Five-year survival of nonagenerian patients undergoing total hip replacement in the United Kingdom

Between January 2000 and December 2007, 31 patients 90 years of age or older underwent total hip replacement at our hospital. Their data were collected prospectively. The rate of major medical complications was 9%. The surgical re-operation rate was 3%. The requirement for blood transfusion was 71% which was much higher than for younger patients. The 30-day, one-year and current mortality figures were 6.4% (2 of 31), 9.6% (3 of 31) and 55% (17 of 31), respectively, with a mean follow-up for the 14 surviving patients of six years. Cox’s regression analysis revealed no significant independent predictors of mortality. Only 52% of patients returned immediately to their normal abode, with 45% requiring a prolonged period of rehabilitation.

This is the first series to assess survival five years after total hip replacement for patients in their 90th year and beyond. Hip replacement in the extreme elderly should not be discounted on the grounds of age alone, although the complication rate exceeds that for younger patients. It can be anticipated that almost half of the patients will survive five years after surgery.

The proportion of the population classed as elderly in the United Kingdom has increased over the last 50 years. The last census estimated that in 2008, 1.3 million people in the United Kingdom would be aged 85 or over.1 This is the fastest-growing sector of the population and is predicted to increase to more than 3 million by 2030, accounting for 5% of the population.1,2 The number of patients presenting for primary hip replacement after entering their 90th year will increase. The typical life expectancy of a 90-year-old in the United Kingdom currently is 4.3 years3 and hence this group of patients have a significant amount of time during which they may benefit from total hip replacement (THR). However, there is concern that the physiological demands of THR in this group may be too great, with unacceptable levels of morbidity and mortality.

There is little in the literature describing THR in patients above the age of 90, but there is evidence that such surgery should not be discounted on the grounds of age alone.4–7 Relief of pain and functional improvement are well documented following THR, but these improvements are not age related. Patients over the age of 80 have been shown to derive as much benefit from THR as those under 80.8

Most of the published studies are from the United States.4–6 There are differences in socio-economic circumstances and the provision of healthcare between the two countries, which limits the relevance of studies from the United States to the United Kingdom. The only data from a United Kingdom institution cover patients who underwent surgery over a 20-year period, suggesting a highly selective patient recruitment policy.2

Patients and Methods
Between January 2000 and December 2007, 31 patients underwent THR at the age of 90 years or more at a single institution. Their data were collected prospectively. The indications for surgery, the American Society of Anesthesiologists (ASA)9 grade, comorbid conditions, post-operative complications, requirements for blood transfusion, the duration of in-patient stay and details on discharge were recorded. All had severe pain despite large amounts of analgesics, and this was the indication for surgery in all cases. Formal pre- or post-operative functional scoring was not performed since the burden of other joint disease and comorbid medical conditions meant that routine functional scoring was not applicable.

The 30-day, one-year and current mortality rates were calculated. The date of death was verified using a combination of hospital and
General Practitioner records cross-referenced with those of the Regional Health Authority.

Statistical analysis. Multivariate Cox’s regression was used to examine the effects of gender, age, length of stay, the ASA grade, the number of comorbidities and the requirements for transfusion upon the mortality rate. A p-value of 0.05 was considered significant in all analyses.

Results
We identified 31 patients (19 women, 12 men) with a mean age of 92 years (89 to 96) of whom 24 were nonagenarians (Table I). Osteoarthritis was the diagnosis in all patients. The median ASA grade was 2 (1 to 4). Pre-operative medical comorbidities are shown in Table II. All patients had a pre-operative assessment by an anaesthetist, all aspects of anaesthetic care were conducted by consultant anaesthetists and they were admitted to a high-dependency unit following the operation. Of the 31 patients, 25 had a fully cemented THR, five a hybrid and one an uncemented THR. The choice of implant was at the discretion of the consultant. The post-operative protocol was identical in all cases and involved full weight-bearing as tolerated, using crutches for six to 12 weeks as required.

The mean in-patient stay was for 12 days (1 to 25). Patients were admitted from either their own (29) or a residential home (two). Only 16 (52%) patients returned directly to their usual place of residence; discharge to a rehabilitation centre was required for 14 (45%). All eventually returned home. There were two inter-hospital transfers for specialist medical intervention; one of these patients died. One patient died at our institution. Both deaths were as a result of cardiac complications.

A total of 21 post-operative complications (three surgical, 18 medical) were experienced by 42% (13 of 31) of patients (Table III). Of the medical complications ten were minor and eight were major. The latter occurred in five patients. The surgical complications included one wound haematoma, one superficial infection and one trochanteric nonunion following trochanteric osteotomy. The haematoma needed evacuation, and was the only re-operation required. Blood transfusion, given at the discretion of the consultant anaesthetist, was used in 22 of the patients. A total of 62 units of blood were used with a mean of two units being transfused per patient. Two patients also required transfusion with fresh-frozen plasma. One of these had been on warfarin pre-operatively, and despite having a normal pre-operative INR had profuse intra-operative bleeding. The other patient had a gastrointestinal bleed in the immediate peri-operative period, requiring transfusion with both blood and fresh-frozen plasma.

