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Original Article

Activity levels following hip resurfacing arthroplasty: A tool to help manage patient expectations

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ABSTRACT

Background: When compared to total hip arthroplasty (THA), hip resurfacing arthroplasty (HRA) is usually undertaken in younger, more active patients with hip osteoarthritis. Previous research has noted that patients are able to return to pre-operative activity levels, with many even increasing their activity post HRA, but patterns in post-operative recovery have been less well investigated.

Materials and Methodology: A randomised controlled trial dataset was analysed to explore activity levels attained after HRA. Data was collected on 80 male patients. The primary outcome of focus was the University of California, Los Angeles (UCLA) Activity Index, with follow-up at 6 weeks, 16 weeks and 1 year.

Results: Mean UCLA at baseline was 5.4 (SD; 2.1) which, after an initial fall to 4.7 (SD; 1.6, $p = 0.008$) at 6 weeks, increased at both the 16 week and 1 year follow ups ($p < 0.001$), with a final mean activity index of 7.2 (SD; 1.7). Mode UCLA at 1 year was 7 or 8, representing patients who are regularly taking part in activities such as cycling and golf.

Conclusion: Following HRA, patients can achieve significant improvements in activity measured using the UCLA Activity Index. Activity levels have been shown to initially decrease following HRA, with improvement throughout the first postoperative year. The results of this study provide clinicians with a simple tool to help patients visualise their post-operative recovery. This may have implications when managing patient expectations of post-operative activity level in both HRA and large head THA populations.

1. Introduction

The number of primary hip arthroplasties recorded in the UK since the National Joint Registry's inception in April 2003 has now reached almost 900,000. Of all hip arthroplasty subgroups, hip resurfacing arthroplasty (HRA) has the youngest population at a median age of 55.[1] Due to this younger population, many patients wish to return to their previous level of physical activity, with some patients that had not previously taken part in sporting activities prior to surgery, being able to take up some level of sport after HRA.[2–4] The HRA procedure itself presents several advantages over conventional total hip arthroplasty (THA) including bone stock preservation and reduced dislocation rates, which assist with return to impact activity.[5] In addition, it is suggested that gait characteristics in patients following HRA are more normal than those who have undergone THA,[6] and overall the procedure has provided excellent success rates in these populations with survival rates reported at over 95% at 10 years.[7–9]

The outcomes of HRA have been well investigated, with the procedure noted as an attractive treatment option for the younger active population.[10,11] Nevertheless, HRA has not been without controversy due to the concern over adverse reactions to metal debris from wear of the metal components.[12,13] Whilst recent research has shown problems with metal sensitivity reaction in patients of small stature and women (leading to MHRA guidance) the use of HRA is still a recommended treatment for younger male patients. Although metal-on-metal (MOM) resurfacing implants account for only 4.4% of hip replacements since April 2003, current HRA research may be applicable to large head THA and short femoral metaphyseal stem arthroplasties, due to the advantages and functional outcomes that these tissue preserving techniques share.[11,14]

Activity level and return to sporting activity have been reported by experts in THA.[15,16] This has provided a consensus on return to specific activities; however, no such consensus exists within HRA literature. Return to sport following HRA has been investigated suggesting that activities can be maintained, particularly in the case of lower impact sports such as golf and swimming, but patients were less likely to take part in higher impact sports such as soccer and badminton.[2] Other authors have come to a similar conclusion, noting that patients are able

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to return to activities at pre-operative intensity, maintaining their activity levels with few complications.[17] There have also been attempts to identify correlations and predictors of function, noting associations between self-reported functional questionnaires and observed outcome measures as well as predictors such as age, male gender and pre-operative activity level,[18] but patterns of post-operative recovery have been less well investigated.

With this in mind, further research in this area is of importance as these results may have implications for realistic functional goal setting, pre-operative assessment, and altered emphasis on activity levels within both HRA and large head THA populations. This study aims to report on trends in activity levels and functional outcomes of patients through the first post-operative year following HRA.

2. Materials and methods

Data analysis was performed on a pre-existing dataset. This data was originally collected for a randomised controlled trial with follow up at 6 weeks, 16 weeks and 1 year, attempting 'to identify if a tailored rehabilitation programme is more effective than standard practice at improving function in patients undergoing metal-on-metal hip resurfacing arthroplasty'.[19] Data was collected on a total of 80 male patients who underwent HRA performed by five different consultant-grade orthopaedic surgeons, using their preferred approach and prostheses. Exclusion criteria included patients due for bilateral arthroplasty, minimally invasive surgery, patients in whom further lower limb joint surgery was planned within 12 months and patients unable to provide informed consent.

