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Return to Daily Activities, Work, and Sports at 3 Months After Total Hip Arthroplasty

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Background: It is largely unknown if and when patients return to daily activities after undergoing total hip arthroplasty (THA) and which factors might influence this return. This study aimed to assess the percentages of patients who had been able to return to daily activities, work, and sports at 3 months after THA. Furthermore, the time to return and factors influencing the return (patient characteristics, surgical characteristics, and preoperative patient-reported outcomes) were assessed.

Methods: A retrospective cohort study of patients who underwent THA was performed with use of prospectively collected data. At 3 months postoperatively, patients completed a questionnaire regarding their return to 16 different activities across the categories of daily activities, work, and sports. The percentage of patients who returned to an activity, the time to return, and factors influencing the return were analyzed with use of logistic regression models utilizing backward selection.

Results: A total of 2,006 patients were studied. Most of the studied activities had been returned to by the majority of patients at 3 months after THA, with the percentage of patients who returned to an activity ranging from 28.8% to 97.9%. The mean or median time to return to an activity ranged from 1 to 56 days after THA. For 13 out of 16 activities, 1 or more of the studied factors influenced the return to the activity. R^2 values ranged from 0.057 to 0.273.

Conclusions: At 3 months after THA, 8 out of 10 patients had returned to daily activities, 7 out of 10 had returned to work, and 5 out of 10 had returned to sports. Factors that clearly influenced the return to daily activities, work, and sports could not be established. These findings might be useful in setting realistic expectations when counselling patients on their return to daily activities, work, and sports after THA.

Level of Evidence: Therapeutic Level III. See Instructions for Authors for a complete description of levels of evidence.

For patients with end-stage hip osteoarthritis, total hip arthroplasty (THA) has been shown to be successful in relieving pain and improving the ability to perform daily activities, work, and sports[1]. The times to return to work and sports after THA have already been assessed[2,3]. Return to work is promoted by factors including active recovery (e.g., walking and cycling), psychological characteristics (e.g., desire and motivation), necessity, and job flexibility (e.g., remote work and self-employment). Pain, fatigue, and medical restrictions impede the ability to return to work[4]. Younger age, preoperative sports participation, and participation in low-impact sports have been demonstrated to increase the chance of returning to sports[2].

Studies have shown that patients desire information not only regarding return to work and sports but also regarding the time to return to daily activities such as walking, bathing, driving a car, and getting in and out of vehicles[5,6]. Patients who undergo THA have demonstrated more beneficial outcomes when timely information and education are delivered preoperatively[7,8]. However, it is still largely unknown if and when patients return to these daily activities after THA and which factors might influence such return. Age, sex, American Society of Anesthesiologists (ASA) score, body mass index (BMI), previous hip surgery, smoking status, anesthesia technique, operative duration, and preoperative patient-reported outcomes (PROs) have been shown to influence outcomes following THA[9-11]. Therefore, these factors should be taken into account when investigating factors that influence the return to daily activities, work, and sports after THA.

Disclosure: The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (http://links.lww.com/JBJSOA/A582).

The primary aim of this descriptive study was to assess the percentages of patients who had been able to return to daily activities, work, and sports at 3 months after THA. The secondary aims were to determine the time to return to daily activities, work, and sports and which factors influenced the return to such activities.

Materials and Methods

Patients and Setting

A retrospective cohort study of patients who underwent primary THA was performed with use of prospectively collected data. Patients underwent THA between August 2017 and December 2021 at a medium-sized, Dutch orthopaedic hospital (Kliniek ViaSana, Mill, The Netherlands). Kliniek ViaSana is not allowed to operate on higher-risk patients (ASA score of >II and/or BMI of >35 kg/m^2), and thus the cohort was characterized by an ASA score of I to II and a BMI of ≤35 kg/m^2. During consultation, patients were advised to return to low-impact sports 6 weeks after surgery and to return to medium-impact sports 3 months after surgery. Patients were advised not to force a return to sports and to only return to sports when it felt right. Patients were included if, prior to undergoing primary THA, they had signed the informed consent form to allow further scientific analysis using their anonymized data. Therefore, the institutional review board ruled that formal approval for the study was not required.

