

## Revision hip arthroplasty in nonagenarians

Ian STARKS, Jonathan GREGORY, Stephen PHILLIPS

*From the Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry, Shropshire, U.K.*

**The results of a series of revision hip arthroplasties in nonagenarians performed at a single institution over an 8 year period are presented. All data was collected prospectively. The indications for surgery, ASA grade, co-morbid medical conditions, post operative complications, blood transfusion requirements, length of in-patient stay, and discharge disposition, were recorded. Thirty day, one year and current mortality rates were calculated.**

**Fifteen patients were identified with a mean follow-up of 3 years. There were 14 single-stage and 1 two-stage revisions. The mean age at the time of surgery was 92 years. The mean ASA grade was 2. The average inpatient stay was 14 days. Sixty three percent of patients required a period of further rehabilitation. The rate of complications was high (63%) as was the need for blood transfusion (75%). Mortality at 30 days was 7% (1/15), at 1 year 20% (3/15), and at 3 years 33% (5/15).**

**If indicated, revision hip arthroplasty can still be considered in very elderly patients ; however, a higher than usual complication rate is to be expected.**

**Keywords :** hip ; revision ; arthroplasty ; nonagenarians

### INTRODUCTION

It is estimated that by 2030 one third of the United Kingdom's population will be aged 60 years or older with those aged 80 years or above accounting for the fastest growing sector of the population

(19). As a result the number of patients living long enough to experience symptomatic failure of their primary hip arthroplasty after entering their 9<sup>th</sup> decade of life is likely to increase. The current life expectancy of a 90 year old in the UK is 4.3 years (10) which, for a patient with a failing arthroplasty, is a significant period over which to experience symptoms. However, there are concerns that the physiological demands of revision hip arthroplasty in this population may be too great with high levels of morbidity and mortality.

There is a paucity of literature describing revision hip arthroplasty in nonagenarians. The only previously published series is from North America ; this

■ Ian Starks, BA BM BCh, FRCS (T&O), Specialist Registrar Trauma and Orthopaedic Surgery.

■ Jonathan James Gregory BSC, MB ChB, FRCS (T+O), Specialist Registrar Trauma and Orthopaedic Surgery. *Robert Jones and Agnes Hunt Orthopaedic & District General Hospital, Oswestry, U.K.*

■ Stephen Phillips, MB ChB, FRCS (T+O), Consultant Trauma and Orthopaedic Surgeon.

*Robert Jones and Agnes Hunt Orthopaedic & District General Hospital, Oswestry, Shropshire, and Wrexham Maelor Hospital Wrexham, U.K.*

Correspondence : Ian Starks BA BM BCh, FRCS (T&O), Specialist Registrar Trauma and Orthopaedic Surgery, Robert Jones and Agnes Hunt Orthopaedic & District General Hospital, Oswestry, Shropshire, SY10 7AG, UK

E-mail : ianstarks@doctors.org.uk

© 2010, Acta Orthopædica Belgica.

provides evidence to suggest that such surgery can be safely undertaken in this age group (13). The relevance of this study to a Northern European population may be limited by socio-economic and health-care differences between Northern Europe and the USA. We report the first series of revision hip arthroplasty in nonagenarians from a European centre.

### PATIENTS AND METHODS

Between January 2000 and September 2008 15 nonagenarians underwent revision hip arthroplasty at a single institution (Robert Jones and Agnes Hunt Orthopaedic & District General Hospital, Oswestry, UK). All data was collected prospectively: indications for surgery, ASA grade, co-morbid medical conditions, post operative complications, blood transfusion requirements, length of in-patient stay, and discharge disposition. Mortality rates were calculated for 30 days, one year and at the time of the study. Date of death was verified using a combination of hospital and GP records cross-referenced with Regional Health Authority records.

