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A clinical observational study on patient-reported outcomes, hip functional performance and return to sports activities in hip arthroscopy patients

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ABSTRACT

Objectives: To describe data of short- and midterm results of hip arthroscopy patients based on patient-reported hip function, hip functional performance and return to sports activities.
Design: Observational cohort study.
Setting: Sports medical center.
Participants: 37 recreational athletes (21 men) at least six months after finishing rehabilitation for hip arthroscopy.
Main outcome measures: International Hip Outcome Tool 33 (IHOT-33), Pain Visual Analogue Scale (VAS), Global Perceived Effect Scale (GPE), sports questionnaires and hip functional performance tests.
Results: At a mean follow-up time of 2.3 years, 81% of participants reported improvement on the GPE and 84% returned to sports activities. The mean IHOT-33 score was 69.3; the mean VAS score was 35.0. Range of motion (ROM) and strength were within the 90% Limb Symmetry Index (LSI) limit, except for hip internal rotation ROM. A full recovery of hip functional performance, as measured with balance and hop tests, was established based on the 90% LSI limit.
Conclusions: The overall short- and midterm results of these follow-up data show good recovery of hip arthroscopy patients on patient-reported outcomes, functional performance and return to sports activities. The functional performance tests used in this study seem adequate for measuring recovery in hip arthroscopy patients.

1. Introduction

Over the last decade, the use of hip arthroscopy in the treatment of intra-articular hip pathology has increased (Bozic, Chan, Valone, Feeley, & Vail, 2013). Femoroacetabular impingement (FAI), labral pathology, cysts and chondral damage are a few of the pathologies for which this operation technique is currently used (Byrd & Jones, 2010; Nicholls, 2014). Studies investigating hip arthroscopy have focused mostly on diagnosis, arthroscopic procedures and surgical outcomes and less on clinical outcomes such as recovery of hip function and return to sports activities (Bennell et al., 2014; Casartelli, Leunig, Maffiuletti, & Bizzini, 2015; Hetaimish et al., 2013).

At present, most outcome data are based on patient-reported outcome questionnaires (PROs) (Thorborg et al., 2015; Tijssen, van Cingel, van Melick, & de Visser, 2011), which give an indication of hip function from a patient's perspective, but do not measure actual hip functional performance (Casartelli et al., 2015). Functional performance consists of two components, quantity and quality of movement (Engelen-van Melick, van Cingel, Tijssen, & Nijhuis-van der Sanden, 2013). Quantity of movement components include, for example, range of motion (ROM) and muscle

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strength (Chmielewski et al., 2007; Ekegren, Miller, Celebrini, Eng, & Macintyre, 2009; Engelen-van Melick et al., 2013). Quality of movement refers to how the movement is performed. Components like the occurrence of dynamic knee valgus, (lateral) trunk flexion or pelvic drop while landing from a jump can be assessed by video analysis or observation (Chmielewski et al., 2007; Ekegren et al., 2009; Engelen-van Melick et al., 2013). Both components of functional performance give information about the amount of recovery, compensation strategies and eventually, sport readiness (Casartelli, Bizzini, Maffiuletti, Lepers, & Leunig, 2014; Engelen-van Melick et al., 2013; Enseki et al., 2014; Kivlan & Martin, 2012). These data are, therefore, important indicators of recovery and might also indicate possible risk factors for future new injuries (Kivlan, Carcia, Clemente, Phelps, & Martin, 2012; Kivlan & Martin, 2012). As hip arthroscopy is often performed in a young and active population who have a desire to return to an active/sports lifestyle, insight on recovery is important (Alradwan et al., 2012; Bennell et al., 2014; Casartelli, Bizzini, et al., 2014; Kivlan et al., 2012; Kivlan & Martin, 2012).

To date little information is available on recovery of hip functional performance in a population of hip arthroscopy patients (Casartelli et al., 2015; Hegedus, McDonough, Bleakley, Baxter, & Cook, 2015; Hetaimish et al., 2013). Two case studies (total $n = 2$) have described data on functional performance linked to postoperative rehabilitation after hip arthroscopy (Cheatham & Kolber, 2012; Philippon, Christensen, & Wahoff, 2009). However, only very short term follow-up results were available (within four months post-rehabilitation) and the participants were both (semi)-professional athletes (Cheatham & Kolber, 2012; Philippon et al., 2009). A recent systematic review including hip arthroscopy patients diagnosed with FAI found that only 34% of the studies reported ROM data and only 14% reported data on return to sports (Hetaimish et al., 2013). Therefore, the aim of this study was to describe data regarding short- and midterm results of hip arthroscopy patients based on patient-reported hip function, hip functional performance and return to sports activities.

