

Patient-reported outcome of hip resurfacing arthroplasty and standard total hip replacement after short-term follow-up

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ABSTRACT

INTRODUCTION: The purpose of this study was to investigate patient-reported outcome in terms of satisfaction in two study groups that had undergone hip resurfacing arthroplasty (HRA) or total hip replacement (THR). The procedure consists of placing a hollow, mushroom-shaped metal cap over the femoral head while a matching metal cup is placed in the acetabulum (pelvis socket).

MATERIAL AND METHODS: The two study groups included a total of 84 patients with an average age of 57 years who had idiopathic hip osteoarthritis or secondary arthritis based on mild dysplasia with arthritis. A descriptive cross-sectional design was used. A patient-reported questionnaire was used to evaluate patient outcome three years after hip surgery.

RESULTS: The study showed that both groups (HRA and THR) reported high levels of overall satisfaction, with 97% and 93% being very satisfied or satisfied. Men were more satisfied with their ability to walk longer distances than women ($p < 0.05$) and the THR group claimed to be treating their artificial hip with more caution than the HRA group ($p < 0.05$).

CONCLUSION: The choice of prosthesis (HRA or THR) does not appear to affect the overall satisfaction or patient-perceived functional outcome three years after surgery in patients who on average were 57 years old and who had idiopathic hip osteoarthritis or secondary arthritis based on mild dysplasia.

FUNDING: A number of the patients included in this study were enrolled in a randomized controlled trial that was financially supported by Protosekompagniet. Furthermore, Centre for Applied Health Services Research and Technology Assessment (CAST) has paid wages in the preparation of the qualitative aspect of the research.

TRIAL REGISTRATION: The survey was not registered at Clinical Trials because the starting point for this study was a health technology assessment report based on a randomized controlled trial (RCT). This RCT was registered at Clinical Trials with the identification number NCT01113762. The patient population was partly taken from this RCT and partly from an earlier pilot study conducted at Odense University Hospital. The present study was registered at the Danish Data Protection Agency, registration number 2010-41-5661.

During the past decade, hip resurfacing arthroplasty (HRA) has been used in selected Danish patients with degenerative hip disease [1]. HRA is used mainly in cases where younger patients might otherwise be expected to replace their standard prosthesis within 10-15 years.

The procedure consists of placing a hollow, mushroom-shaped metal cap over the femoral head while a matching metal cup is placed in the acetabulum (pelvis socket). HRA may have some advantages compared with conventional total hip replacement (THR). Resurfacing surgery preserves more femoral bone than conventional THR surgery which preserves the option of further treatment via a standard THR. Register studies show an overall increased failure rate of HRA compared with THR, but in male patients younger than 65 years with primary osteoarthritis, the survival rates of HRA are equivalent to those of THR [2, 3]. The internationally recommended age group for HRA prosthesis is younger patients [4].

HRA also raises some concerns – especially about the release of large amounts of very small wear particles that lead to elevated metal ion concentrations locally and in the peripheral blood. The long-term biological consequences of exposure to these Co-Cr particles and ions remain largely unknown, but development of pseudo-tumours locally in response to excessive metal particles and metal ion is a serious complication. Moreover, fracture of the femoral neck is a well-known risk [5, 6]. HRA holds a promise for improving the quality of life in younger patients wanting to maintain an active lifestyle, but questions regarding risk factors need to be addressed.

Patient-reported outcome measures after HRA/THR focusing on pain, health outcomes and satisfaction are becoming increasingly important in evaluating the results of surgery [7]. Few studies have focused on patient-reported outcomes such as satisfaction or patient-perceived functional outcomes after HRA [8, 9]. No Danish studies have compared satisfaction after HRA versus THR. The measurement of patient satisfaction, however, is complex and should ideally be studied by including several factors instead of measuring one overall dimension [8, 10].

The purpose of this study was to investigate pa-

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TABLE 1

Characteristics of total hip replacement and hip resurfacing arthroplasty (n = 84).