### RESULTS

Fifteen patients were identified (13 females: 2 males) with a mean age of 92 years (range 90 years 2 months to 96 years 6 months (table I). Indications for surgery were aseptic loosening, instability, painful hemiarthroplasty and periprosthetic fracture (table I). The median ASA grade was 2 (range 1 to 4). Preoperative medical comorbidities are shown in table II. All aspects of anaesthetic care were conducted by consultant anaesthetists. All patients were admitted to a high dependency unit following surgery. There were 16 operations in 15 patients: 14 patients underwent a single stage revision and one patient underwent a two stage procedure separated by a period of 5 months.

The mean length of hospital stay was 14 days (median 12 days; range: 6 to 40). Patients were admitted from either their own home (10/16 operations), a residential home (1/16) or transferred from another hospital (5/16). Only 25% of patients returned directly to their usual place of residence. Discharge to a rehabilitation centre was required for

Table I. — Demographics and outcome for patients undergoing revision hip arthroplasty.

Mean Age (years)	92 yrs
Sex	13 female ; 2 male
Indication for surgery :	
aseptic loosening	2
instability	3
periprosthetic #	5
painful hemiarthroplasty	5
Median ASA grade	2 (1-4)
Median length of inpatient stay (days)	14 (6-40)
Blood transfusion required	75%
% patients experiencing a complication	63%
30 days mortality	7%
1 year mortality	20%

Table II. — Comorbid medical conditions.

Comorbid condition	Number of patients
Hypertension	10
Ischaemic heart disease	2
Atrial Fibrillation	3
Cerebrovascular disease	2
Previous DVT/PE	1
Malignancy	1
Non insulin dependent diabetes	1

63% of patients. There were two inter-hospital transfers for specialist medical intervention, one of these patients died of cardiac complications. There were no inpatient deaths at our institution.

When including any adverse event, post operative complications were experienced by 63% (10/16) of patients (table III). In these patients there were a total of 16 documented complications (3 surgical, 13 medical). The medical complications may be regarded as either minor or major. The major medical complications occurred in 5 patients, giving a major medical complication rate of 31% (5/16). The three surgical complications all occurred in the same patient. This patient was transferred from another hospital with a periprosthetic fracture around a hemiarthroplasty. He was suffering from

Table III. — Complications experienced by patients undergoing revision hip arthroplasty.

	Complications
Surgical complications	
Wound infection	1
Wound haematoma	1
Dislocation	1
Medical complications	
Major :	
Myocardial infarction	1
Cerebrovascular accident	1
Left ventricular failure	2
Acute renal failure	1
Minor :	
Urinary tract infection	2
Confusion	4
Chest infection	1
Atrial fibrillation	1

acute medical problems on arrival and required a period of optimisation before surgery. In the early post-operative period the patient required a closed reduction for a dislocation which was complicated by a haematoma and a superficial wound infection.

Blood transfusion was required by 75% (12/16) of patients. A total of 63 units of blood were used (range 1-13) with an average of 5.3 units being transfused. Two patients also required transfusion with fresh frozen plasma for coagulopathy secondary to massive transfusion.

Thirty-day, 1 year and current mortality figures were 7% (1/15), 20% (3/15) and 33% (5/15) respectively. The mean duration from surgery to present is 3 years with a mean period of follow-up for surviving patients of 3 years 3 months. All patients were asymptomatic at last follow-up.

## DISCUSSION

In an aging population we are going to be faced with a growing number of nonagenarians experiencing symptomatic failure of a primary total hip arthroplasty or a hemiarthroplasty. This study shows that revision hip surgery in nonagenarians should not be discounted on the grounds of age

alone. Approximately two-thirds of these patients will be alive at 3 years and thus could gain significant benefit from revision surgery. However, such surgery is not without significant risk of complications. An increased requirement for blood transfusion and rehabilitation can also be anticipated.

Only one previous series looking specifically at revision hip surgery in this age group has been published (13). Our study is an improvement on this work as data was collected prospectively and over a shorter period (8 years vs 27 years). It is also the first from a European centre. Whilst our series is of a comparable size to Pagnano's, the total numbers in both are small. The morbidity and mortality figures should therefore be interpreted with caution and used merely as a guide.

