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Letter: High or low return to sport rates following hip arthroscopy is a matter of definition?

A 2018 meta-analysis reports an overall return to sports (RTS) rate of 91% and high patient satisfaction following hip arthroscopy for femoroacetabular impingement syndrome ('arthroscopy' in this paper) ¹. Even though three in four athletes were reported to return to pre-injury levels of sports, it remains unknown if they also reach their pre-injury level of performance. Currently, RTS is frequently defined as a binary outcome (i.e. either as having returned to sport or not).

This simple definition does not reflect the complexity of the dynamic RTS process; the more complex elements that constitute RTS were highlighted in the 2016 consensus statement on RTS ². That statement recommends reporting RTS as a continuum from return to participation through return to sport and finally, return to performance ². This letter reports RTS-rates following arthroscopy according to the continuum-approach. In addition, patients' satisfaction regarding RTS-levels attained is presented.

Applying a cross sectional study design, all patients undergoing arthroscopy at a single surgical clinic between 2014-2016 (n=208) were invited to respond to an online RTS-survey and included in the study if they did not report further surgery following indexed arthroscopy. Patients were asked whether they had:

- (a) Not returned to any sport or exercise
- (b) Returned to participation in a different sport or exercise than prior to hip symptoms

(c) Returned to participation in the same sport or exercise but on a lower performance level

(d) Returned to participation in the same sport or exercise on same or higher performance level than prior to hip symptoms.

Patients were also asked for satisfaction with their current level of sports activity (binary response yes/no), and to report time from arthroscopy to RTS (in months). Our study sample [N=127, 76% male, age 34.3 (10.13)] predominantly underwent arthroscopic cam-resections. Mean time since surgery was 19.4 months (SD 10.4; Range 3-39). Patients who had returned to their previous sport or exercise reported a mean RTS-time of 8.1 (+/-3.8) months.

The majority of patients [89% (95%CI 82%-93%)] had returned to sport, when reporting RTS in traditional fashion. That is all patients that had returned to participation in some sort of sport or exercise, which qualified them as having returned to sport. However, only 28% (95%CI 21-37%) participated in the same sport as prior to hip symptoms but at lower performance levels, and just 21% (95%CI 15–29%) participated in the same sport on same or higher performance levels. Among patients >6 months following arthroscopy, about half [46% (95%CI 37-56%)] reported satisfaction with current RTS-level (Figure 1).

By describing RTS rates on a continuum, results of this study showed that only one out of five patients participated at their previous level of performance at time of data collection. Hence, in light of our findings, previously reported RTS rates of 91%¹ appear realistic in relation to a return to participation but overly optimistic in relation to return to pre-injury level of sport and performance. Our data cannot be extrapolated

to elite settings, where high return-rates have been reported ³. Our study sample comprises athletes with varying levels of sport and exercise participation. However, as the real-world population undergoing arthroscopy does not solely consist of young high-level athletes⁴ our sample may be more representative of the typical patient.

Considering the rapid increase in performed arthroscopies ⁵ and patient expectations that often exceed realistic outcomes⁶, the increasing importance of providing accurate information to the rising number of patients presenting to our clinics, applicable to their individual goals regarding RTS, should be acknowledged. We hope that the findings of this study can assist clinicians in creating realistic patient expectations regarding the post-operative reality following arthroscopy.

