mild pain	1
Moderate pain	2
Severe pain	3
Very severe pain	4
Mobility	
Questionnaire answer	
Very good movement	0
Good movement	1
Fair movement	2
Poor movement	3
Very poor movement	4
Overall success	
Questionnaire answer	
Very good	0
Good	1
Fair	2
Poor	3
Very poor	4

The 166 patients had undergone a total of 340 hip replacements, including 64 revisions. Demographics and details of the operations are summarized in Table 2. One hundred thirty-five patients had a right hip replaced and 141 patients had a left hip replaced; 109 (66%) had had bilateral hip replacements. The average followup of the primary THA was 14 years. When disease onset is considered as the beginning of followup, 18%, 42%, 20%, and 20% of patients required a primary THA at 0–10, 11–20, 21–30, and > 30 years, respectively (Figure 1). Separated into 5 year cohorts, 56, 69, 58, 46, and 47 primary hips were followed for 0–5, 6–10, 11–15, 16–20, and > 20 years, respectively.

Overall, for every replaced hip, 83% reported none/mild pain, 52% good/very good movement, and 58% high/very high success. Analysis of data in terms of first (or only hip) and second hip revealed that scores were almost identical to those for left or right hip, indicating that patients with bilateral THA do as well as those with unilateral THA. Dividing the total group into 2 subsets of primary THA and revision THA, 85% of the primary group reported none/mild pain, 54% reported good/very good movement, and 62% reported high/very high success. For the revision group, 78% reported non/mild pain, 46% good/very good movement, and 52% high/very high success.

The review of 5 year cohorts by followup (Figure 2) revealed similar or identical scores for those with 0–5 years' duration and those with > 20 years' (right hip: pain 0.7 and 0.1, movement 2.7 and 2.62, and success 3.5 and 3.4, respectively; left hip: pain 0.7 and 0.4, movement 2.5 and 2.8, and success 3.3 and 3.4, respectively).

Table 2. Demographic data and details of total hip arthroplasties: n = 166; 112 men, 54 women, ratio = 2:1.

	Mean, yr	Range
Age at review	53.7	28–78
Age at onset of AS symptoms	19.5	7–43
Age at onset of hip symptoms	29.8	7–72
Age at first THA	40.0	19–72
Mean followup after 1st THA	14	1–52
Mean followup after last THA	10	1–47

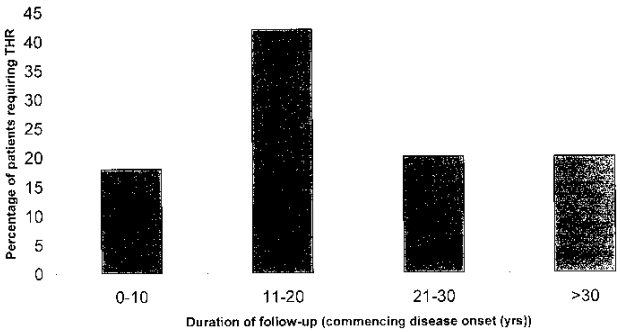

Figure 1. Percentage of patients requiring THA after followup duration 0 to > 30 years.

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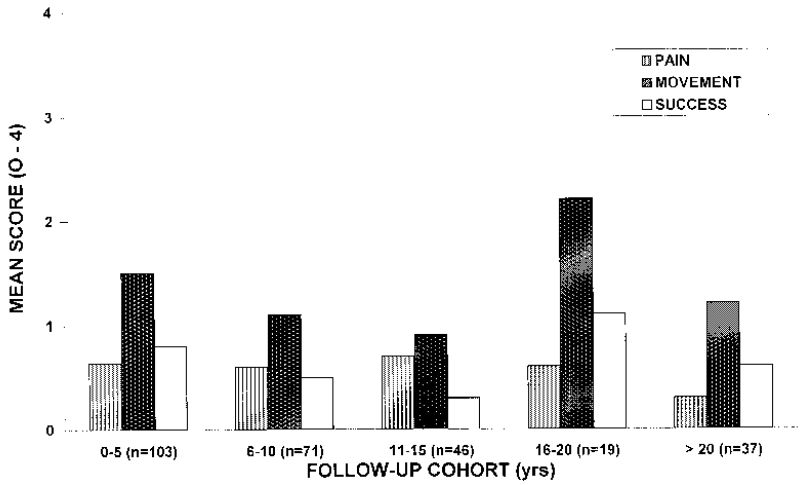

Figure 2. Mean pain, movement, and success scores for 5 followup cohorts followed 0–30 years.