Outcomes and Measurements

The primary outcomes were the percentages of respondents (i.e., patients who completed the postoperative return-to-activity questionnaire) who had returned to daily activities, work, and sports at 3 months after THA. This 3-month time frame was chosen during an expert-opinion meeting with 5 experienced, high-volume orthopaedic hip surgeons. A total of 16 different activities related to daily activity, work, or sports were assessed in the return-to-activity questionnaire. Daily activities consisted of supine sleeping, prone sleeping, sleeping on the operative side, sleeping on the nonoperative side, night rest, walking without aids, stair walking, grocery shopping, putting shoes/socks on, driving a car, and outdoor cycling. Work consisted of low-impact work (e.g., office work, education) and medium-impact work (e.g., health care, hospitality, painting). Sports consisted of low-impact sports (e.g., cycling, fitness, dancing, golf), medium-impact sports (e.g., mountain biking, tennis), and swimming. For each activity, patients were asked whether they were able to return to that activity (yes, no, or not applicable) and to provide the date of return (dd/mm/yyyy). "Not applicable" was chosen when a specific activity did not fit the activity pattern of that patient (e.g., not sleeping in a supine position, not working in an industry categorized as low-impact work, not being in the possession of a driver's license).

Primary outcomes were calculated by dividing the number of patients who had returned to the activity at 3 months postoperatively by the total number of patients who completed the specific question minus the number of patients who answered not applicable. Percentages were calculated for each activity separately.

Secondary outcomes included the time to return to daily activities, work, and sports, measured in days. These outcomes were calculated for each activity by subtracting the date of THA from the date of return to that activity. Other secondary outcomes consisted of potential predictive factors influencing the return to each activity separately. The investigated variables were age (years), sex (male = 0, female = 1), ASA score (I = 0, II = 1), BMI (kg/m^2), smoking status (yes = 1, no/quit = 0), alcohol use (yes = 1, no/quit = 0), previous hip surgery (yes = 1, no = 0), Charnley classification, diagnosis, anesthesia technique (general = 0, spinal = 1), fixation technique (cementless = 0, cemented = 1, hybrid = 2), operative duration (the number of minutes from the time of incision to a closed wound), and complications. These variables were collected from electronic patient records. Before patients underwent surgery, PROs were also collected in order to assess whether such outcomes influenced the return to activities. The studied preoperative PROs were pain at rest, pain during activity, function, and quality of life. Pain was measured with use of the Numeric Rating Scale (NRS) on a scale from 0 (no pain) to 10 (worst-imaginable pain). Hip function was assessed with use of the Hip disability and Osteoarthritis Outcome Score Physical Function Short Form (HOOS-PS), scored from 0 (no difficulty) to 100 (extreme difficulty)[12]. Combined pain and function were measured with use of the Oxford Hip Score (OHS), scored from 0 (most-severe symptoms) to 48 (least-severe symptoms)[13]. Quality of life was assessed with use of the 5-level version of the EuroQol-5 Dimensions (EQ-5D-5L), which consists of a visual analogue scale (EQ VAS) scored from 0 (worst-imaginable health state) to 100 (best-imaginable health state) and a descriptive system (the EQ-5D index) with a maximum value of 1[14].

All answers on the postoperative return-to-activity questionnaire and the preoperative PRO questionnaires were collected digitally (OnlinePROMs; Interactive Studios). A maximum of 2 digital reminders were sent.

Statistical Analysis

Analyses were performed with use of SPSS version 26.0 (IBM). Patient characteristics, surgical characteristics, and preoperative PRO scores were compared between patients who completed the return-to-activity questionnaire (respondents) and patients who did not respond to the questionnaire (nonrespondents) in order to assess the generalizability of results. Means, medians, or percentages were utilized for comparison.

For each activity, the distribution of answers for the time to return in days was analyzed. The mean and standard deviation (SD) were utilized if data were normally distributed, the median and interquartile range (IQR) were utilized if data were not normally distributed, and the mode with the percentage were utilized if >50% of the answers were similar.

