OBESITY AND QUALITY OF LIFE AFTER PRIMARY HIP ARTHROPLASTY

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In a prospective trial we studied 176 consecutive patients having a primary total hip arthroplasty to compare the quality of life before and after operation in non-obese and obese groups. We used a modified Harris hip score and the Rosser Index Matrix to generate these scores, and found that the median preoperative quality of life score for both groups was similar.

During review, both groups showed a corresponding marked improvement in quality of life scores at one and three years. There was no statistically significant difference in the improvement in scores between the non-obese and obese groups. It appears that relative body-weight on its own does not influence the benefit derived from primary total hip arthroplasty.

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There is a traditional association between obesity and increased postoperative complications, which include higher incidences of deep-vein thrombosis, wound infection and dehiscence, and respiratory problems (Strauss and Wise 1978). In addition, fracture of the femoral component and aseptic loosening have both been shown to occur earlier and with greater frequency in obese patients after total hip arthroplasty (THA) (Wroblewski 1982; Hierton, Blomgren and Lindgren 1983).

Despite these risks, THA is performed on a number of obese patients, defined as having a body mass index of >25 (Garrow and Webster 1985). Quality of life (QoL) assessment is becoming an increasingly important outcome measure in determining the impact and success of joint arthroplasty (Gartland 1988), but we could find no study of the effect of body-weight on QoL after primary THA. Research of this kind centres on the health of the patient

and may be more meaningful than assessments of the technical efficiency of the procedure.

We aimed to determine by a prospective trial whether there is a difference in the QoL between non-obese and obese patients after primary THA.

PATIENTS AND METHODS

During 1990 and 1991 we studied 176 consecutive patients having a primary THA for osteoarthritis. All the operations were performed by or under the supervision of the senior surgeon (RNV).

The body mass index (BMI) was calculated for each patient from their height and weight at the time of admission for arthroplasty. The patients were divided into four groups in terms of obesity: non-obese (BMI < 25); grade I, mild ($25 < \text{BMI} < 29.9$); grade II, moderate ($30 < \text{BMI} < 39.9$); and grade III, severe (BMI > 40) (Garrow and Webster 1985). There were 85 in the non-obese group, 56 in grade I and 24 in grade II. Only one patient had a BMI > 40 and was therefore placed in the grade-II group which we then renamed the 'grade II and above group'.

Pain and function scores were derived from a modified Harris hip score (Harris 1969), excluding information on deformity and range of motion. The preoperative scores were obtained by personal interview by an audit co-ordinator on the day before surgery. Postoperative information was collected annually by postal questionnaire and when necessary followed up by telephone by the same audit co-ordinator. The postal questionnaire was sent to all the patients with an accompanying letter requesting their assistance in gathering information for research purposes. They were asked to highlight the answers to the questions shown in Table I which best described their condition.

The qualitative nature of these pain and function scores made it possible to translate them directly into Rosser categories for distress (pain) and disability (Kind, Rosser and Williams 1982; Table II). These scores were then superimposed on to the Rosser Index Matrix (Gudex and Kind 1986; Drewett, Minns and Sibly 1992) (Table III) to derive QoL scores. The Rosser Index Matrix allocates scores ranging from -1.486 to 1.000 . A score of 1.000 indicates complete normality and death is given a score of 0.000 . Negative scores indicate health states thought to be worse than death.

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Table I. 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

Statistical analysis of the difference in QoL scores between the non-obese and obese populations was performed using the Mann-Whitney U and the Wilcoxon signed-rank tests. Analysis was carried out to ascertain the difference in QoL between preoperative and postoperative scores within the same population (non-obese and obese)

Table II. The Rosser Index (Rosser and Watts 1972)

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

Table III. The Rosser Index Matrix showing a QoL score for each disability/distress combination (Gudex and Kind 1988)

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			

and between different populations (non-obese v obese).

RESULTS

Of the 176 patients, ten were not included in the final analysis because of inadequate follow-up data (they had died before one year had elapsed postoperatively). These ten patients did not differ significantly from the remaining patients with regards to gender, age, diagnosis and BMI ($p > 0.05$) (Table IV).

The average ages of the weight groups were not statistically significantly different (Table IV). There was an

Table IV. The age and gender distribution of the 176 patients with OA according to their grade of obesity

	Non-obese	Obesity		Not followed up
		Grade I	Grade II and above	
Number of patients	85	56	25	10
Age in years ($\pm$ SD)	71.4 $\pm$ 4.9	69.0 $\pm$ 5.1	68.1 $\pm$ 4.7	73.2 $\pm$ 6.3
Female (%)	54 (30.7)	27 (15.3)	17 (9.7)	6 (3.4)
Male (%)	31 (17.6)	29 (16.5)	8 (4.5)	4 (2.3)

Table V. The median QoL scores for the non-obese group (n = 85) preoperatively, and at one- and three-year reviews