Primary outcomes were the University of California, Los Angeles (UCLA) Activity Index, a simple self-reported 10 point scale measuring activity levels, the Oxford Hip Score (OHS), a short 12 item questionnaire used to assess hip function and pain and Hip disability and the Osteoarthritis Outcome Score (HOOS), a 10 min questionnaire, split into five subsections, designed to evaluate symptoms and functional impairments of the hip. These measures were collected at baseline and 6 weeks, 16 weeks and 1 year following HRA. Secondary outcomes included hip range of motion (ROM) and muscle strength. For the purposes of this analysis, both the control and intervention group data were combined, producing a prospective cohort study design of 80 male patients. UCLA activity index was the primary outcome of focus during this analysis, which has been shown to be a reliable and valid tool for assessment of activity levels in patients undergoing total joint arthroplasty, specifically THA, with superior metric properties when compared to other instruments such as the Tegner Activity Scale.[20]

Statistical analyses were performed using IBM SPSS version 23. There were 30 cases (9.4%) of missing data from the UCLA Activity Index throughout the four follow ups (320 data sets) which were excluded from the analysis. The Wilcoxon Signed Rank test was used to analyse related non-parametric data and Mann-Whitney U for unrelated non-parametric data. The Chi-Squared test for association and Pearson correlation were used to assess for the association between characteristics. Variables were categorised for association analysis. UCLA Activity Indexes were categorised into low activity (UCLA ≤ 6) and high activity (UCLA ≥ 7), OHS was categorised into, excellent (42–48), good (34-41), fair (27–33), and poor (0–26) and Body Mass Index (BMI) was categorised into underweight (BMI ≤ 18.4), healthy (BMI 18.5–24.9), overweight (BMI 25.0–29.9) and obese (BMI ≥ 30.0). Significance was defined at $p < 0.05$.

3. Results

3.1. Demographics

Eighty male patients were included in the analyses with a mean age of 54 (SD; 8.5), comprising 38 (47.5%) right and 42 (52.5%) left operated hips. Thirty five patients (43.8%) reported that a single hip was affected (Charnley classification class A), 36 (45%) described both hips as affected (class B) and 8 patients (10.0%) stated that multiple joints were affected (class C).

Table 1
Post-operative complications.

Complication	Number (%)
Significant Unexplained Pain	13 (16.25%)
Superficial Wound Infection	3 (3.75%)
Deep Infection	0
Deep Vein Thrombosis	1 (1.25%)
Pulmonary Embolism	1 (1.25%)
Dislocation	0
Fracture	2 (2.5%)
Aseptic Loosening	0

3.2. Complications

In the first year, 2 patients (2.5%) had their HRA revised to a THA following femoral neck fractures, and 2 patients (2.5%) had further surgery (one for heterotrophic ossification and one had fluid aspirated from the groin). Two patients (2.5%) had unconfirmed adverse reactions to metal debris. There were no reported cases of deep infection, aseptic loosening or dislocation (Table 1).

3.3. Function

Self-reported functional outcomes (Table 2) showed a significant improvement in OHS and HOOS ($p < 0.001$) comparing scores at baseline and 1 year. The most statistically significant change in HOOS questions were the symptoms and pain subscale scores ($p < 0.001$). The number of patients that classed their walking as unlimited rose from 43 (53.8%) to 66 (82.5%) ($p < 0.001$), and those that reported a normal gait pattern when climbing stairs increased from 34 (42.5%) to

Table 2
Self-reported functional questionnaires.

Outcome measure	Score
UCLA (1-10), median (IQR)	
Baseline	5.0 (4.0)
1 Year	7.0 (2.0)
Oxford Hip Score (0-48), mean (SD)	
Baseline	25.9 (8.3)
1 Year	44.3 (7.0)
HOOS (0-100), mean (SD)	
Total	
Baseline	46.3 (14.7)
1 Year	87.6 (13.9)
Symptoms	
Baseline	48.9 (19.8)
1 Year	88.7 (15.4)
Stiffness	
Baseline	45.2 (17.4)
1 Year	84.4 (19.8)
Pain	
Baseline	49.5 (14.8)
1 Year	92.8 (14.7)
Function of Daily Living	
Baseline	57.6 (17.4)
1 Year	94.1 (10.8)
Function of Sport	
Baseline	32.7 (20.0)
1 Year	82.4 (21.7)
Quality of Life	
Baseline	38.5 (15.9)
1 Year	80.8 (20.3)

UCLA, University of California Los Angeles Activity Score; HOOS, Hip disability and Osteoarthritis Outcome Score; OHS, Oxford Hip Score; IQR, Interquartile Range; SD, Standard Deviation.