Return to Athletic Activity after Total Hip Arthroplasty

Consensus Guidelines Based on a Survey of the Hip Society and American Association of Hip and Knee Surgeons

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Abstract: A web-based survey was developed to evaluate joint arthroplasty surgeon's preferences for the return to sporting activities after total hip arthroplasty. This survey listed 30 groups of activities (37 specific sports) and was sent to all members of the Hip Society and American Association of Hip and Knee Surgeons. All surgeons were asked to grade each activity as follows: allow, allow with experience, not allowed, or undecided. Results were computed using a power analysis, *Z* test, and χ^2 test to determine statistical significance. There were a total of 549 responses giving an overall response rate of 72%, with 93% (92/99) of the Hip Society members and 72% (522/727) of American Association of Hip and Knee Surgeons members responding to the survey. Consensus guidelines and postoperative timing for the return to specific activities are presented. **Key words:** total hip arthroplasty, survey, sports, consensus guidelines.

There are no prospective randomized studies that delineate guidelines for safe and appropriate activities for patients who have had a total hip arthroplasty (THA). Current recommendations are based on personal preferences and surveys of surgeons' beliefs. In 1999, Healy et al [1] surveyed 54 members of the Hip Society (HS) concerning the return to sporting activities and presented the results in 1 of 4 descriptive categories: allowed, allowed with experience, not recommended, or no conclusion. The authors reported 10 activities that they recommended (all low-impact), 7 were allowed with experience (intermediate-impact), and 15 were not recommended (high-impact). Because of the relatively small number of responses, definitive statistical conclusions could not be determined for 11 of the activities (Table 2). More recently, Clifford and Mallon [2] provided a guide for sports participation after THA, based on a review of the current literature and their own experiences. These recommendations were ultimately based on interpretations made by the 2 authors and did not vary significantly from Healy's results.

Over the past few years, modified surgical techniques such as capsular repair, the use of alternative bearing surfaces [3-5], and minimally invasive techniques [6,7] have become increasingly popular. With the rising prevalence of these

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Table 1. Hip Society and AAHKS Responses for Return to Sporting Activities After THA

	Allow (%)			Allow With Experience (%)			Not Allowed (%)			Undecided (%)		
Sports	AAHKS	HS	Total	AAHKS	HS	Total	AAHKS	HS	Total	AAHKS	HS	Total
Golf	**99**	**100**	**99**	0	0	0	0	0	0	0	0	0
Swimming	**99**	**100**	**99**	1	0	1	1	0	1	0	0	0
Singles tennis	15	15	16	29	30	28	**52**	**49**	**52**	4	6	4
Doubles tennis	**63**	**62**	**64**	30	30	29	6	6	6	1	2	1
Racquetball/squash	11	8	11	28	21	27	**60**	**66**	**60**	2	6	2
Stairclimber	**72**	**62**	**72**	10	17	10	14	17	14	3	4	3
Walking	**98**	**100**	**98**	1	0	1	0	0	0	0	0	0
Speedwalking	**81**	**87**	**81**	8	4	8	9	6	9	2	4	2
Jogging	6	2	6	5	4	5	**88**	**92**	**87**	2	2	2
Hiking	**79**	**79**	**79**	18	14	18	3	2	3	1	2	1
Downhill skiing	21	28	21	**56**	**62**	**56**	22	9	22	0	0	0
Snowboarding	11	13	11	28	**42**	28	**55**	36	**55**	7	9	6
Cross-country skiing	**55**	**64**	**56**	38	30	37	6	6	5	1	0	1
Stationary skiing	**87**	**91**	**87**	11	9	11	2	0	1	1	0	0
Bowling	**90**	**94**	**90**	8	6	8	1	0	1	1	0	1
Contact sports	2	0	2	3	6	2	**93**	**91**	**93**	2	4	2
Baseball/softball	13	15	13	27	26	27	**57**	**57**	**57**	3	2	3
Weight machines	**61**	**47**	**60**	33	40	33	5	13	5	2	0	1
Weightlifting	**46**	38	**46**	34	**42**	33	18	19	19	2	2	2
Ice skating/rollerblading	34	40	35	**43**	**42**	**43**	22	19	21	2	0	2
Treadmill	**87**	**89**	**87**	8	6	8	4	6	4	2	0	1
Road cycling	**80**	**75**	**80**	19	23	19	1	2	1	0	0	0
Stationary bicycle	**95**	**92**	**95**	5	8	5	0	0	0	0	0	0
Elliptical machine	**93**	**91**	**92**	5	8	5	1	0	1	1	2	1
Low-impact aerobics	**86**	**87**	**86**	9	8	9	5	4	4	0	2	0
High-impact aerobics	6	2	6	7	11	7	**84**	**85**	**84**	3	2	3
Pilates	**58**	**68**	**58**	24	19	24	9	11	10	9	2	9
Rowing	**64**	**64**	**64**	21	28	21	13	6	13	2	2	2
Dancing	**93**	**100**	**94**	6	0	6	0	0	0	0	0	0
Martial arts	9	11	9	39	34	38	**48**	**51**	**49**	4	4	4