Our mortality figures compare favourably with both Pagnano's (6% 60-day mortality) and those previously published in octogenarians, which range from 0% to 13.3% (4,14,16,17,20). The overall mortality for revision hip surgery in all patients is in the region of 2-3% (11). Thus nonagenarians are exposed to at least a 3 fold increase in risk. For the sub group of patients with peri-prosthetic fractures the mortality associated with non operative management would be expected to be considerably higher. These figures also compare favourably to published mortality figures for nonagenarians undergoing other forms of major surgery (3,7). Arenal *et al* reported mortality rates of 9% and 31% respectively for elective and emergency abdominal surgery, and the overall 30-day mortality for heart valve replacement surgery has been reported as 17%.

The complication rates following revision hip arthroplasty are high in this age group and medical complications predominate. Previous studies have reported complication rates of 7-61% in octogenarians (4,14,16,17,20) and a medical complication rate of 39% in nonagenarians (13). Major medical complications occurred in 31% of our cases. Whilst comparison of data between studies is difficult, due to the differences in grading and reporting of complications, the overall risk of a major medical complication appears to be high. The involvement of an orthogeriatric consultant for patients suffering from proximal femoral fractures has been demonstrated

to reduce complication rates and length of inpatient stay (1,8,12). Similar effects may be seen in nonagenarians undergoing revision hip arthroplasty.

In this study, only one patient suffered surgical complications. The resultant re-operation rate was 6%. Again similar surgical complication rates have been reported in octogenarians and nonagenarians (4,13,14,16,17,20). The observed dislocation rate in our series falls within the range for dislocation after revision for all ages (2). Age does not therefore appear to be a specific risk for dislocation following revision surgery. This observation is supported by the data relating to octogenarians.

Our study had a transfusion rate of 75% with a mean of 5.3 units transfused. Two patients received fresh frozen plasma. This is similar to that previously observed and may represent a significant demand on the blood transfusion services in the future. Any evidence of anaemia, even if only mild should be identified and treated preoperatively to reduce the requirement for blood transfusion. In addition, both tranexamic acid and intraoperative cell salvage have been shown to reduce transfusion requirements during revision hip surgery (6,15). Whilst not used in our patients, their routine use in the future may reduce the transfusion requirements in this patient group.

The average length of post operative stay in the study was 14 days. Our overall unit average is also 14 days; this is because we are a tertiary referral centre for infected revisions and our unit policy is for 2 weeks intravenous vancomycin post-operatively. A large number of patients required further prolonged rehabilitation which has been reported previously in nonagenarians undergoing primary hip arthroplasty (5,9). Inpatient stay may be reduced by the early identification of these patients and putting such arrangements in place.

In conclusion, when confronted with indications for revision hip surgery in very elderly patients, it is important that all parties are aware of the increased risk of morbidity and mortality, the likelihood of allogeneic blood transfusion, and the prolonged period of rehabilitation. Patients should be considered on an individual basis and the potential benefits must be weighed up against the recovery period. Further research is required to see if such

surgery is cost effective and to look at ways in which morbidity and mortality can be reduced.

#### Acknowledgments

The surgeons of the Robert Jones and Agnes Hunt arthroplasty unit; Mr C Evans, Mr N Graham, Mr P Gregson, Mr S Karlakki Mr C McGeoch, Professor J Richardson, Mr R Spencer-Jones, Mr N Steele, and Mr D H Williams.