Logistic regression models were applied to assess which variables influenced patient return to each activity separately

TABLE I Patient Characteristics, Surgical Characteristics, and Preoperative PRO Scores*

	Respondents (N = 2,006)	Nonrespondents (N = 323)	P Value
Patient characteristics			
Age† *(yr)*	67.0 (11.0)	66.0 (13.0)	0.889
Male *(no. of patients)*	827 (41.2%)	130 (40.2%)	0.761
ASA score of I‡ *(no. of patients)*	1,019 (50.9%)	144 (44.6%)	**0.036**
BMI† *(kg/m²)*	26.06 (4.75)	26.51 (4.43)	0.276
Smoking status‡ *(no. of patients)*			**0.003**
Yes	189 (9.5%)	49 (15.2%)	
No/quit	1,804 (90.5%)	273 (84.8%)	
Alcohol use‡ *(no. of patients)*			**0.009**
Yes	1,476 (74.2%)	217 (67.6%)	
No/quit	514 (25.8%)	104 (32.4%)	
Previous hip surgery‡ *(no. of patients)*	59 (12.4%)	12 (18.5%)	0.175
Charnley classification‡ *(no. of patients)*			0.120
A: Unilateral hip arthritis	489 (24.4%)	79 (24.5%)	
B1: Unilateral THA, opposite hip arthritic	788 (39.3%)	105 (32.6%)	
B2: Bilateral THA	373 (18.6%)	73 (22.7%)	
C: more joints affected	353 (17.6%)	65 (20.2%)	
Surgical characteristics			
Diagnosis *(no. of patients)*			0.206
Osteoarthritis	1,910 (95.2%)	302 (93.5%)	
Other	96 (4.8%)	21 (6.5%)	
Anesthesia technique‡ *(no. of patients)*			0.729
General	15 (0.7%)	3 (0.9%)	
Spinal	1,989 (99.3%)	320 (99.1%)	
Fixation technique‡ *(no. of patients)*			0.097
Cementless	1,454 (72.5%)	219 (67.8%)	
Cemented	373 (18.6%)	77 (23.8%)	
Hybrid	178 (8.9%)	27 (8.4%)	
Operative duration†‡ *(min)*	56.0 (19.0)	56.0 (17.0)	0.084
No complications *(no. of patients)*	1,920 (95.7%)	303 (93.8%)	0.148
Preoperative PROs†‡			
NRS pain score at rest	6.0 (3.0)	6.0 (4.0)	0.060
NRS pain score during activity	8.0 (1.0)	8.0 (2.0)	0.155
HOOS-PS score	46.1 (22.0)	46.1 (23.9)	**<0.001**
OHS	25.0 (11.0)	23.0 (12.0)	**<0.001**
EQ VAS score	75.0 (25.0)	70.0 (30.0)	**<0.001**
EQ-5D index	0.687 (0.477)	0.559 (0.477)	**<0.001**

*Values are given as the count, with the percentage in parentheses, except as indicated. †Values are given as the median, with the IQR in parentheses. ‡Variable with missing data.

(no = 0, yes = 1). First, missing values were investigated. These were found to be below 15% (indeed, all were ≤1.3%) and were therefore considered to be missing at random. Second, variables were tested individually in a univariate regression model. Finally, characteristics with a p value of <0.05 were assessed with use of a multiple logistic regression model utilizing backward selection. The same list of possible predictive variables was utilized for each model to guarantee comparability. The Nagelkerke R^2 was calculated for each model to assess model fit. R^2 values can range from 0 to 1, with higher values representing more reliable models. Odds ratios were calculated to determine the effect of the variables on return to each activity separately. Significance was set at $p < 0.05$.

Source of Funding
No external funding was received for this study.

Results

A total of 2,329 patients underwent primary THA, of whom 2,006 (86.1%) completed the questionnaire at 3 months postoperatively. Of these 2,006 patients, 1,987 (99.1%) had completed the preoperative questionnaire. Respondents significantly differed from nonrespondents with respect to the following variables: ASA score, smoking status, alcohol use, preoperative HOOS-PS score, preoperative OHS, preoperative EQ VAS score, and preoperative EQ-5D index (Table I).