In terms of disease activity (BASDAI, 0–10 scale with 0 normal, 10 endstage), the THA patients reported an average score of 4.6 compared to 4.3 for the control group patients matched for age, sex, and disease duration ($p > 0.05$). For function (BASFI), the THA group reported a mean score of 6.9 compared to 4.7 ($p < 0.0001$). Finally, for global well being (BAS-G) the THA group reported a mean score of 5.0 compared to 4.3 for the control group ($p < 0.017$). Comparing primary THA with revised THA, the primary THA patients reported an average score of 4.3 compared to 4.4 for the revisions (NS). For function, primary THA patients reported a mean score of 6.8 compared to 6.6 (NS). Also, for global well being the primary THA group reported a mean score of 4.8 compared to 5.0 for revisions (NS).

Of the 166 patients, 117 were aged 60 years or under. Of these, 49 (42%) were employed compared to 68 (64%) of the control group ($p < 0.001$). There were 80 men in our study aged 60 years or under, and 39 (49%) of them were working compared to 49 (68%) of the control group ($p < 0.01$).

Forty-four patients (27%) had undergone a total of 64 revisions, and out of these, 12 hip joints were revised twice and 2 were revised thrice. The main reasons for revision were loosening (n = 36), infection (n = 4), fracture (n = 4), ankylosis (n = 5), and other unknown reasons (n = 15). Of the 12 hip joints revised twice the main reason was loosening (n = 7). Analysis of revision times for THA destined for revision showed that most failures occurred within the first 7 years (Figure 3).

Survival analysis (Kaplan-Meier estimate) of the 276 original THA and 64 revisions (Figure 4) revealed that survival probability (95% CI) after 10, 15, and 20 years is 90% (86–94%), 79% (72–86%), and 65% (56–74%) for originals, and 75% (61–89%), 61% (37–85%), and 61% (37–85%), respectively, for revisions.

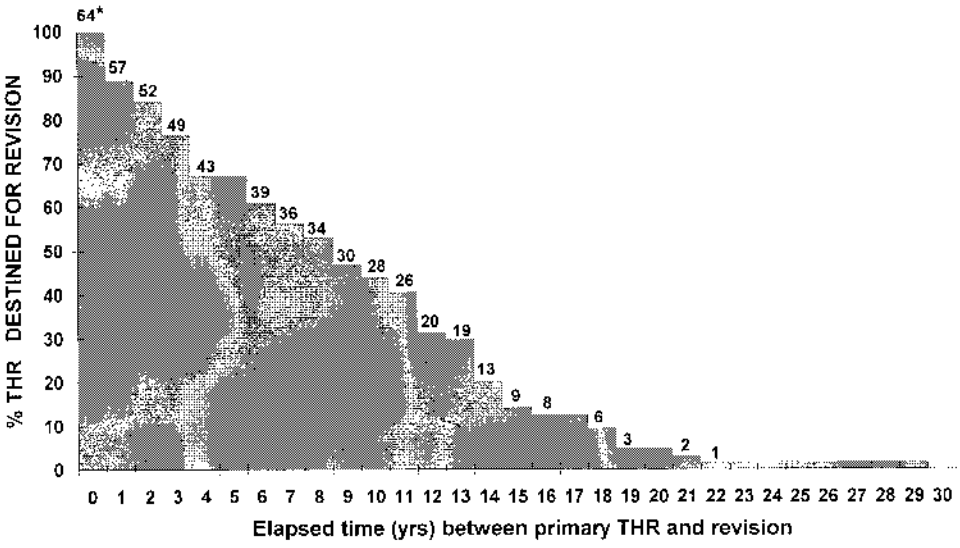

Figure 3. Revision time points of primary hips destined for revision. *Number of total hip replacements (THR) at each time point.

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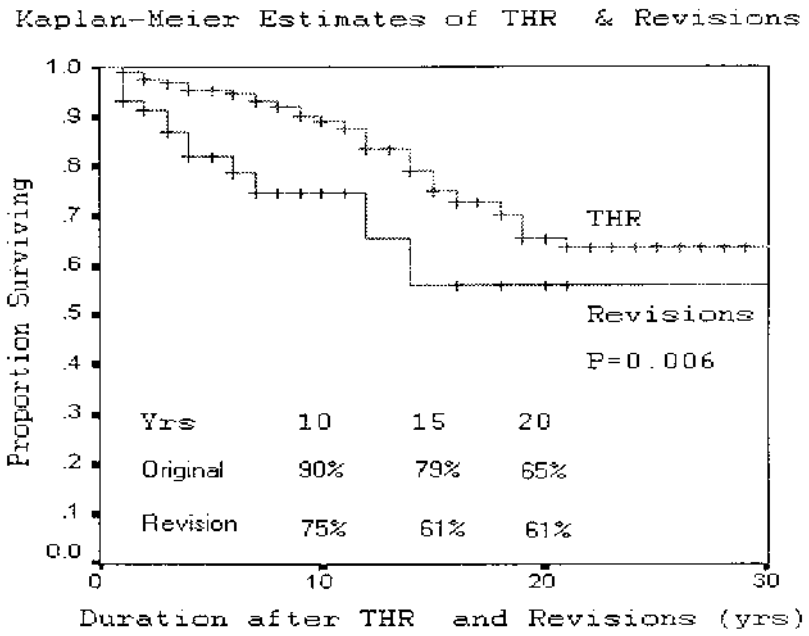

Figure 4. Survival probabilities of THA followed 10, 15, and 20 years. THR: total hip replacement.

