

Quality of life in different age groups after metal-on-metal hip resurfacing arthroplasty

A.V. PAPAVALIOU, R.N. VILLAR

The Wellington Hospital, London - UK

ABSTRACT: Hip resurfacing arthroplasty is known to improve quality of life (QoL) and allow increased activity levels in young patients. It is, however, traditionally offered to the younger age group of patients, largely those aged under 60 years. We studied 42 consecutive patients (42 hips) aged 60 years or over (mean age 64) and 41 consecutive patients (42 hips) under this age (mean age 49), all of whom had undergone a metal-on-metal hip resurfacing arthroplasty. A modified Harris hip score was translated to QoL scores using the Rosser Index Matrix immediately pre-operatively, and at six weeks, six months, one year and four years after surgery. We found a significant improvement in QoL for both groups ($p < 0.0001$) but no difference between the two groups. The maximum improvement was reached one year after surgery. Implant survival at four years was also similar (97.6% for group I and 100% for group II).

We thus conclude that in carefully selected active patients aged 60 years and over, hip resurfacing arthroplasty provides significant and equal QoL improvement as it does for those under this age with similar implant survival. For this reason, age alone should not influence a surgeon's decision to proceed with a hip resurfacing arthroplasty. (Hip Int 2008; 18: 307-12)

KEY WORDS: Hip resurfacing, Quality of life, Age

INTRODUCTION

A review of the hip arthroplasty registers of Denmark, Sweden, and England and Wales, suggests that the type of primary total hip replacement (THR) (cemented, hybrid, uncemented) used by surgeons largely depends on the patient's age (1-3). The current trend is for uncemented and hybrid types of THR to be used predominantly in young and active patients (1-3).

Equally, hip resurfacing is usually offered to patients under the age of 60 years (3-4). The third annual clinical report of the England and Wales national joint registry shows that of the 5091 patients under 55 years of age, 1712 (34%) had a primary resurfacing procedure, compared with only

6% of those aged over 55 years (3). Meanwhile, in the Australian joint registry report, the mean age of a patient undergoing hip resurfacing is 54 years (13 to 81) whereas for a primary total hip replacement it is 67 (13 to 102) (4).

The guidance on the use of Metal-on-Metal (MoM) hip resurfacing arthroplasty by the National Institute for Clinical Excellence in the UK, states that even though the current evidence for the clinical and cost effectiveness of MoM hip resurfacing is principally in individuals less than 65 years of age its suitability should be assessed on an individual basis based on activity levels rather than age alone (5).

Recently Steffen et al published an independent series of 532 patients following hip resurfacing (6). A sub-analysis was performed dividing the hips based on the age of the

patients into young (less than 50 years) and older (more than 50 years). Younger patients had a significantly worse outcome in terms of Oxford Hip Score (OHS) than the older patients, and slightly worse prosthesis survival. They explained this finding by suggesting that a larger proportion of the younger age group had a diagnosis other than primary osteoarthritis (OA).

The end result of surgical prosthetic intervention is traditionally assessed through measures of mortality and mor-

bidity, operative complications, and the survival of the prosthetic material. However, assessment of quality of life (QoL) allows the patient's health status, (a broad concept representing individual responses to the physical, mental, and social effects of illness and its treatment) to be expressed independently of technical concerns, survival data and diagnosis (7-8). The QoL has a numerical value which can be generated from a patient-derived classification of health states called the Rosser Index Matrix (Tab. I) (9-10). The classification examines two areas; disability and distress. There are 29 possible health states, each with a numerical score for QoL (Tab. II). The translation of pre-existing scores to the Rosser Index Matrix can be a source of error and subjectivity (11). The Harris hip score, however, is closely comparable to the Rosser categories, allowing the two parameters (pain and function) to be translated and to thereby quantify QoL (10, 12-13). Data can be collected in one of three ways: from questionnaires completed by the patient, by clinical assessment, or by reprocessing previously collected disease-specific data (10).