Return to Daily Activities

Among the daily activities studied, the percentage of patients who had returned to an activity at 3 months after THA ranged from 82.1% (1,495 of 1,821 patients) to 97.9% (1,417 of 1,447 patients) (Table II). The activities that had been achieved by the highest percentages of patients at 3 months after THA were supine sleeping (97.9% [1,417 of 1,447 patients]) and sleeping on the nonoperative side (95.9% [1,702 of 1,775 patients]). Outdoor cycling had the lowest percentage (82.1% [1,495 of 1,821 patients]). Patients almost immediately returned to supine sleeping (median, 1 day; IQR, 6.0 days), and it took patients the longest to return to outdoor cycling (median, 43 days; IQR, 22.0 days) (Table II).

TABLE II Return to Activities at 3 Months

Activity	Return to Activity* *(no. [%] of patients)*	Time to Return† *(days)*
Daily activities		
Sleeping		
Supine	1,417 (97.9%)	1 (6.0)
Prone	542 (83.6%)	21 (29.0)
Operative side	1,535 (87.8%)	32 (27.0)
Nonoperative side	1,702 (95.9%)	10 (29.0)
Night rest	1,548 (83.3%)	13 (28.0)
Walking without aids	1,880 (93.7%)	33 (22.0)
Stair walking	1,844 (91.9%)	35 (24.0)
Grocery shopping	1,921 (95.6%)	35 (24.0)
Putting shoes/socks on	1,701 (84.8%)	38 (26.0)
Driving a car	1,776 (94.6%)	42 (17.0)
Outdoor cycling	1,495 (82.1%)	43 (22.0)
Work		
Low-impact work	776 (91.7%)	31 (34.0)
Medium-impact work	287 (56.9%)	52 ± 17.1
Sports		
Low-impact sports	719 (70.5%)	46 (29.0)
Medium-impact sports	134 (28.8%)	56 ± 17.9
Swimming	277 (61.4%)	52 ± 15.9

*Percentages represent the portion of patients who answered “yes” on the questionnaire out of the total number of patients who answered “yes” or “no” to that specific question. †Values are given as the median with the IQR in parentheses, or as the mean ± SD.

Sleeping on the operative side and sleeping on the nonoperative side were not significantly predictable by the studied variables in the multivariable models. For the other daily activities, return to activity was predicted by 1 or more of the following variables: age, sex, BMI, smoking status, operative duration, fixation technique, preoperative NRS pain score during activity, preoperative HOOS-PS score, preoperative OHS score, and preoperative EQ-5D index score. The multivariable models had R^2 values ranging from 0.097 to 0.273. The model for return to grocery shopping had the highest predictive value (R^2 = 0.273) (Table III).

Return to Work

At 3 months after THA, 91.7% of patients (776 of 846) had returned to low-impact work, at a median of 31 days (IQR, 34.0 days) (Table II). Return to low-impact work was significantly predictable by BMI (odds ratio [OR] = 0.786; p = 0.013; R^2 = 0.096) (Table III).

In total, 56.9% of patients (287 of 504) had returned to medium-impact work at 3 months after THA, at a mean and SD of 52 ± 17.1 days (Table II). Four variables were significant or nearly significant predictors: BMI (OR = 0.877; p = 0.050), alcohol use (OR = 2.675; p = 0.050), preoperative HOOS-PS (OR = 1.036; p = 0.044), and preoperative OHS (OR = 1.090; p = 0.018) (R^2 = 0.202) (Table III).

Return to Sports

Low-impact sports had been returned to by 70.5% of patients (719 of 1,020) at 3 months after THA, at a median of 46 days (IQR, 29.0 days) (Table II). The return to low-impact sports was significantly predicted by smoking status (OR = 0.345; p = 0.036; R^2 = 0.057).

Medium-impact sports had been returned to by 28.8% of patients (134 of 465) at 3 months after THA, at a mean of 56 ± 17.9 days (Table II). Variables predicting the return to medium-impact sports were alcohol use (OR = 5.713; p = 0.034), preoperative HOOS-PS score (OR = 1.068; p = 0.010), and preoperative OHS (OR = 1.105; p = 0.031) (R^2 = 0.206) (Table III).

Swimming had been returned to by 61.4% of patients (277 of 451) at 3 months after THA (Table II). Patients returned to swimming at a mean of 52 ± 15.9 days after THA. None of the variables were predictive of the return to swimming.