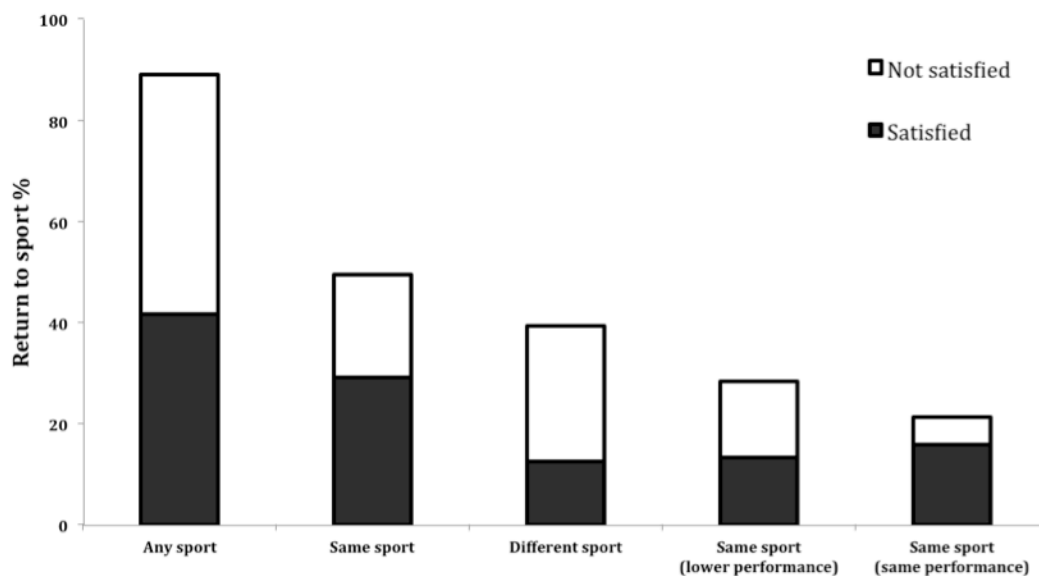


Figure 1: Return to sports rates following hip arthroscopy according to different definitions.

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Return to sport following hip arthroscopy in patients with femoroacetabular impingement syndrome: A cross-sectional study of return rates in patients 3-39 months after surgery

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Key words: *FAI; Hip arthroscopy; Return to Sports; Performance*

ABSTRACT

Objectives

The primary aim of this study was to describe return to sport (RTS) following hip arthroscopy (HA) for femoroacetabular impingement syndrome (FAIS). The secondary aim was to examine patient satisfaction with RTS-levels reached as well as to describe patient reported time to RTS.

Methods

Patients operated for FAIS between 2014-2016 (n=208) were invited to respond to an online-survey. RTS was assessed on a continuum from (a) no return to sport or exercise, return to (b) different sport/exercise (c) same sport/exercise at lower performance-level (d) same sport/exercise at same performance-level. Time to RTS was defined as time between HA and return to previous (pre-symptomatic) sport or exercise

Results

The final sample consisted of 127 patients (mean age: 34.3 years [SD=10.2]; mean time post-HA=19.4 months [SD=10.4]). In total, 89% of patients had returned to some sort of sport or exercise. However, only 50% returned to same sport [21.4% to same- and 28.3% to lower performance-levels] and 39% returned to participation in a different sport. Eleven percent had not returned to any form of sport/exercise.

Conclusions

Defining RTS following HA as continuum revealed that only half of all patients returned to the same sports/exercise as prior to hip symptoms, and just a fifth reported a return to previous performance-levels. Hence, traditional definitions may yield overly optimistic results, and not reflect the complete RTS-picture needed for clinicians aiming to create realistic patient expectations.

INTRODUCTION

Hip arthroscopy (HA) is an orthopedic procedure, used to treat femoroacetabular impingement syndrome (FAIS) in physically active, young and middle-aged patients¹. The worldwide number of patients undergoing HA has been increasing dramatically²⁻⁵, and is expected to keep rising⁶. Satisfaction with HA is strongly predicted by the fulfillment of patient's expectations regarding return to sport (RTS)⁷. However, just a fraction of studies investigating efficacy of HA report RTS outcomes⁸. Furthermore, when reported, it often lacks a clear definition and definitions vary between studies⁹

A systematic review from 2015 on RTS following HA for FAIS reported that 87% of patients returned to sport and 82% returned to previous levels⁹. This high rate of RTS has since been confirmed by a 2018 systematic review and meta-analysis, reporting that while 91% return to sport at any level just 74% return to sport at their previous levels¹⁰. The discrepancy between the rate of patients returning to any level of sport and the rate of patients returning to their previous levels indicates that the definition of RTS matters. Yet, current studies frequently define RTS as binary outcome; either having returned to sport or not¹¹⁻¹⁴. This simplistic definition may not reflect the complexity of RTS, which is a dynamic process paralleling recovery and rehabilitation.