techniques we sought to reevaluate guidelines for sporting activities after THA. In addition, many activities that current THA patients participate in were not previously surveyed.

Methods

With the support of the HS and the American Association of Hip and Knee Surgeons (AAHKS), a web-based survey (Survey Monkey, surveymonkey.com, Portland, OR) was sent to the 93 active members of the HS and the 645 active members of AAHKS with e-mail addresses on file. There were 60 surgeons who were members of both groups and were included in the results for both the HS and AAHKS. The web-based survey was sent twice to the e-mail address on file by both societies. If a response was not obtained, a paper version was mailed or faxed to the appropriate address or number on file. There were 6 and 82 members of the HS (99 total) and AAHKS (727 total), respectively, that did not have e-mail addresses and were sent paper copies of the survey only.

The survey listed 30 groups of activities (37 specific sports) and the surgeons were asked to classify their recommendations for a standard (metal-on-polyethylene) THA into 1 of 4 categories: allow, allow with experience, not allowed, or undecided. Participants were also queried for their recommendation on when they allow patients to return to sporting activities.

Statistical Analysis

All survey results were tabulated, and the categorical data were analyzed using a χ^2 test and proportions were tested using a Z score ($P < .05$ was considered statistically significant). Based on the number of survey respondents (AAHKS, n = 522; HS, n = 87; surgeons in both societies were only counted once leaving a total n = 549 for the combined analysis), a power analysis for a 1-sample proportion test determined that approximately 58% for AAHKS, 69% for HS, and 58% for the combined societies of any 1 of the 4 categories selected would be required to achieve statistical significance (power = 0.95).

For each sport surveyed, the percentage of response for each category (allow, allow with experience, not allowed, and undecided) was compared with the percentage of response required

Table 2. Consensus Guidelines for Return to Activities by the Members of the HS and AAHKS

Allow	Allow With Experience	Not Allowed	Undecided
Golf	*Downhill skiing*[1]	Racquetball/squash	Martial arts
Swimming	Cross-country skiing	Jogging	*Singles tennis*[2]
Doubles Tennis	*Weightlifting*[1]	Contact sports (football, basketball, soccer)	
Stairclimber	*Ice Skating/rollerblading*[1]	High-impact aerobics	
Walking	Pilates	Baseball/softball	
Speed walking[1]		Snowboarding	
Hiking[3]			
Stationary skiing[1]			
Bowling[3]			
Treadmill			
Road cycling[3]			
Stationary bicycling			
Elliptical			
Low-impact aerobics[3]			
Rowing[1]			
Dancing (ballroom, jazz, square)[1]			
Weight machines			

Italic type denotes classification change from a previous study by Healy [12]: 1, change from undecided; 2, change from not allowed; 3, change from allowed with experience; 4, change from allowed. Underline denotes activity not previously described.

for significance (58%) with a Z test. In cases where the percentage of response in any one category failed to reach statistical significance with Z testing, further evaluation was performed using a χ^2 analysis. The responses for allow and allow with experience were grouped together and compared with the combined not allowed and undecided groups. If the combined allow and allow with experience group was significantly favored compared with the combined not allowed and undecided group, then the overall recommendation was "allow with experience." If the combined not allowed and undecided group was significantly favored compared with the combined allow and allow with experience group, then the overall recommendation was "not allowed." If statistical significance could not be achieved for either comparison, then the overall recommendation was "undecided." This method of analysis was used to account for sports whose allow and allow with experience recommendations composed at least 75% of responses, but when considered as individual responses did not reach statistically significant values.