Discussion

The primary aim of this descriptive study was to assess the percentages of patients who had been able to return to daily activities, work, and sports at 3 months after THA. The secondary aims were to determine the time to return to daily activities, work, and sports and to assess which variables might influence whether patients return. At 3 months after THA, most of the activities had been returned to by the majority of patients, with the percentage of patients ranging from 28.8% for medium-impact sports to 97.9% for supine sleeping. Patients were almost immediately able to return to supine sleeping (median, 1 day; IQR, 6.0 days), and it took patients took the longest to return to medium-impact sports (mean, 56 ± 17.9 days). For 13 out of 16 activities, 1 or more of

TABLE III Variables Predicting Return to Daily Activities, Work, and Sports*

Activity	No.†	R^2	Predictive Variables	OR (95% CI)	P Value
Daily activities					
Sleeping					
Supine	243	0.127	NRS pain during activity	1.554 (1.022-2.362)	0.039
Prone	115	0.200	Alcohol use	3.467 (1.002-11.995)	0.050
			Operative duration	1.057 (1.000-1.117)	0.048
			Fixation technique	0.237 (0.077-0.731)	0.012
Operative side	289	0.023	—	—	—
Nonoperative side	301	<0.001	—	—	—
Night rest	314	0.123	Sex	0.384 (0.188-0.786)	0.009
			BMI	0.896 (0.816-0.985)	0.022
			Operative duration	0.965 (0.938-0.992)	0.011
			Fixation technique	1.919 (1.002-3.676)	0.049
			HOOS-PS	1.033 (1.008-1.058)	0.010
			OHS	1.071 (1.016-1.129)	0.011
Walking without aid	456	0.126	Sex	0.345 (0.140-0.848)	0.020
			BMI	0.815 (0.722-0.919)	0.001
			Operative duration	0.969 (0.947-0.992)	0.009
Stair walking	455	0.225	Sex	0.186 (0.072-0.481)	0.001
			BMI	0.783 (0.696-0.880)	0.001
			Smoking status	0.336 (0.132-0.857)	0.022
			Operative duration	0.962 (0.940-0.985)	0.001
Grocery shopping	456	0.273	Age	0.911 (0.844-0.984)	0.018
			BMI	0.795 (0.680-0.931)	0.004
			Operative duration	0.955 (0.928-0.983)	0.002
			NRS pain during activity	1.390 (1.063-1.817)	0.016
			EQ-5D index	16.656 (1.619-171.359)	0.018
Putting shoes/socks on	456	0.097	Age	0.961 (0.930-0.994)	0.020
			BMI	0.896 (0.831-0.967)	0.004
			HOOS-PS	1.022 (1.002-1.041)	0.027
			EQ-5D index	3.939 (1.140-13.615)	0.030
Driving a car	422	0.139	Sex	0.198 (0.053-0.738)	0.016
			BMI	0.838 (0.719-0.978)	0.025
			OHS	1.102 (1.008-1.204)	0.032
Outdoor cycling	416	0.154	Age	0.950 (0.916-0.986)	0.007
			Sex	0.379 (0.212-0.676)	0.001
			BMI	0.858 (0.793-0.929)	0.001
			OHS	1.070 (1.023-1.118)	0.003
Work					
Low-impact work	180	0.096	BMI	0.786 (0.651-0.950)	0.013
Medium-impact work	112	0.202	BMI	0.877 (0.770-1.000)	0.050
			Alcohol use	2.675 (0.998-7.168)	0.050
			HOOS-PS	1.036 (1.001-1.072)	0.044
			OHS	1.090 (1.015-1.171)	0.018

continued

TABLE III (*continued*)

Activity	No.†	R^2	Predictive Variables	OR (95% CI)	P Value
Sports					
Low-impact sports	231	0.057	Smoking status	0.345 (0.128-0.932)	0.036
Medium-impact sports	108	0.206	Alcohol use	5.713 (1.140-28.638)	0.034
			HOOS-PS	1.068 (1.016-1.123)	0.010
			OHS	1.105 (1.009-1.210)	0.031
Swimming	95	0.053	—	—	—

*OR = odds ratio, CI = confidence interval. †Values represent the number of patients who returned to the activity and who had complete data available for patient characteristics, surgery characteristics, and preoperative PRO measures, which were utilized to create the model.

the studied factors influenced the return to that specific activity, although the reliability of the predictive models was low.