The 30-day, one-year, and current mortality figures were 6.4% (2 of 31), 9.6% (3 of 31) and 55% (17 of 31), respectively. The mean follow-up for the 14 surviving patients was for five years (2.5 to 9.7). All patients reported significant relief of pain following surgery.

Cox’s regression analysis for age, gender, ASA grade, transfusion requirements, duration of stay and the number of pre-existing comorbidities revealed no significant independent predictors of mortality or morbidity at a significance level of p = 0.05 (Table IV).
Discussion

The strengths of this study are the prospective nature of the data collection and the duration of follow-up, which at five years is the longest of any published series and exceeds the life expectancy for this age group. Previously, the longest reported follow-up of nonagenarian patients undergoing THR has been 3.2 years. Our patients were collected over seven years. Previous studies have involved data collected over periods ranging from 17 to 25 years. Significant medical, anaesthetic and surgical modifications will have occurred during these periods. The weakness of our study is the relatively small sample size. This may explain some of the observed differences in mortality rates.

The 30-day mortality rates from the two North American series are 1.8% (1 of 56) and 2.1% (1 of 48), respectively. The only series from the United Kingdom to date reported a 0% mortality rate at one month. Our 30-day mortality rate is higher than these, although the effect of sample size may account for this difference. Ramiah et al recorded a 0.4% mortality rate at 30 days in 5831 patients undergoing primary THR with an average age of 67 years. The in-patient mortality rate for all patients undergoing primary THR at our institution is 0.12%. Therefore, very elderly patients undergoing primary THR have a greatly increased risk of death.

The one-year mortality rate in this study was 9.6%. The only previously published one-year mortality-rate in the very elderly was 1.5%. This may be a result of highly selective patient recruitment in that series, resulting in only 58 nonagenarians being operated on over a 20-year period, as this is below the expected one-year mortality rate for the general population of the same age. Berend et al found a mortality rate of 18% at 2.5 years in the subgroup of very elderly patients undergoing primary THR. Pagnano et al found a mortality rate of 56% in nonagenarians at a mean of 3.2 years following THR. The mortality rate of 55% at a mean of five years after surgery in our patients compares favourably with these series.

Complications following primary THR are frequent in this age group, and medical problems predominate. Pagnano et al reported a complication rate of 46%. The major medical complication rate in that series was 18.7%, which is equivalent to that in our patients. The surgical complication rate in our patients was 9.7%, with one re-
operation to evacuate a haematoma. Berend et al\textsuperscript{5} had a surgical complication rate of 7\% (4 of 56). Three of these were major with two dislocations and one peri-prosthetic fracture. Pagnano et al\textsuperscript{4} had a surgical complication rate of 8.3\% (4 of 48), and a re-operation rate of 2.1\%.

Studies examining the outcome of hip replacement in octogenarians have reported medical complications in 8\% to 27.5\%.\textsuperscript{11,12} The surgical complication rates in this age group were 15\% to 19.6\%, although one of these papers is almost 20 years old.

The only previous paper to report requirements for transfusion in this age group had a transfusion rate of 68\%, with a mean of 2.2 units being transfused.\textsuperscript{4} Our study had a transfusion rate of 71\%, with a mean of two units being transfused. The overall transfusion rate for primary THR in our unit during the period studied was 22\%, with a mean number of 1.7 units.\textsuperscript{13} This compared favourably with the national average transfusion rate of 25\%, with an average 2.4 units.\textsuperscript{13} The risk of requiring a blood transfusion has been shown to increase with increasing ASA grade and increasing comorbidity.\textsuperscript{8} It is not clear whether the increased transfusion requirement in our study reflects the effect of ASA grade, comorbidity or age.

The mean in-patient stay in this study was 12 days, which compares with the average in our unit of eight days at the time these patients underwent surgery. A large number of patients require further prolonged rehabilitation, which has been reported previously.\textsuperscript{5,7} In-patient stay may be reduced by identifying pre-operatively those patients who will benefit from rehabilitation, and by putting such arrangements in place. The involvement of an orthogeriatric consultant for patients suffering from proximal femoral fractures has been shown to reduce complication rates and in-patient stay and increase functional gain.\textsuperscript{14-16} Our patients were reviewed by the medical team only for treating medical complications. Having these extremely elderly patients admitted under joint care between orthopaedic surgeons and orthogeriatricians may yield improvements in rehabilitation and post-operative morbidity.

When considering THR in very elderly patients, it is important that all parties are aware of the significant risk of increased morbidity and mortality, the likelihood of transfusion being necessary, and the prolonged period of rehabilitation. It can be anticipated that almost half of patients will be alive five years after surgery.

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References