Results

Ninety-two (93%) of the 98 active members of the HS and 522 (72%) of the 727 members of AAHKS responded (72% response rate for the combined societies). Five and 14 members of the HS and AAHKS responded but were excluded because they did not perform THA (3 and 4) or refused to participate (2 and 10), respectively. The distributions of responses to activity recommendations by all surgeons are listed in Table 1. Consensus guidelines on return to sports after THA for a standard THA (metal on polyethylene) by members of the HS and AAHKS are listed in Table 2. There were no significant differences between these 2 societies with only minor variations in their overall recommendations. The activities that differed between the 2 societies were Stairclimber, doubles tennis, weight machines, snowboarding, and rowing. All of these activities were allowed with experience by the members of the HS and were allowed regardless of experience by the members of AAHKS, except for snowboarding, which was not allowed and undecided, respectively. There was no significant difference in the percentage of responses for these activities, and the variation in overall recommendation is likely a function of the greater number of members and responses from AAHKS members.

Table 3. Time Interval Recommended Before Allowing Return to Activities After THA

Time Interval (mo)	AAHKS (%)	HS (%)	Combined (%)	*P*
0-1	0.8	0	0.6	NS
1-3	32.5	24	32	NS
3-6	60.4	71	59	.001
6-12	5.1	2	5	NS
>1 year	0.6	2	0.6	NS

NS indicates not significant.

Table 4. Activities as Classified by Clifford and Mallon [7] and Recommended Guidelines Based on AAHKS/HS Survey

Activity	Impact level	Recommendation
Racquetball/squash	High	Not allowed
Jogging	High	Not allowed
Contact sports	High	Not allowed
Baseball/softball	High	Not allowed
High-impact aerobics	High	Not allowed
Martial arts	High	Undecided
Singles tennis	Intermediate	Undecided
Doubles tennis	Intermediate	Allow
Stairclimber	Intermediate	Allow
Hiking	Intermediate	Allow
Downhill skiing	Intermediate	Experience
Snowboarding	Intermediate	Not allowed
Weight machines	Intermediate	Allow
Weightlifting	Intermediate	Experience
Ice Skating/rollerblading	Intermediate	Experience
Low-impact aerobics	Intermediate	Allow
Bowling	Potentially low	Allow
Road cycling	Potentially low	Allow
Rowing	Potentially low	Allow
Speedwalking	Potentially low	Allow
Cross-country skiing	Potentially low	Experience
Dancing	Potentially low	Allow
Pilates	Potentially low	Allow
Golf	Low	Allow
Swimming	Low	Allow
Walking	Low	Allow
Stationary skiing	Low	Allow
Treadmill	Low	Allow
Stationary bicycle	Low	Allow
Elliptical machine	Low	Allow

Underline text indicates impact level not previously described by Clifford and Mallon.

Overall recommendations were relatively consistent among all surgeons. The 17 activity groupings given an allow recommendation received an average of 84% (range, 60%-99%) of the responses in the allow category and 95% (range, 82%-100%) when combining the allow and allow with experience categories. Another 5 of the activity groupings were found to have at least 77% (average, 82%; range, 77%-93%) of the responses in the combined allow and allow with experience headings. There were 6 activity groupings that received just enough responses to receive a definitive recommendation (3 allowed and 3 not allowed sports). The allowed activities included doubles tennis, weight machines, and rowing, all of which received at least 60% of the responses in the allow category (average 63%) and at least 85% (average 90%) in the combined allow and allow with experience categories.

Racquetball/squash, baseball/softball, and snowboarding were activities with a recommendation of not allowed based on 62% (60% not allowed and 2% undecided), 60% (57% not allowed and 3% undecided), and 61% (55% not allowed and 6% undecided) of the responses in this category; these represent the lowest number of votes for activities with a definitive recommendation. The remaining 2 sports (singles tennis and martial arts) were listed as undecided with less than 53% (average, 50.5%; range, 49%-52%) of the responses in the not allowed category and less than 56% (average, 54.5%) of the responses in the combined not allowed and undecided categories.