At least 8 out of 10 patients were able to return to each of the studied daily activities within 1.5 months after THA. Unfortunately, there were no activities to which 100% of patients had returned by 3 months postoperatively. To our knowledge, the present study is the first study to investigate the percentage of patients returning to an activity and the time to return among a large variety of daily activities. We found that, within 2 months after THA, 57% of patients had returned to medium-impact work and 92% had returned to low-impact work. Interestingly, in a systematic review that included 14 different studies of return to work after THA, Tilbury et al. reported that 25% to 95% of the patients had returned to work at 1 year after THA[3]. Although the investigated time frame in the present study was only a 3-month period, the percentages for return to work after THA were comparable with those reported in most of the studies reviewed by Tilbury et al. In addition, in the present study, 71% of the patients returned to low-impact sports within 1.5 months, 29% returned to medium-impact sports within 2 months, and 61% returned to swimming within 2 months. A study with a longer time frame than ours found that return to work after THA varied between 1 day and 4 months[2]. This study also found that an average of 82% of patients returned to their presymptomatic level at 5 months after THA[2]. Apart from the aforementioned study, we found limited evidence on this topic. Findings regarding the percentage of patients returning to an activity and the time to return, including for those activities reported in our study, can be applied to set realistic expectations for returning to daily activities.

The return of patients to 14 of the 16 activities was predicted by 1 or more of the studied factors, but the reliability of the prediction models was low. Low reliability was indicated by the variances of <30% ($R^2 \leq 0.273$, meaning that a maximum of 27.3% of the variance could be explained by the presence or absence of the studied factor). One possible explanation for these low variances is that additional relevant factors exist that were not studied because such factors are currently unknown. No research has previously been performed on factors influencing the return to these daily activities; therefore, the studied variables were chosen on the basis of previous research on return to work and sports. Secondly, we decided to include the same variables in each model to guarantee comparability, but the assumption of large sample sizes for logistic regression was not met for the activities of prone sleeping, medium-impact work, and swimming. These activities were not returned to by a sufficiently high percentage of patients; therefore, the reliability of these specific models is questionable. Furthermore, significant differences between respondents and nonrespondents were found for most of the preoperative PRO scores and for some of the patient characteristics. It is unknown why these differences occurred. However, research on loss to follow-up following total knee arthroplasty showed that patients who do not attend follow-up do not necessarily have poor results[15]. Because of the low reliability of the prediction models in the present study, return to daily activities, work, and sports could not be predicted on the basis of the studied patient characteristics, surgical characteristics, and preoperative PROs.

The strengths of the present study are the large sample size and the number and variety of activities investigated. To our knowledge, this study is the first study to focus on the return of patients to a large variety of daily activities after THA. A limitation of the present study is the evaluation of the return to daily activities, work, and sports at only 3 months after THA. It can be argued that patients are still recovering at 3 months after THA and that patients might have returned to these activities after the end point chosen in the study. Furthermore, given the retrospective design of our study, it was not possible to assess the preoperative activity status of the cohort. Although we aimed to describe if and when patients returned to daily activities, work, and sports postoperatively, preoperative activity status would ideally have been included. Another limitation of this study is the generalizability of the results given that patients had an ASA score of I to II and a BMI of ≤35 kg/m^2. Unfortunately, it was not possible to include high-risk patients because they were not a part of the patient population at the studied health-care institution. Although approximately 80% of the total THA population has both a BMI of ≤35 kg/m^2 and an ASA score of I to II[16], it has been documented that patients with a higher ASA score and a higher BMI generally score worse on THA-specific

PRO measures[9]. Including these patients in the studied population might have changed the outcomes found in our study. Future research should therefore focus on a prolonged time frame, the inclusion of preoperative activity status, and the external validation of these data in order to confirm and generalize the results found in this specific population.

Conclusions

At 3 months after THA, 8 out of 10 patients had returned to daily activities, 7 out of 10 had returned to work, and 5 out of 10 returned to sports. The mean or median time to return to these activities ranged from 1 to 56 days postoperatively. Unfortunately, factors that clearly influenced the return to daily activities, work, and sports could not be established because of the unreliability of the multivariable models. However, these findings may be useful in setting realistic expectations when counselling patients on their return to daily activities, work, and sports after THA. ■

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