A recent consensus statement recommended reporting RTS on a three-part continuum from return to participation, over return to sport, then finally return to full performance at the same or higher level. The consensus statement also recommended assessing satisfaction with achieved RTS-levels¹⁵. To the authors' best knowledge no

existing study reports RTS-rates in HA patients following the recommendations of the RTS consensus statement ¹⁵.

The primary aim of the study was to describe RTS-rates, defined as a continuum from (a) no return, or return to (b) different sport or exercise than prior to hip symptoms (c) same sport or exercise as prior to hip symptoms at a lower performance level or (d) same sport or exercise as prior to hip symptoms at the same level of performance, in a group of previously sport- or exercise-active patients from 3-36 months following HA for FAIS. Secondly we aimed to describe patient satisfaction with reached RTS-levels as well as patient reported time to RTS, defined as return to same (pre-symptomatic) sport or exercise.

METHODS

Study design

This cross-sectional study was approved by the Ethics Committee at Lund University (Dnr:2016/1068) and conformed to the provision of the Declaration of Helsinki. Reporting of findings follows the STROBE guidelines ¹⁶.

Sample and procedures

Patients who underwent HA between 2014 and 2016 (3-39 months post-operative at time of inclusion) were identified through a journal search for diagnostic codes [International classification of diseases 10 (ICD10) treatment codes for: Labrum repair (NFT99); Labrum resection (NFH91); Rim trimming (NEK19); Cam resection (NFK19)]. Identified patients were eligible if they (a) were ≥ 18 years old; (b) received HA for FAIS (Cam-, pincer-resection or combination) \geq three month prior to

data collection; (c) participated in sports/exercise [Hip Sports Activity Scale (HSAS) ≥ 1] before surgery; (d) did not have had any further surgery following their indexed HA.

Between April and May 2017, eligible patients were invited to participate in a web-based survey. Two subsequent reminders were sent to non-responders. Since it could not be assumed that retrieved e-mail addresses were up to date, a paper version of the survey was also sent by regular mail.

Surgical technique and post-operative rehabilitation

HA was performed according to standardized clinical procedures, with the patient in a supine position using antero-lateral and mid-anterior portals. Access to the peripheral compartment was achieved through capsulotomy parallel to the ilio-femoral ligament and a transverse cut, kept as small as possible in order to minimize iatrogenic increase in hip laxity. For access to the central compartment an axial traction was used. No capsular closure was performed at the end of surgery. Pincer morphology was preferably addressed with an “over-the –top technique”, through resection of the acetabular rim with the labrum left in situ. When the labrum had to be released it was re-fixed with suture anchors (Suture-Fix, Smith & Nephew, Andover, Mass, USA). CAM morphologies were thoroughly resected from far lateral to far medial, caudal and posterior. At the end of surgery a meticulous fluoroscopic and dynamic assessment was made in order to avoid remaining impingement.

Patients were rehabilitated either by local community physiotherapists or at the operating clinic. On discharge, all patients received the same home-training program, which aimed to improve range of motion, prevent intra-articular adhesions and

maintain lower extremity and abdominal muscle function. Patients were recommended to book a first physiotherapy appointment one week after surgery with the recommendation to follow a standardized rehabilitation protocol provided by the clinic. The four-phase protocol describes specific goals, pitfalls, and suggested exercises/activities for each phase, from surgery to RTS. Expected time-lines are given for each phase, considering biological tissue healing times; while it is emphasized that progression should be tailored to the individual patient and based on achieving the phase-specific goals.

Data collection

Background/descriptive data

Data regarding performed arthroscopic procedures as well as cartilage defects at the time of surgery was retrospectively retrieved by review of patient charts, surgical reports and arthroscopic imaging taken during surgery. In the survey, patients were asked for age, gender, side of affected hip(s), and any potential further surgeries following the initial HA. Current, as well as pre-symptomatic activity levels were measured by the Hip Sports Activity Scale (HSAS) ¹⁷.

Outcome measures

Patients were asked to report current RTS-levels according to whether they had (a) not returned to sport (did not participate in any sport or exercise, “No sport”) or returned to (b) general participation in any sport or exercise, other than prior to hip symptoms (“Different sport”) (c) participation in same sport or exercise as prior to hip symptoms but a on lower performance level or [”Same sport (lower performance)”] (d) participation in same sport or exercise on same or higher performance level than

prior to hip symptoms [“Same sport (same performance)”]. Furthermore, patients were asked for satisfaction with their current level of sports activity (binary response yes/no), and to report time from HA to RTS (in months).

