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Research Article

Rehabilitation after Hip Arthroscopy

Alessandro Aprato*, Marco Gastaldo, Francesco Pasquero and Alessandro Masse

Department of Orthopaedics, Traumatology and Rehabilitation, University of Torino, Torino, Italy

Abstract

Hip arthroscopy has gained considerable popularity in the past decade and currently several hip pathologies may be addressed with this technique. Because of evolving indications, several steps of the procedure are debated at the moment. One of the most common topics of debate is the post-operative rehabilitation: a number of post-operative physiotherapy protocols have been described in the literature but there is no consensus on several aspects of rehabilitation in those patients.

In this paper we reviewed studies regarding rehabilitation after hip arthroscopy. These were analysed to describe indications for postoperative weight bearing, range of motion exercises, phases of rehabilitation and return to sport.

Most of the published studies are based on authors' personal experience and often present poor evidence for their conclusion. Furthermore heterogeneity of published rehabilitation protocols does not allow clear conclusions about this topic a part from the indication for immediate post-operative passive motion and for sport return around the twelfth and sixteenth post-operative weeks. Further studies will be necessary to support these statements with higher level of evidence and to understand which steps of rehabilitation may significantly improve clinical results.

Keywords: Hip arthroscopic; Physiotherapy; Rehabilitation

Background

Hip arthroscopy has gained considerable popularity in the past decade [1]. At present Femoroacetabular Impingement (FAI) is the most common indication for hip arthroscopy, though several other intra-articular conditions of the hip are also commonly treated. The most common indications for hip arthroscopy are shown in Table 1.

Hip arthroscopy showed good results for several pathologies but a consistent rate (from five to 25%) of patient did not meet the pre-operative expectation [2,3]. To improve those results, several steps of the procedure are debated at the moment. One of the most common topics of debate is the post-operative rehabilitation [4]. A number of post-operative physiotherapy protocols have been described in literature but there is no consensus on several aspects of rehabilitation in those patients. Rehabilitation is believed more complex after hip arthroscopy than after knee or shoulder procedures. Traction, capsulotomy and bone excision are key steps for the procedure in the hip and require a careful treatment after surgery and may severely influence the outcome. The purpose of this paper was to review the current literature and to describe the indications for postoperative weight bearing, range of motion exercises, phases of rehabilitation and return to sport after hip arthroscopy for FAI.

Femoroacetabular impingement
Articular cartilage lesions
Labral injuries
Loose body retrieval
Synovitis
Snapping hip
Muscle injuries around the hip
Trochanteric bursitis
Painful hip replacement or resurfacing
Iliopsoas tendinopathy
Hip instability
Infection
Nerve release around the hip
Hip fractures or dislocation
Torn ligamentum teres
Foreign body retrieval (eg., bullet)
Ischiofemoral impingement

Table 1: Most common indications for hip arthroscopy.

Database Search

We performed a systematic review of the literature. Electronic searches in Medline and Scopus to identify relevant articles have been performed. Search has been restricted to English language, human species and to publication period from 2005 up to today. Search terms were 'hip arthroscopy' and 'physiotherapy'. Two reviewers (AA, MG) have independently scrutinized the list of titles of all retrieved citations and, if available, the abstracts to determine potential usefulness of the article. All references cited in the identified reviews have been manually searched for further potential relevant studies. The final list of article included 20 papers or published abstracts relevant to this topic.

Results

Weight bearing

Opinion leaders recommend to design rehabilitation after hip arthroscopy according to the performed surgical procedure [2,4]: in fact, bone trimming seems to be a key factor for the time of weight bearing. Treatment of a "cam" type or a mixed type of FAI usually is performed by trimming the femoral head-neck junction and an excessive bone resection is dangerous because a neck fracture may occur [5]. