Return to sport after joint replacement

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Our aim was to determine the pre-operative sporting profiles of patients undergoing primary joint replacement and to establish if they were able to return to sport after surgery. A postal survey was completed by 2085 patients between one and three years after operation. They had undergone one of five operations, namely total hip replacement, hip resurfacing, total knee replacement, unicompartmental knee replacement or patellar resurfacing. In the three years before operation 726 (34.8%) patients were participating in sport, the most common being swimming, walking and golf. A total of 446 (61.4%) had returned to their sporting activities by one to three years after operation and 192 (26.4%) were unable to do so because of their joint replacement, with the most common reason being pain. The largest decline was in high-impact sports including badminton, tennis and dancing. After controlling for the influence of age and gender, there was no significant difference in the rate of return to sport according to the type of operation.

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Advances in surgical techniques have been accompanied by increasing patient expectations and there is now a demand for joint replacement to allow a return to higher function activities, such as sports. The ability to return to sporting activities is important to some patients and if such expectations are not met, there may be dissatisfaction with the outcome of technically successful surgery.^{1,2}

It is predicted that the demand for total hip replacement (THR) and total knee replacement (TKR) will grow by 174% and 673%, respectively, between 2005 and 2030,³ because of changing demographics and wider indications.⁴ With the increase in joint replacement and the rise in expectations, it is important to determine if these procedures allow patients to return to sporting activities.

Although previous studies have explored participation in sport after joint replacement,⁵⁻¹³ none has compared the rate of return to sport after a range of such procedures in the lower limb. We have undertaken a cross-sectional postal survey to determine the pre-operative sporting profiles of patients undergoing either primary THR, hip resurfacing, TKR, unicompartmental knee replacement (UKR) or patellar resurfacing and to establish if these procedures allow them to return to sporting activities.

Patients and Methods

All living patients who had undergone a primary THR, hip resurfacing, TKR, UKR or patellar resurfacing at the Avon Orthopaedic Centre between April 2004 and April 2006 were included in the survey. Ethical approval had been obtained from the Local Research Ethics Committee.

Questionnaires were sent to 3125 patients, of whom 2085 (66.7%) responded. Of these, 911 had THR, 157 hip resurfacing, 866 TKR, 100 UKR and 51 patellar resurfacing.

We included patients in whom the operation had been performed between one and three years previously because the short-term outcome has been shown to reflect the longer-term result.^{14,15} Patients who had multiple primary joint replacements were sent a questionnaire about one joint only to reduce the participation burden and to ensure that they were not over-represented in the study. The joint included was the first to be replaced during the period of study. If simultaneous replacements were performed, the side was chosen at random.

The patients were asked if they had taken part in any sport in the three years before their joint replacement. If they answered 'yes' they were asked to list their sporting activities. They were then asked whether they had been able to return to any sporting activities post-

Table I. Clinical details, post-operative pain and function scores and participation in sport

	Overall	THR*	Hip resurfacing	TKR†	UKR‡	Patellar resurfacing
Number of patients	2085	911	157	866	100	51
Gender (%)						
Male:female	42:58	37:63	71:29	41:59	48:52	23:77
Mean age at surgery in yrs (range)	67.3 (15 to 94)	68.2 (15 to 94)	52.2 (25 to 72)	69.6 (26 to 93)	66.0 (45 to 88)	56.0 (25 to 80)
Mean post-operative WOMAC§ score (SD)						
Pain	85.2 (19.7)	88.9 (17.6)	92.8 (13.9)	81.5 (20.8)	81.6 (19.3)	66.8 (26.2)
Function	79.9 (20.6)	82.6 (19.0)	89.6 (16.0)	76.3 (21.4)	79.1 (20.5)	64.3 (26.5)
Number of patients (%)						
Active in sport pre-operatively	726 (34.8)	318 (34.9)	101 (64.3)	253 (29.2)	36 (36)	18 (35.3)
Unable to return to sport post-operatively because of joint replacement	192 (26.4)	84 (26.4)	23 (22.7)	68 (26.9)	9 (25)	8 (44.4)

* THR, total hip replacement

† TKR, total knee replacement

‡ UKR, unicompartmental knee replacement

§ WOMAC, Western Ontario MacMasters Osteoarthritis Index. 0, extreme pain/functional limitation; 100, no pain/functional limitation

operatively. If they answered 'no' they were asked to provide the reasons why.

Use of the joint was assessed using the Western Ontario McMasters Osteoarthritis Index (WOMAC) pain and function scales,¹⁶ which judges pain during five different activities and functional limitations on performing 18 activities of daily living.

Statistical analysis. The chi-squared test was used to compare differences in the rates of pre-operative participation in sport with the clinical details and type of operation. A logistic regression model was used to determine the clinical variables which were significantly correlated with a return to sport and whether, after adjustment for these factors, there was a difference in the rate of return to sport according to the type of operation.

Results

The details of the patients, their WOMAC scores and their pre- and post-operative participation in sport are shown in Table I.

In the three years before their joint replacement, 726 patients (34.8%) participated in one or more sporting activities (Table I). The ten most common are shown in Figure 1. In total, 1452 patients participated in sports performing a mean number of two (0 to 6) sporting activities each.

Pre-operatively, participation in sport declined with age ($p < 0.001$; Fig. 2) and was significantly higher in men than in women (43% *vs* 29% respectively; $p < 0.001$). There was also a significant difference in pre-operative participation according to the type of operation ($p < 0.001$; Table I). Patients who went on to have hip resurfacing were the most active pre-operatively, with 64.3% participating in one or more sports. The lowest rate of participation (29.2%) was in patients who had a TKR.