## REFERENCES

1. **Adunsky A, Lusky A, Arad M, Heruti RJ.** A comparative study of rehabilitation outcomes of elderly hip fracture patients : The advantage of a comprehensive orthogeriatric approach. *J Gerontology* 2003 ; 58-A : 542-547.
2. **Alberton GM, High WA, Morrey BF.** Dislocation after revision total hip arthroplasty : an analysis of risk factors and treatment options. *J Bone Joint Surg* 2002 ; 84-A : 1788-1792.
3. **Arenal JJ, De Teresa G, Tinoco C, Toledano M, Said A.** Abdominal surgery in nonagenarians : short-term results. *Surg Today* 2007 ; 37 : 1064-1067.
4. **Ballard WT, Callaghan JJ, Johnston RC.** Revision of total hip arthroplasty in octogenarians. *J Bone Joint Surg* 1995 ; 77-A : 585-589.
5. **Berend ME, Thong AE, Faris GW et al.** Total joint arthroplasty in the extremely elderly : hip and knee arthroplasty after entering the 89<sup>th</sup> year of life. *J Arthroplasty* 2003 ; 18 : 817-821.
6. **Bridgens JP, Evans CR, Dobson PMS, Hamer AJ.** Intraoperative red blood-cell salvage in revision hip surgery. A case matched study. *J Bone Joint Surg* 2007 ; 89-A : 270-275.
7. **Edwards MB, Taylor KM.** Outcomes in nonagenarians after heart valve replacement operation. *Ann Thorac Surg* 2003 ; 75 : 830-834.
8. **Fisher AA, Davis MW, Rubenach SE, et al.** Outcomes for older patients with hip fractures : the impact of orthopaedic and geriatric medicine cocare. *J Orthop Trauma* 2006 ; 20 : 172-178.
9. **Gregory JJ, Starks I, Phillips SJ.** Five-year survival of patients in their 90th year and beyond undergoing primary hip arthroplasty in the UK. *J Bone Joint Surg* 2010 ; 92-B : 1227-1230.
10. [http://www.statistics.gov.uk/downloads/theme\\_population/NPP2008/wEWcohort08.xls](http://www.statistics.gov.uk/downloads/theme_population/NPP2008/wEWcohort08.xls). National Statistics Online (date last accessed November 30 2009).
11. **Mahomed NN, Barrett JA, Katz JN et al.** Rates and outcomes of primary and revision total hip replacement in the United States medicare population. *J Bone Joint Surg* 2003 ; 85-A : 27-32.
12. **Miura LN, DiPiero AR, Homer LD.** Effects of a geriatrician-led hip fracture program : improvements in clinical and economic outcomes. *J Am Geriatrics Soc* 2009 ; 57 : 159-167.

13. **Pagnano MW, McLamb LA, Trousdale RT.** Primary and revision total hip arthroplasty for patients 90 years of age and older. *Mayo Clin Proc* 2003 ; 78 : 285-288.
14. **Parvizi J, Pour AE, Keshavarzi N et al.** Revision total hip arthroplasty in octogenarians. A case-control study. *J Bone Joint Surg* 2007 ; 89-A : 2612-2618.
15. **Phillips SJ, Chavan R, Porter ML et al.** Does salvage and tranexamic acid reduce the need for blood transfusion in revision hip surgery ? *J Bone Joint Surg* 2006 ; 88-B : 1141-1142.
16. **Radcliffe GS, Tomichan MC, Andrews M, Stone MH.** Revision hip surgery in the elderly : is it worthwhile ? *J Arthroplasty* 1999 ; 14 : 38-44.
17. **Raut VV, Wroblewski BM, Siney PD.** Revision hip arthroplasty : can the octogenarian take it ? *J Arthroplasty* 1993 ; 8 : 401-403.
18. **Saleh E, McClelland DBL, Hay A, Semple D, Walsh TS.** Prevalence of anaemia before major joint arthroplasty and the potential impact of preoperative investigation and correction on perioperative blood transfusions. *Br J Anaesth* 2007 ; 99 : 801-808.
19. **Smith C, Tomassini C, Smallwood S, Hawkins M.** The changing age structure of the UK population. Chapter 4, Focus on People and Migration 2005 UK National Statistics. [http://www.statistics.gov.uk/downloads/theme\\_compendia/fom2005/04\\_FOPM\\_AgeStructure.pdf](http://www.statistics.gov.uk/downloads/theme_compendia/fom2005/04_FOPM_AgeStructure.pdf) (date last accessed 27<sup>th</sup> August 2010).
20. **Strehle J, DelNotaro C, Orlor R, Isler B.** The outcome of revision hip arthroplasty in patients older than age 80 years : complications and social outcome of different risk groups. *J Arthroplasty* 2000 ; 15 : 690-697.