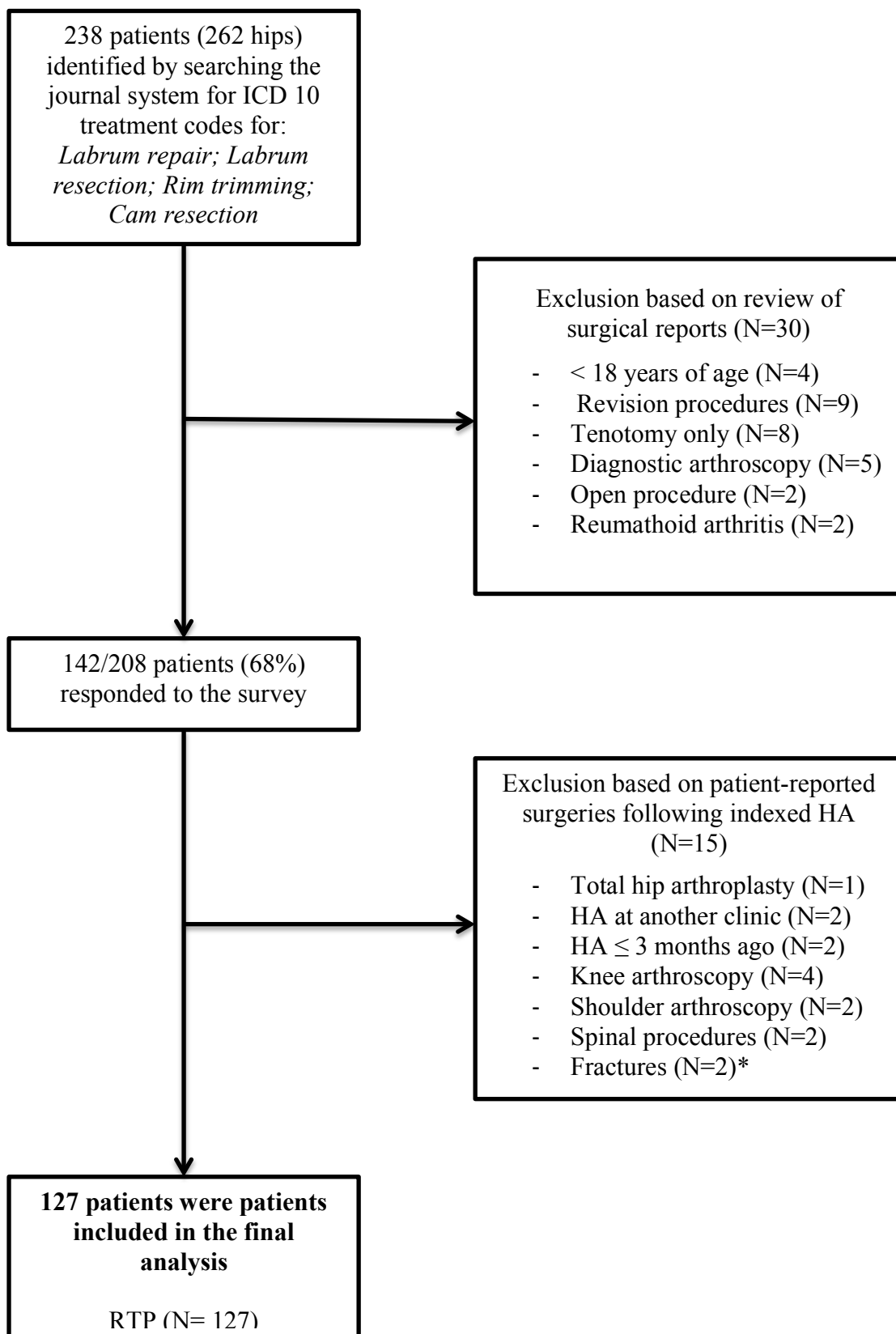
Statistical analysis

Percentage of patients having reached the different RTS-levels, with accompanying 95% confidence intervals, and satisfaction with the level of RTS reached was presented for the whole sample as well as stratified into subgroups according to time since surgery in months (>3-6; >6-12; >12-18; >18-24; >24-39). Median HSAS levels (pre-operative/post-operative) were calculated. All statistical management was performed in SPSS (Version 23.0, Armonk, NY: IBM Corp.).