	Total hip replacement	Hip resurfacing arthroplasty
Women, %	33	37
Men, %	67	63
Age, years, mean	61	55
Idiopathic arthritis, n	32	40
Secondary arthrosis based on mild dysplasia, n	4	8

tient-reported outcome in terms of satisfaction in two study groups that had undergone HRA or THR.

MATERIAL AND METHODS

The present study was designed as a cross-sectional study.

Patients

In total, 96 patients were eligible to receive the questionnaire. Thirty-nine (20 HRA and 19 THR) of these patients participated in a RCT and 57 patients (36 HRA and 21 THR) were recruited during a pilot study in the 2002-2006 period. THRs were all cementless components with a 28-mm head, whereas HRAs had a cementless cup and a cemented head. The head diameter ranged from 44 to 57 mm. Inclusion criteria for all patients were: aged 40-65 years with the following diagnoses: idiopathic arthritis or secondary arthritis based on mild dysplasia. This is the internationally recommended age group for

HRA [4]. Exclusion criteria: dysplasia of the acetabulum, severe caput-neck deformity, reduced neck length, difference in length of the legs, offset problems, deformation by any previous fracture or osteotomy, inflammatory arthritis, endocrinological disorders, malignancy, neuromuscular and vascular disease, osteoporosis and patients treated with morphine because of other ailments or a body mass index > 30 kg/m².

Evaluation of patient-reported satisfaction

A literature search was carried out on 30 March 2009 in the following databases to find validated questionnaires: PubMed, The Health Technology Assessment (HTA) Database and The National Project Database for HTA and Evaluation. The search was performed with the following subject headings: "hip resurfacing OR hip arthroplasty AND patient satisfaction". No validated questionnaire that could measure patient-reported satisfaction with a hip replacement was found in the literature of the past ten years. A questionnaire was therefore devised specifically for this study. The questionnaire was based on the key concepts of the framework by Mainz, Donabedian and Carr-Hill, which concerns patient-perceived quality in relation to the concept of patient-reported outcome [11-13]. The questionnaire was also partly based on two qualitative focus-group interviews with patients from the same study group – with a particular focus on how they perceived the outcome of the surgery. A total of nine key concepts were identified and converted into 34 questions via the above procedure: Background information, causes of hip surgery, satis-

TABLE 2

Patient satisfaction (n = 84) after total hip replacement and hip resurfacing arthroplasty as percentages.

Question	Total hip replacement				Hip resurfacing arthroplasty				p value
	very satisfied	satisfied	un-satisfied	very un-satisfied	very satisfied	satisfied	un-satisfied	very un-satisfied	
Overall satisfaction: How satisfied are you with your artificial hip in terms of pain you currently experience?	58	39	3	–	70	23	6	–	0.27
<i>How satisfied are you with your artificial hip in terms of</i>									
Sitting?	67	33	–	–	66	32	2	–	0.68
Standing?	60	37	3	–	67	29	4	–	0.73
Getting in and out of bed?	69	29	3	–	77	23	–	–	0.40
Climbing stairs?	56	33	8	3	56	40	4	3	0.54
Walking longer distances (more than 30 min. without a break)?	60	23	14	3	51	36	6	3	0.35
Participating in sports? ^a	26	58	11	5	50	37	10	5	0.41
Having sexual intercourse?	52	45	3	–	55	41	5	–	0.92
Your social life?	69	31	–	–	72	23	4	–	0.37
Performing your job? ^b	62	38	–	–	66	32	–	–	0.69

- a) A total of 15 total hip replacement patients and 14 hip resurfacing arthroplasty patients indicated that they did not practice any sports – these patients were excluded from this analysis.
 b) A total of 15 total hip replacement patients and 11 hip resurfacing arthroplasty patients said that they were not active in the labour market – these patients are excluded in this analysis.

faction with the outcome of hip surgery, functionality of the hip, pain, rehabilitation period after discharge, complications, concerns and diligence dealing with hip prosthesis. The nine key concepts were converted into 34 questions, and answer options were presented as a five-point Likert scale, except for eight “yes” or “no” questions.

Pre-test

The questionnaire was pretested by orthopaedic surgeons and by patients who had undergone hip surgery.