The aim of our study, therefore, was to investigate the suitability of metal-on-metal hip resurfacing arthroplasty in patients aged 60 years and over by establishing how the improvement in their QoL after surgery along with the implant survival compared with the post-operative improvement in QoL and implant survival for patients under the age of 60 years.

TABLE I - THE ROSSER INDEX

Disability	
I	No disability
II	Slight social disability
III	Severe social disability and/or slight impairment of performance at work
IV	Choice of work or performance at work severely limited Housewives and old people able to do light housework only, but able to go shopping
V	Unable to undertake any paid employment Unable to continue any education Old people confined to home except for escorted outings and short walks and unable to do any shopping
VI	Confined to chair or wheelchair or able to move around in the house only with support from an assistant
VII	Confined to bed
VIII	Unconscious
Distress	
A	No distress
B	Mild
C	Moderate
D	Severe

PATIENTS AND METHODS

We investigated 84 consecutive cementless, hydroxyapatite-coated Cormet hip resurfacing arthroplasties (Corin

TABLE II - THE ROSSER INDEX MATRIX SHOWING A QOL SCORE FOR EACH DISABILITY/DISTRESS COMBINATION

Disability	Distress			
	A	B	C	D
I	1.000	0.995	0.990	0.967
II	0.990	0.986	0.973	0.932
III	0.980	0.972	0.956	0.912
IV	0.964	0.956	0.942	0.870
V	0.946	0.935	0.900	0.700
VI	0.875	0.845	0.680	0.000
VII	0.677	0.564	0.000	-1.486
VIII	-1.028			

Group plc, Cirencester, UK) in 83 patients. One patient had undergone a bilateral staged procedure during the study period. Each procedure was undertaken by the senior surgeon (RNV) in the same hospital, using the same surgical approach (posterolateral), and the same anaesthetic team. At the time of the operation, 42 of the 83 patients were aged 60 years and over (group I, mean age of 64) and 41 were under this age (group II mean age of 49). Full details of the patients are provided in Table III.

All patients were available for follow-up. Our criteria for hip resurfacing were the same as for THR; hip pain which resulted in limitation of daily or leisure activities. Patients were considered for resurfacing rather than THR if they enjoyed good general health, had good bone stock, maintained the sphericity of the femoral head and had no radiographic evidence of osteopenia or history of osteoporotic fractures. Routine bone density scans were not performed. The pre-operative diagnosis in all patients was OA. In all cases the patients were consented for hip resurfacing and THR. There were no instances where, intra-operatively, the procedure had to be abandoned in favour of a THR because of concerns about the quality or viability of the femoral bone stock. All patients were mobilised on the day of surgery and allowed to bear weight as tolerated.

Pain and function scores were derived from a modified Harris hip score (Tab. IV) (9). The pre-operative scores were obtained on the day of operation. Post-operative information was collected at six weeks, six months and thereafter annually by postal questionnaire until four years after the procedure.

The quantified nature of the questionnaire allows the patient-derived information to produce a numerical score which is based on pain and function. This, in turn, allows its translation into the two dimensions of the Rosser Index

Matrix, distress (pain) and disability (function) which can then be applied to provide one of the 29 possible health states, each with a numerical score for QoL. The Rosser Index Matrix allocates scores from -1.486 to 1.000. A score of 1.000 indicates complete normality, while death is given a score of 0.000. Negative scores indicate health states thought to be worse than death.

An analysis was performed using survival tables to assess implant survival between the two groups at four years (Tabs. V and VI).

Within-group comparisons were used to compare pre- and post-operative scores. Between-group comparisons were used to assess any difference between the two age groups. All data were collected and analysed using Excel spreadsheets (Microsoft Corp., Seattle, Washington, USA). Statistical analysis was performed using the paired t-test with values for $p < 0.05$ being regarded as significant.