RESULTS

Among 208 eligible patients, 142 (68%) responded. Patients that reported further surgery after initial HA (N=15) were excluded from data analysis (Figure 1). The final sample (N=127) predominantly consisted of male participants undergoing cam-resections. Mean time since surgery was 19.4 months (SD 10.4; Range 3-39) at the time of follow up and participants reported a median HSAS score of 3.5 (IQR: 2-5), with a median decrease of 2 HSAS levels (IQR: -3 – 0) compared with prior to symptoms. The most common pre-symptomatic sports were soccer and ice hockey. A detailed description of the study sample is provided in table 1.

Figure 1: Patient flow into the study



* No fractures related to the hip joint (1 clavicle; 1 elbow)

Table 1: Patient demographics (N=127)

Age in years) [Mean (SD); range]	34.26 (10.13) 17-60
Gender [% (n)]	
Females	24.4 (31)
Males	75.6 (96)
HSAS before symptoms (N=126)	
Mean (SD)	5.47 (1.93)
Median (IQR)	5 (4-7)
Time from surgery to follow up in months [Mean (SD); range]; [Median (IQR)]	19.4 (10.4); 3-39 18.3 (10.8-25.9)
Current hip-related function [Mean (SD)]	
iHOT 12	68.2 (24.4)
HAGOS subscale sports and recreation	65.4 (24.2)
HAGOS subscale physical activity	82.5 (14.5)
Pre-symptomatic sports [% (n)]*	
Team sports	44.0 (51)
Gym-based sports	35.3 (41)
Endurance sports	27.8 (32)
Other sports	34.2 (40)
Operated hip [% (n)]	
Right	48.4 (62)
Left	34.6 (44)
Bilateral	16.5 (21)
Description of performed arthroscopic procedures (N=125)	
CAM-resection [% (n)]	98.4 (123)
Combined CAM & Pincer [% (n)]	12.8 (16)
CAM-resection + microfracture [% (n)]	3.1 (4)
CAM resection + tenotomy [% (n)]	1.6 (2)
Labrum stabilization [% (n)]	24 (30)
Labrum re-fixation [% (n)]	3.9 (5)
Cartilage defects [% (n)]	65.4 (83)
Acetabular cartilage defect (N=123)	
<i>Outerbridge classification [% (n)]</i>	63 (78)
1 = <i>Rough surface; chondral softening</i>	1 = 20.3 (25)
2 = <i>Irregular surface defects; <50% cartilage thickness</i>	2 = 12.2 (15)
3 = <i>Loss of >50% cartilage thickness</i>	3 = 11.4 (14)
4 = <i>Cartilage loss, exposed bone</i>	4 = 19.5 (24)
Femoral cartilage defect (N=123)	
<i>Outerbridge classification [% (n)]</i>	8.9 (11)
1 = <i>Rough surface; chondral softening</i>	1 = 4.1 (5)
2 = <i>Irregular surface defects; <50% cartilage thickness</i>	2 = 0.8 (1)
3 = <i>Loss of >50% cartilage thickness</i>	3 = 1.6 (2)
4 = <i>Cartilage loss, exposed bone</i>	4 = 1.6 (2)

N = Number; SD = Standard deviation; % = Percentage; iHOT12 = International Hip Outcome Tool; HAGOS = Copenhagen Hip And Groin Outcome Score;

* Reported team sports: Soccer, Ice hockey; Floorball; Basketball; Handball

Endurance sports: Running; Cycling

Other sports: Tennis, Golf, Skiing, Gymnastics, Dance etc.

Participants could report more than one sport

The majority of patients [89% (95%CI: 82%-93%)] had returned to some sort of participation in sports or exercise at follow up. However, just 21% (95%CI: 15–29%) participated in the same sport as prior to hip symptoms, on same or higher performance levels, 28% (95%CI: 21-37%) participated in same sport but at lower performance levels. The highest proportion of patients that had returned to their previous sports was found in groups between 6 and 24 months post-surgery. Return-rates to the different categories across the RTS-continuum for all participants together, as well as stratified according to time since surgery are illustrated in table 2.