Ethical considerations

This questionnaire survey was distributed by mail. The patients were informed about the goal of the survey and guaranteed anonymity. The survey was registered at the Danish Data Protection Agency with registration number 2010-41-5661. The author did not register the study at the local research ethics committee which is in accordance with the general rules for retrospective studies.

Statistics

Responses to the questionnaire survey were analyzed using SPSS version 17.0. Descriptive statistics (frequencies, cross-tabulation) were used to analyze all questions – demographic (gender, age, education, employment, etc.) as well as satisfaction-related. The statistics used were approved by an expert statistician. Frequency measurements were all tested by using Pearson’s chi square test at a 0.05 level of significance.

Trial registration: The present study was registered with the Danish Data Protection Agency, registration number 2010-41-5661.

RESULTS

A total of 84 patients completed the questionnaire survey (88% response rate). Date of operation, type of hip prosthesis, age and gender did not differ significantly between respondents and non-respondents. The patients included (n = 84) were divided into a THR group (43% of the patients) and a HRA group (**Table 1**). The patients in the HRA group were on average six years younger than those in the THR group. There were slightly more men than women in both groups.

There was no significant difference in overall satisfaction between the THR and HRA group (**Table 2**). Both groups reported high levels of overall satisfaction, with 97% and 93% being very satisfied or satisfied, respectively.

A comparison of genders showed that the men were significantly more satisfied with their ability to walk longer distances than women ($p < 0.05$), irrespective of type of prosthesis ($p = 0.92$) (**Table 3**).



TABLE 3

Satisfaction percentages by gender. p-value = 0.01.

Question	Women				Men			
	very satisfied	satisfied	unsatisfied	very unsatisfied	very satisfied	satisfied	unsatisfied	very unsatisfied
How satisfied are you with your artificial hip in terms of walking longer distances? (more than 30 minutes without a break)	32	43	21	4	67	24	4	5

The conventional THR group claimed to treat their artificial hip with more caution than the HRA group ($p < 0.05$). Patients were asked to respond to the statement “I am generally careful with my artificial hip (e.g., I avoid sharp movements, extreme positions and movements that hurt)” with a “yes” or a “no”. 38% of the HRA group responded “yes” and 62% “no”, whereas in the THR group 60% responded “yes” and 40% “no”.

DISCUSSION

This cross-sectional study of 84 consecutive patients aimed to evaluate and compare the patient-reported outcome in relation to satisfaction with the functioning of the prosthesis after conventional hip replacement and HRA. The study showed no major difference between patient groups and could not verify the potential benefits of HRA.

The questionnaire was carefully structured and contained a large number of satisfaction-related questions, whereas other studies have often only used a few questions. These studies often measure satisfaction only in terms of overall satisfaction [9, 14]. In addition, to ensuring content validity, a theoretical literature review was conducted. A literature search and results from two qualitative focus-group interviews were used as input to develop the key questions that would reflect the patients’ view of the outcome after their hip surgery. The questionnaire was also pilot-tested by surgeons and patients, and the high response rate indicates that the survey was considered credible and relevant.

The study has some limitations. Firstly it is not a randomized clinical trial. Some selection bias might therefore be present. However, the diagnosis and gender distribution were comparable. Moreover, patients in the HRA group were six years younger than patients in the conventional THR group. Furthermore, the HRA group might have had higher expectations than the standard group, as some of them were offered HRA during the pilot study of the RCT. Patients who received the questionnaire were selected over a period of seven years. Satisfaction may therefore be influenced by

changing courses in terms of pain, time of mobilization and early discharge, etc.

The present study showed that at an average of three years after hip surgery, overall satisfaction was equal in the two groups. Moreover, patients in the HRA group felt less cautious about walking and men claimed to be more satisfied with walking longer distances. The absence of an overall difference in patient-reported outcome after hip surgery has also been found in other studies [9, 14, 15]. A study by Mont et al compared overall satisfaction among patients (mean 52 years) with either HRA or THR prosthesis after a follow-up of 40 months. The study showed that the groups were equally satisfied with overall performance and that satisfaction was very high – a mean of 9.2 out of 10 points for the HRA group and 8.8 out of 10 points for the THR group. Although the present study measured more dimensions of patient satisfaction after hip replacement, the study results are comparable to those of other studies [9, 14, 15].