Disability	Distress			
	A	B	C	D
Preoperative				
I	-	-	-	-
II	-	-	11	4
III	-	-	6	21
IV	-	-	2	23
V	-	-	-	18
VI	-	-	-	-
At one-year review				
I	21	8	-	-
II	23	20	8	1
III	2	1	1	-
IV	-	-	-	-
V	-	-	-	-
VI	-	-	-	-
At three-year review				
I	24	9	2	1
II	19	14	9	3
III	-	2	1	-
IV	-	-	-	1
V	-	-	-	-
VI	-	-	-	-

Table VI. The median QoL scores for the grade-I obesity group (n = 56) preoperatively and at one- and three-year reviews

Disability	Distress			
	A	B	C	D
Preoperative				
I	-	-	-	-
II	-	-	9	-
III	-	-	6	11
IV	-	-	3	19
V	-	-	1	7
VI	-	-	-	-
At one-year review				
I	11	2	1	-
II	16	18	-	1
III	3	1	3	-
IV	-	-	-	-
V	-	-	-	-
VI	-	-	-	-
At three-year review				
I	13	7	-	-
II	17	12	4	-
III	1	-	-	2
IV	-	-	-	-
V	-	-	-	-
VI	-	-	-	-

overall preponderance of female patients (1:1.44), with similar proportions in the non-obese group and the 'grade-II and above' obesity group. There were more men in the grade-I obesity group (Table IV).

From Table V, the median preoperative QoL score for the non-obese group was 0.912 (0.700 to 0.973). The one-year

Table VII. The median QoL scores for the 'grade-II and above' group (n = 25) preoperatively and at one- and three-year reviews

Disability	Distress			
	A	B	C	D
Preoperative				
I	-	-	-	-
II	-	-	2	2
III	-	-	1	3
IV	-	-	-	17
V	-	-	-	-
VI	-	-	-	-
At one-year review				
I	6	1	-	-
II	8	1	1	-
III	-	3	4	-
IV	-	-	1	-
V	-	-	-	-
VI	-	-	-	-
At three-year review				
I	5	2	-	-
II	5	-	-	-
III	4	3	3	2
IV	-	-	1	-
V	-	-	-	-
VI	-	-	-	-

QoL was significantly improved ($p < 0.001$) with a median score of 0.990 (0.932 to 1.000) and 24.7% of patients experienced no distress or pain. At three years the results remained similar, with a median QoL score of 0.990 (0.870 to 1.000), not significantly different from the one-year score ($p > 0.05$).

Table VI shows that the grade-I obesity group had a median preoperative QoL score of 0.912 (0.700 to 0.973), identical to that of the non-obese group. There was a highly significant improvement to a median score of 0.990 (0.956 to 1.000) at one year ($p < 0.001$) and at three years (median score 0.990; range 0.912 to 1.000) ($p < 0.001$).

The 'grade-II and above' obesity group (Table VII), although a smaller sample, produced very similar results to the other two groups. The median preoperative QoL score was 0.870 (0.870 to 0.973), the median score at one year was 0.990 (0.942 to 1.000) and at three years 0.980 (0.912 to 1.000). There was no significant difference between the one-year and three-year scores ($p > 0.05$).

The non-obese group and both grades of obesity groups showed very similar improvements in median QoL scores from before operation to one year ($p > 0.05$) and three years ($p > 0.05$).

DISCUSSION

Many osteoarthritic patients awaiting THA are overweight (Goldin et al 1976); in our series 49% were classified as obese, as defined by their BMI (Garrow and Webster 1985). The preoperative QoL scores confirm that advanced osteoarthritis of the hip causes severe distress and disability

regardless of body-weight, but we found no significant difference in the degree of distress and disability between the non-obese and obese groups.

Our postoperative QoL results suggest that there was no difference in the quality of life after a primary THA between the non-obese, mildly obese and moderately obese groups at one and three years, but we have no data for morbidly obese patients with a BMI > 40. Follow-up for one year has been deemed sufficient to show the benefits from THA (Pugh 1973); our findings confirm this and have also shown that this significant improvement was maintained at three years.

The translation of existing scoring systems into Rosser health-state categories has been criticised as a potential source of error and subjectivity (Carr-Hill and Morris 1991; Coast 1992), but the modified hip score which we used

lends itself well to translation because the patient answers questions about the same variables of pain (distress) and function (disability) as are included in the Rosser Index.

Our findings compare well with other published results (O'Boyle et al 1992; Laupacis et al 1993) showing that THA produces good improvement of the quality of life for patients suffering from osteoarthritis. We have also shown that a BMI of up to 40 does not influence the improvement of the QoL score in the medium term. The effect of obesity on the success of joint arthroplasty is of considerable concern to the surgeon. Although weight reduction before hip replacement has been recommended (Larsen and Sorensen 1980), we conclude that patients should not be denied the benefits of THA on the basis of obesity alone.

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