Table 2: Return to sport rates at different time point

Reached level of RTS [%(<i>n</i>)]	<i>Stratification according to time since surgery in months</i>					
	>3-39 (N=127)	>3-6 (N=15)	>6-12 (N=24)	>12-18 (N=23)	>18-24 (N=15)	>24-39 (N=50)
No return to sport/exercise	11 (14)	23.1 (3)	4.2 (1)	4.3 (1)	-	18 (9)
Return to diff. sport/exercise	39.4 (50)	38.5 (6)	37.2 (9)	43.5 (10)	33.3 (5)	40 (20)
Return to same sport at lower performance level	28.3 (36)	30.8 (5)	29.2 (7)	26.1 (6)	33.3 (5)	26 (13)
Return to same sport at same performance level	21.3 (27)	7.7 (1)	29.2 (7)	26.1 (6)	33.3 (5)	16 (8)

Among patients >6 months post HA, about half [46.4% (95%CI: 37-56%)] reported to be satisfied with current activity levels. Higher proportions were observed in groups with higher levels of sport or exercise participation. The only group with more satisfied than not- satisfied patients, was the group who had returned to the same or higher level of performance (Figure 2). Patients who had returned to their previous sport or exercise reported a mean RTS-time of 8.1 (+/-3.8) months.

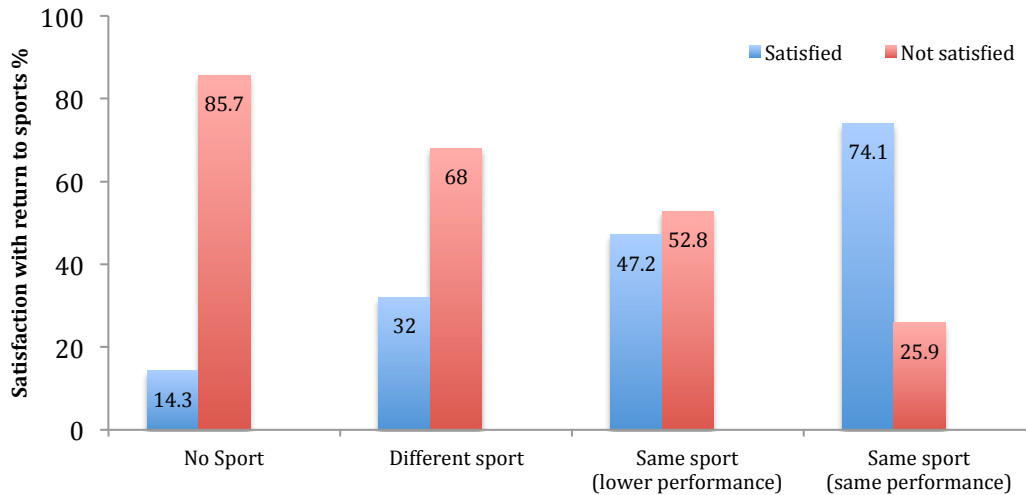


Figure 2: Satisfaction with return to sports levels >6months post hip arthroscopy (N=114)

DISCUSSION

By describing RTS-rates on a continuum, results of this study showed that although almost 90% of all participants returned to some sort of sport or exercise, return-rates to same sport or exercise was only achieved by 50% and only a fifth participated at their previous performance level at time of data collection. Hence, in light of our findings, previously reported RTS-rates in patients following HA for FAIS appear overly optimistic^{9-12 14 18}. The most apparent reason for the high return-rates in previous studies and the low rates in the current study is how RTS was defined. The previous studies defined RTS as binary outcome¹¹⁻¹⁴, whereas we defined RTS as different levels of a staged process as recommended by a recent consensus statement on RTS¹⁵.