Few studies have examined patient satisfaction on more than one dimension similar to ours [8, 15]. Lingard et al found significantly higher satisfaction scores for returning to daily activities for HRA patients, which was one of four satisfaction measuring questions. Hall et al found that there was no difference regarding the Oxford Hip score and Short Form Health Survey 12 in a study from the United Kingdom. Moreover, the patients were asked to complete an eight-question satisfaction survey six months postoperatively. The HRA group reported significantly better heavy lifting and were likely to experience “excellent” or “very good” pain relief compared with the THR group [8]. When measuring satisfaction in this particular study and by asking several

questions, we found a significant difference not between the two prosthetic groups, but between the genders. Thus, men were more satisfied with their ability to walk longer distances than women. The finding was significant in both the HRA and THR group. A study by Röder et al showed a pre-surgery difference in connection with THR surgery between the two genders in terms of physical functionality, and that this difference was even more pronounced postoperatively [16]. A significantly larger proportion of men were able to walk at least 60 minutes during the first ten years after THR. Another study by McMurray et al investigating recovery from THR surgery also found a gender difference in physical function, which was significantly lower for women than for men across the entire three-year recovery period [17]. The pre-surgical physical function was not measured beforehand either in the present study or in the referenced study by McMurray et al. Given a choice, women choose surgery later in the process of functional decline than men [17]. The fact that women in the present study are significantly less satisfied with walking longer distances may reflect this tendency to seek help later. Furthermore, differing patterns of physical recovery may also contribute to explain the lower satisfaction among women.

A notable finding is that at an average of three years after hip surgery, the THR group indicated that they were significantly more careful with their artificial hip than the HRA group. Information given before surgery informs patients about restrictions after surgery. After HRA surgery, there are no physical restrictions, but after THR surgery there are some restrictions in the first three months. Patients with unrestricted movements are, however, advised to avoid sharp movements, extreme positions and movements that hurt [18]. Information, both written and verbal, given at the time of surgery seems to influence how careful the group of patients with THR prosthesis are three years after surgery.

CONCLUSIONS

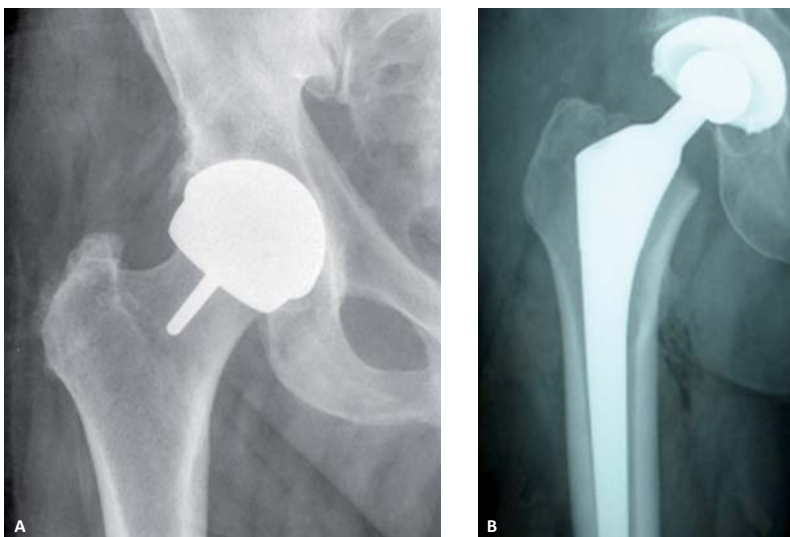
The choice of hip prosthesis – conventional THR or HRA – does not seem to affect the patient-reported outcome in terms of overall satisfaction in younger (mean age 55-61 years old) hip patients with idiopathic hip osteoarthritis or secondary arthritis based on mild dysplasia. The HRA group were less cautious when walking, and men claimed to be more satisfied than women when walking more than 30 minutes without a break – irrespective of type of prosthesis.

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Hip resurfacing arthroplasty (A) and standard total hip replacement (B).



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