2. Materials and methods

2.1. Study population and design

In this prospective clinical observational study, all patients that underwent hip arthroscopy at Rijnstate Hospital between January 2010 and April 2014 and finished a standardized rehabilitation protocol at Sports Medical Center Papendal (see Appendix 1) at least six months before the start of this study were contacted by telephone to invite them for a follow-up measurement. Patients willing to participate received information letters and after providing written informed consent, they were invited for the actual follow-up measurement. The study design was approved by the local ethics committee (CMO) Arnhem-Nijmegen, registration number 2013/361. A flow chart of patient inclusion is presented in Fig. 1.

2.2. Study protocol

During the visit to our institution, participants completed five questionnaires before starting the standardized physical examination, which included testing bilateral hip range of motion, hip muscle strength, balance and hop tests (Table 1) (Enseki et al., 2014). Two researchers (MH, BS) who were blinded to the exact diagnosis, as well as to the course of the postoperative rehabilitation process, performed the tests. Afterwards, a different researcher (MT), who was blinded to the earlier assessment findings, analyzed the videotaped performance tests to score the quality of movement.

The non-operated leg was tested first during all functional assessments. To ensure that the non-operated leg could serve as a reference for the operated leg, all patients with current injuries, previous injuries (<six months ago) or indications for possible intra-articular hip pathology of the non-operated leg were excluded ($n = 2$) (Fig. 1). Indications for possible intra-articular hip pathology were described according to a recent consensus statement (Weir et al., 2015) and included the presence of groin pain and/or a positive anterior impingement test and/or a positive Flexion-Abduction-External Rotation (FABER) test (Tijssen, van Cingel, Willemsen, & de Visser, 2012; Weir et al., 2015). Previous studies have shown that the use of the unaffected limb as a comparison when examining patients with unilateral lower limb injury should be considered reasonable (Thorborg et al., 2011; van Cingel et al., 2006).

2.3. Patient-reported outcomes questionnaires and sports activity

Several PROs were used in this study. First, hip function was measured using the IHOT-33 (Mohtadi et al., 2012). This scale consists of 33 questions regarding hip disease and quality of life, with each scored on a visual analogue scale (VAS) where zero represents the worst and 100 represents the best score. A final score is calculated by summing up the scores of all questions answered and dividing it by the number of questions answered (Mohtadi et al., 2012; Thorborg et al., 2015). A higher final score (maximum 100) represents a better quality of life and less symptoms, with 100 representing no symptoms. Activity level was measured with the Tegner Activity Scale and a sports activity questionnaire (Collins, Misra, Felson, Crossley, & Roos, 2011). The Tegner Activity Scale measures physical activity level based on a zero to ten scale in which zero represents sick leave based on (hip) injury whereas ten stands for participation in national or international elite level competitive sports (Collins et al., 2011). The sports activity questionnaire used in this study was based on the sports module questionnaire (Malviya, Paliobeis, & Villar, 2013) and consists of 18 questions regarding current and former activity levels, new or recurrent injuries and patient satisfaction after hip arthroscopy (Tables 2 and 3). In order to establish self-reported improvement, a Global Perceived Effect (GPE) scale was used (Table 3) (Jaeschke, Singer, & Guyatt, 1989).

2.4. Hip functional performance – quantity of movement

Range of motion of hip flexion, extension, abduction, adduction, external and internal rotation were determined using a goniometer (Fysiosupplies 20 cm) (Enseki et al., 2014; Holm et al., 2000; Pua, Wrigley, Cowan, & Bennell, 2008). Strength tests of these same directions were performed using a handheld dynamometer (HHD) (microFET 2, Hoggan Health Industries, USA); the make method and average outcome of the three trials were used as the final score (Enseki et al., 2014; Holm et al., 2000; Pua et al., 2008). Previous studies have shown high intra-rater reliability for these measurement instruments (Enseki et al., 2014; Holm et al., 2000; Pua et al., 2008). The balance and hop tests consisted of the single leg balance test, single leg squat test, single leg hop for distance, single leg vertical jump and single leg side hop (Gustavsson et al., 2006; Hegedus, McDonough, Bleakley, Baxter, et al., 2015; Kivlan & Martin, 2012). The balance and hop tests chosen in this study were based on earlier research of postoperative knee rehabilitation (i.e. ACL rehabilitation) combined with recommendations from recent clinical practice guidelines for non-arthritic hip pain (Enseki et al., 2014; Gustavsson et al., 2006; Hegedus, McDonough, Bleakley, Cook, & Baxter, 2015; Stickler, Finley, & Gulgin, 2014). See Table 1 for an overview of all functional performance tests, exact test executions and reliability figures. Pain scores (VAS) were