Sansone et al.¹⁹ used HSAS scores to define RTS-levels and reported that only 52% of athletes in their sample returned to their previous activity levels after HA. Whilst

this result is more similar with our data, a smaller percentage of participants in our study, just 21%, reported participation at previous performance levels. This difference may however be explained by differences in studied populations. While the study by Sansone et al. investigated high-level athletes ¹⁹, our sample was older and had lower pre-operative activity levels. High-level athletes have been shown to have higher RTS-rates than recreational athletes ⁹. As the total population undergoing HA does not solely consist of young high-level athletes ²⁰, results of our study may be more representative for the general physically active population undergoing FAIS-surgery. Investigating a comparable population in a similar design, a study by Tijssen et al., including 37 patients following HA, reported similar RTS-rates to the ones found in our study. In their study, 84% of patients returned to general sport participation but only 19% returned to the same sport as before ²¹.

The highest proportions of patients that had returned to same sports were observed in time-groups 6-24 months post-operative. The return-rate was lower in both the <6 and >24 month groups. While these numbers should be interpreted with caution due to small sub-group sizes, parallels can be drawn with the existing literature. According to a recent systematic review, patients recover ADL function 3-6 months post FAIS-surgery, while improvements in sport-specific function occurs between 6 and 12 months ²². We observed the highest return-rates within this expected timeframe for recovery of sport-specific function. A possible explanation for the relatively lower RTS-rates ≥ 24 months post-surgery could be the that we asked for current RTS-status, and some participants could potentially have returned to sports but ceased participation again, for other reasons than hip-related problems. Earlier than 6-months post-surgery, fewer patients can be expected to have recovered that level of

functioning ²², which also is reflected by our results. On the contrary, rehabilitation protocols provided by North American surgeons report median times to return to running and sports to be 12 and 15 weeks post HA ²³. Participants in our study reported a mean RTS-time of 8 (+/-4) months, which is similar to other cohort studies ^{18 24} but longer than that currently expected by surgeons and physiotherapists ^{23 25 26}. Future prospective studies, defining RTS on a continuum, are needed to accurately describe the patient's journey through the RTS-continuum while taking other factors potentially influencing the return into account.

Clinical implications

Most patients undergoing arthroscopic surgery expect to be able to RTS ^{27 28}. In patients undergoing HA, these expectations have been shown to be overly optimistic ⁷. Our findings highlight that actual RTS-rates, when defined as a return to same sport and level of performance, are not as high as previously reported ^{9 10}. Likewise, patient satisfaction, which has been reported to be high in previous RTS-studies ¹⁰, was observed to differ between patients that had reached different stages on the continuum with most satisfied patients among those returned to the same sport and level of performance. Findings of this study may therefore assist clinicians in providing balanced and accurate information to patients in order to create realistic expectations about post-operative reality concerning RTS-rates.

Methodological considerations

The final response rate to the survey was 68%. We see no obvious reason to suspect that any certain group of patients, based on their RTS-status, would be more or less inclined to respond. Hence, we don't expect our results to be affected by an

underlying response bias. Inclusion of participants at a wide range of times since surgery may have affected the main outcome RTS, which is a time sensitive measure. Participants responded to the survey at different time points in their rehabilitation process and not all may have reached the end point of rehabilitation. However, no big differences in RTS-rates between individual time groups >6 months post-operative were observed, which indicates that time as such may not have affected RTS-rates much once half a year had passed. Finally, the sample included in this study was homogeneous with regard to the arthroscopic procedure, which is a strength of this study. Resection of CAM-morphology was the main procedure performed in 98.4% of all patients and resection of pincer-morphology almost exclusively performed in combination with CAM-resection. All surgeries were performed at the same surgical center according to the same surgical protocol.

CONCLUSION

Similar to previous reports, which defined RTS as binary outcome, almost 9 out of 10 patients had returned to some sort of sport or exercise after HA for FAIS. However, defining RTS on a continuum reveals that just half of all patients had returned to the same sport and only 1 out of 5 had returned to the same performance levels as prior to hip symptoms.

What are the new findings?

- When defining RTS as binary (yes/no) outcome 9 in 10 patients had returned to sport or exercise after HA, which is comparable to previous reports
- When defining RTS on a continuum:
 - Half of all patients had returned to the same sport as prior to hip symptoms
 - One in five patients had returned to the same sport on the same or higher performance level than prior to hip symptoms

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