DISCUSSION

Our data suggest that the majority of THA last longer than 14 years with high patient satisfaction. The best outcome for THA is from large units with high throughput[10]. We present data from a cross section of units including some that are likely to have less good outcome. Thus the best/biggest units may have even more encouraging results. There are several potential drawbacks to our study. First, our completion rate was 70%, thus we cannot comment on those lost to followup. As in all mail based studies, the nonresponders may respond differently to questionnaires, therefore our results may be biased.

Second, it is possible that the reason for THA may have been due to degenerative change or other arthropathy rather than the primary inflammatory disorder. However, the young mean age at the time of the first hip replacement (40.0 yrs) argues against this being a significant problem. Also, we have previously shown that 16% of individuals with age at onset below 16 required a new hip within 20 years, suggesting that the peak pathology is seen in the early 30s[11]. Further, a population survey from Iceland[12] reports a mean age of 69 years for THA due to primary osteoarthritis.

The third potential problem is that patients were not individually examined at the time of review. However, it is self-evident that the patient's view is of paramount importance. Their perceptions of pain, mobility, and overall success are the factors that are of greatest interest. Additionally, although we cannot comment on range of motion, we feel that the rating of overall outcome would reflect this unmeasured variable.

Penultimately, we acknowledge that we cannot comment on different techniques or compare different types of THA (e.g., cement versus cementless hips).

Finally, our patients were not evaluated radiologically. Thus we cannot comment on the degree of new bone formation or other changes. However, even if ectopic bone formation occurs or other radiological problems exist the clinical findings are very encouraging[12]. Indeed, 2 earlier reports describe a relatively good short term outcome of THA in AS, in spite of calcification[13,14]. Moreover, although joints can reveal impending failure from a radiological point of view in spite of good clinical outcome, we do not think that having radiographs would alter our conclusion.

Clearly, young, relatively mobile patients with AS who receive a THA cope very well, in contrast to oft-quoted concerns from orthopedic surgeons regarding young potential THA recipients. We describe one of the largest experiences to date, with longterm followup in relatively young adults with AS. The outcome of THA in AS patients in terms of pain, movement, and satisfaction is very good. Moreover, comparison of 5 year cohorts over 5–20 years in whom the THA survived revealed that the cohort of > 20 years were as satisfied with their hips as those who had been followed for up to 5 years.

Followup of the 276 original hips revealed a high probability of survival (90%) beyond 10 years. Indeed, there is a 64% chance that a THA will last for 20 years. Survival of the revisions was also excellent, with a 73% survival chance at 10 years and a 55% chance at 20 years. This is a very encouraging finding, especially in consideration of the young average age of THA recipients.

The sex ratio among THA recipients, 2:1 in favor of men,

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mirrors that of the overall population with AS. We conclude that men and women are at equal risk of severe hip involvement.

This study shows that 42% of THA patients are employed compared to 64% of a matched control group. However, this is not surprising, given that we have shown[15] that patients with hip involvement have more severe spinal disease and thus are more likely to be incapacitated.

In addition to presenting followup results we also considered the outcome of THA patients in relation to matched control patients who have not undergone hip surgery. Results revealed that for the THA group disease activity is comparable, while function and global well being are significantly worse. Again, in comparison to the controls, more severe spinal disease in the THA group could adversely affect function and lead to a lesser feeling of well being.

The nature of the postoperative problems was predictable. Sixty-four THA (44 patients) had been revised, including 36 because of loosening, 4 with fracture, 5 with recurrent ankyloses, 4 due to infection, and 15 for other unknown reasons. When revisions were required, the majority were carried out within the first 7 years of surgery.

Previously we noted that simultaneous hip replacement has just as good an outcome as staged THA. The present study supports this finding and weakens the argument that contemporaneous THA is not a viable proposition[16]. Furthermore, we found that individuals with 2 THA did as well as those requiring one.

The longterm benefit of total hip arthroplasty in AS has been questioned. This study reveals that, after a mean followup of 14 years, outcome in terms of pain, function, and satisfaction is very good and survival is excellent. Further, for those subjects requiring a revised THA, outcome is particularly encouraging.

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