RESULTS

The two groups were not specifically matched at an individual level, but had similar mean BMIs and gender ratio (Tab. III). The pre-operative QoL scores were also comparable (Tab. VII). The rate of response to the questionnaire was 100% in both groups throughout the study period.

There was a statistically significant ($p < 0.0001$) improvement in QoL for both patient groups, in comparison with pre-operative levels; this improvement was seen as early as the sixth post-operative week, was maintained and even increased throughout the follow-up (Tab. VII). It reached its maximum score in both groups by one year post-operatively. At this stage 71% (30 patients) from group I and 65% (27 patients) from group II achieved QoL scores of 1.000, in-

TABLE III - DETAILS OF THE PATIENTS STUDIED

	Group I (aged ≥60 yrs)	Group II (aged <60 yrs)
Number of patients/Number of hips	42/42	41/42
Men:women	26:16	27:14
Right:left	22:20	29:13
Mean age in years (range)	64 (60 to 73)	49 (30 to 58)
Mean BMI in kg/m ² (range)	26.04 (19.6 to 30.69)	26.74 (15.6 to 37.22)
Mean follow-up in months (range)	61 (48 to 72)	65 (60 to 72)
Mean pre-operative QoL score (range)	0.927 (0.700 to 0.995)	0.939 (0.700 to 0.995)

BMI = body mass index.

TABLE IV - THE MODIFIED HARRIS HIP SCORE QUESTIONNAIRE

	Score
1. How would you describe your pain?	
A None at all	44
B Occasional pain, does not prevent activities	40
C Pain that only affects strenuous activities	30
D Tolerable pain that affects normal activities	20
E Occasional severe pain with requirement for regular pain-killers	10
F Severe pain, even in bed	0
2. How would you describe your walking?	
A No limp	11
B Slight limp	8
C Moderate limp	5
D Severe limp	0
3. What do you need for walking?	
A I do not need support	11
B One stick for long walks	7
C One stick for most of the time	5
D One crutch	3
E Two sticks	2
F Two crutches	0
G Incapable of walking	0
4. How far can you walk?	
A Unlimited	11
B One mile	8
C Half a mile	5
D Inside the house only	2
E Restricted to bed and armchair	0
5. How would you describe your ability to climb stairs?	
A Normally without using a handrail	4
B Normally but using a handrail	2
C Only just capable of climbing stairs	1
D Not capable of climbing stairs	0
6. How do you put on your shoes and socks/stockings?	
A Easily	4
B With difficulty	0
C Incapable of putting them on	0
7. How do you feel when sitting down?	
A Can sit comfortably for one hour	5
B Can sit comfortably for half an hour	3
C Cannot sit comfortably at all	0
8. Are you able to use public transport? (Or would you be able to even if you normally use a car?)	
A Yes	1
B No	0

dicating a return to complete normality. By four years, this remained unchanged for group I but only 58% (24 patients) of group II maintained QoL score of 1,000. Despite this,

there was no difference between the QoL scores achieved by the two groups at the same post-operative time intervals studied (Tab. VII).

In terms of prosthesis survival, the cumulative survival rate at four years after surgery for group I was 100% and 97.6% for group II (Tabs. V and VI).

DISCUSSION

The recent introduction of metal-on-metal hip resurfacing arthroplasty has shown excellent short- and medium-term survival results for the prostheses with significant post-operative improvements in patients' activities and pain (14-20). The ideal candidate for hip resurfacing is generally believed to be a young (less than 60 years) active male with good bone quality and normal femoral bone geometry. This patient age group, and assuming a normal life span, has a high chance of outliving a conventional THR, so that a more bone-conserving procedure is an appealing option (21).

Recent figures suggest that life expectancy in Europe is increasing; as are the activity levels among the population over the age of 60 years (22). Most reports on hip resurfacing separate older and younger populations in a rather arbitrary fashion. We have chosen to study patients under and over 60 years of age as this is the current approximate mean retirement age in certain key European countries (France 59 yrs, Germany 61 yrs, United Kingdom 62 yrs) (23).