Of the 726 patients who participated in sports pre-operatively, 446 (61.4%) had returned to their pre-operative activities by one to three years after operation. Of the 280 (38.6%) patients who had been unable to return to sport, 16 (5.7%) gave no reason, 72 (25.7%) indicated reasons unrelated to the joint replacement such as arthritis in other joints, age, other general health problems or loss of interest, and 192 (68.6%) had not resumed participation because of their joint replacement. These latter patients represented 26.4% of those who had undertaken sports pre-operatively. They generated 205 reasons as to why they were unable to return to these activities. The five most common are given in Table II, with pain the most frequent.

In order to determine which activities had the largest post-operative decline in participation, non-return was analysed for those activities in which at least 30 patients had participated pre-operatively. The largest decline was in high-impact sports, with 19 of 37 patients (51.3%) being unable to return to badminton, 15 of 40 (37.5%) to tennis and 23 of 72 (31.9%) to dancing.

The percentage of patients who were unable to return to sport after each type of operation is given in Table I, and Table III shows the results from a logistic regression model including age, gender and type of operation. Whereas age had no significant effect on return to sport, the odds for men returning to sport were 1.8 times greater than those for women ($p < 0.01$). There was no significant difference in a return to sport according to the type of operation.

Discussion

In the three years before surgery, 34.8% of patients participated in one or more sports. This agrees with previous findings in a study from Germany in which 36% of THR patients and 42% of TKR patients participated in sporting

Fig. 1

Bar chart showing the ten most common pre-operative sporting activities.

Fig. 2

Bar chart showing the percentage of patients participating in sport pre-operatively by age group.

Table II. Five most common reasons generated by patients for an inability to return to sport because of the replaced joint, ordered by overall percentage

	Number of patients	Overall percentage*
Pain	55	27
Unable to do required movements	53	26
Medical advice	25	12
Fear of damaging joint	21	10
Lack of confidence	14	7

* percentages are calculated out of 205, the number of reasons generated for an inability to return to sport because of the replaced joint

activities at the time of surgery.¹⁰ However, these rates of participation were lower than those noted from Australia by Chatterji et al,^{5,6} who found that 80% of THR patients and 85% of TKR patients took part in sports in the year before operation. These higher rates of sports participation in Australia may be explained by the fact that the Australian participants were less disabled pre-operatively than their counterparts in the United Kingdom¹⁷ and therefore were more able to return to sport earlier. There may also be cultural differences.

The most common pre-operative sports were low-impact activities including swimming, walking and golf. Other studies have also shown that the sports performed most frequently before operation by patients undergoing joint replacement include cycling, walking, bowling and swimming.^{5,6,10,11}

Age was the most important factor in participation in sport before operation. In our study, those who were to have hip resurfacing were the youngest and the most active group, with 64.3% participating in one or more sports. Even higher rates of sports participation have been described in these patients, with 95% participating in one or more sports before operation.¹²

Table III. Logistic regression of a return to sports after joint replacement

Variable	β	Exponentiation of β
Age (yrs)*		
49 and under	-0.260	0.771
50 to 59	-0.069	0.933
60 to 69	0.311	1.365
70 to 79	0.105	1.111
Gender†		
Male	0.580‡	1.786
Type of operation§		
Total knee replacement	-0.332	0.731
Total hip replacement	-0.314	0.717
Unicompartmental knee replacement	-0.284	0.753
Patellar resurfacing	-0.787	0.455

* Base: 80 years or older

† Base: female

‡ $p < 0.01$

§ Base: hip resurfacing

The sports which showed the greatest reduction in participation were badminton, tennis and dancing. Several other studies have observed a shift from participation in high-impact sports, such as jogging and tennis,^{5,6,11,12} and an increase in low-impact sports such as walking and aqua-aerobics after surgery.^{5,6} This may have been due to a combination of advice from surgeons to avoid high-impact sports¹⁸ and encouragement by physiotherapists to participate in low-impact activities to improve muscle strength as part of post-operative rehabilitation.

After controlling for age and gender, there was no significant difference in the rate of return to sport according to the type of operation. In particular, the return after hip resurfacing was similar to that after THR, which suggests

that hip resurfacing confers no advantage over conventional THR. It is therefore particularly important to inform these highly active patients as to the possibility of not being able to return to sport post-operatively.

There are some limitations to our study. First, it was retrospective and required patients to remember if they had participated in sports pre-operatively. Recall bias could have influenced the results. To minimise this, the recall period was limited to three years before operation rather than life-time participation in sport. However, because symptoms may have been present for a long time before joint replacement, some patients may have had to give up sport more than three years before surgery and therefore would not have been included. In addition, other factors, such as the body mass index, which could have influenced the rate of return to sport after joint replacement, were not considered and we did not assess the rate of uptake of new sports after joint replacement and how long it took patients to return to sport after surgery.

In conclusion, we found that 34.8% of patients were active in sport in the three years before joint replacement. At one to three years after operation, 26.4% of patients were unable to return to sport because of reasons related to the joint replacement, most commonly pain. After controlling for the effect of patient demographics, there was no significant difference in the rate of return to sport after THR, hip resurfacing, TKR, UKR and patellar resurfacing. It is important that surgeons discuss the probability of return to sport with patients before operation in order to obviate unrealistic expectations.

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