Thirty-three percent of AAHKS members allowed their patients to return to sports within the first 3 months postoperatively compared with 24% from the HS. Although this was a trend toward allowing an earlier return to sports, this value was not significant ($P = .08$). Seventy-one percent of the HS members recommended a return to sports at 3 to 6 months, whereas only 58.4% of AAHKS members recommended this time interval for return to sporting activities ($P = .001$). In combining the results of the 2 societies to determine consensus guidelines, it appears that waiting 3 to 6 months after a THA is the current recommended waiting time for return to sporting activities (Table 3).

Discussion

Studies evaluating the return to sports or recreational activities after THA are difficult to perform because of the variability in surgeon's preferences, surgical techniques, patient's interests and abilities, and the large numbers of patients required for such an investigation. Most of the prior literature has been based on surveys of surgeons who commonly perform THA or expert opinion; however, most of these studies have included a relatively small number of surgeons (≤54). McGrory et al [8] queried 28 orthopedic surgeons (13 consultants and 15 residents or fellows) and made activity-specific recommendations. The authors classified sports as recommend (if >75% of responses were yes), not recommend (if >75% of responses were no), or intermediate (if <75% of either response). Ten sports were not recommended (running, waterskiing, football, baseball, basketball, hockey, handball, karate, soccer, and racquetball), 6 were recommended (cycling, swimming laps, sailing, bowling, scuba, and golf), and 11 were labeled as intermediate (speed walking, hiking, ice skating, backpacking, doubles tennis, ballet, aerobics, alpine skiing, softball, volleyball, and singles tennis). This study was based on surgeons at one institution that might have similar beliefs and teachings. Healy et al [1] made consensus recommendations on

athletic activity based on a survey of 54 HS members. Because of the relatively small sample size there were many activities for which a consensus was not found and therefore classified as an undecided recommendation.

Overall we have found that the guidelines for many of the activities have changed since the 1999 Hip Society Survey by Healy et al [1]. Activities that are now allowed or allowed with experience that previously had no conclusion include speed walking, stationary skiing, dancing, rowing, downhill skiing, weight machines, weightlifting, and ice-skating/rollerblading. Many activities that had been allowed with experience such as hiking, bowling, road cycling, and low-impact aerobics have been reclassified as allowed. Overall, this represents a greater tolerance and acceptance by the surveyed surgeons today in granting their patients the ability to return to many activities that previously were not allowed or undecided. This may be because of the improved confidence in today's surgical techniques (soft tissue repair, minimally invasive and less invasive) and biomaterial advancements, such as alternative bearing surfaces. However, such changes may be associated with the realization of current patient expectations and compliance. Encouraging patients to limit the previously perceived higher-impact activities to recreational use only may limit the "abuse" to their prostheses. In addition, recommending the use of lower-impact activities for endurance (long-term, repetitive sport) may improve realistic compliance rates in our modern-day THA population.

Clifford and Mallon [2] have previously presented recommendations of various activities based on the anatomic location of arthroplasty and the perceived level of activity. The authors subjectively classified the activities based on their level of perceived impact (low, potentially low, intermediate, and high). Using these levels of impact as a guide (Table 4), we found that all activities (14) classified as either low or potentially low impact were allowed. Eighty percent (8/10) of the activities classified as intermediate impact were either allowed or allowed with experience. The remaining 2 activities, singles tennis and snowboarding, were undecided and not allowed, respectively. In the high-impact group, 5 of 6 activities were not allowed; only martial arts was undecided (47% [9% allow and 38% allow with experience] of surgeons allowing and 53% [49% not allowed and 4% undecided] of surgeons not allowing participation in this activity).

Regarding the postoperative time frame for return to sporting activities the members of AAHKS tended to allow their patients to return sooner than members of the HS. Approximately 10% of AAHKS respondents allowed their patients to participate in these activities within the first 3 postoperative months. However, the largest group of surgeons for both the HS (71%) and AAHKS (60%) recommended return to activities at 3 to 6 months postoperatively. Differences in the response rates between the 2 groups may be because of the amount of experience that its members have or the patient populations that they treat.

In conclusion, we have surveyed a large number (760) of surgeons who perform THA regularly and have received an exceptional response rate (549 responses, 72%). With an increasingly educated population of patients undergoing THA, the data presented here may serve as a basis to answer their questions on timing and recommendations for returning to sporting activities after a standard, primary THA. This survey should serve only as a guideline for return to activities after THA and should be refined by individual surgeons. Definitive recommendations should be made based on each patient's expectations, goals, and past experiences.

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