The two main concerns on offering a patient over the age of 60 a hip resurfacing is its cost effectiveness and the concerns of poor bone quality and viability of the femoral neck, which might result in fractures or femoral head osteonecrosis.

Excluding VAT the price of the MoM resurfacing varies between £1700-£1900 compared with approximately £500 for a conventional cemented THR prosthesis and up to £2000 for a cemented/hybrid THR which is the type of prosthesis more likely to be used in an active patient (5).

Fracture of the neck of femur and osteonecrosis has long been recognised as a major complication. However, studies which have investigated these parameters could draw no definite conclusions between age and increased risk of femoral neck fracture or osteonecrosis after hip resurfacing arthroplasty (24-27).

The Australian joint registry report for 2007, has shown

poorer implant survivorship for older patients and especially for those older than 75 years (9.6% revised). In our study, the patients from group I had a mean age of 64 years (range 60 to 73) and were only offered a hip resurfacing if they fulfilled the criteria described.

We found significant and comparable QoL improvements between our two groups after surgery. The maximum improvement was reached in all patients by the first post-operative year, an improvement which was maintained at the four-year follow-up.

A larger number of patients following the operation from group I - 30 patients (71%) at one year and 29 patients (70%) at four years - reached what they perceived as full normality in comparison with group II - 27 patients (65%) at one year and 24 patients (58%) at four years. The mean

QoL scores though, were similar for both groups (Tab. VII). This perhaps reflects the higher activity levels and demands made by younger patients of their hip resurfacing arthroplasties.

Implant survival was similar for both groups at four years. The one patient who required revision was from group I because of cup loosening and was revised to a large head THR. Intraoperatively the femoral component was found well fixed.

We thus conclude that in carefully selected active patients aged 60 years and over, hip resurfacing arthroplasty provides significant and equal QoL improvement as it does for those under this age with similar implant survival. For this reason, age alone should not influence a surgeon's decision to proceed with a hip resurfacing arthroplasty.

TABLE V - SURVIVAL DATA FOR THE HIP RESURFACING ARTHROPLASTIES FOR GROUP I (AGED ≥60 YRS)

Period (yrs)	Number at start	Censored	Number at end	Lost	Survival rate for period (%)	Cumulative survival rate (%)
0 to 1	42	0	42	0	100	100
1 to 2	42	0	42	0	100	100
2 to 3	42	0	42	1	97.62	97.62
3 to 4	41	0	41	0	97.62	97.62

TABLE VI - SURVIVAL DATA OF THE HIP RESURFACING ARTHROPLASTIES FOR GROUP II (AGED <60 YRS)

Period (yrs)	Number at start	Censored	Number at end	Lost	Survival rate for period (%)	Cumulative survival rate (%)
0 to 1	42	0	42	0	100	100
1 to 2	42	0	42	0	100	100
2 to 3	42	0	42	0	100	100
3 to 4	42	0	42	0	100	100

TABLE VII - MEAN QOL SCORES (RANGE) OVER TIME FOR THE TWO GROUPS

	Group I (aged ≥60 yrs)	Group II (aged <60 yrs)
Pre-operative	0.927 (0.700 to 0.995)	0.939 (0.700 to 0.995)
Six weeks	0.982 (0.956 to 1.000)	0.979 (0.900 to 1.000)
Six months	0.996 (0.986 to 1.000)	0.992 (0.956 to 1.000)
One year	0.997 (0.972 to 1.000)	0.997 (0.986 to 1.000)
Four years	0.997 (0.995 to 1.000)	0.996 (0.986 to 1.000)

QoL = quality of life.

Financial support: No benefits or funds were received in support of the study.

Conflict of interest: None.

Address for correspondence:

A.V. Papavasiliou
The Wellington Hospital
St. John's Wood
London NW8 9LE, UK
ppvsla@aol.com

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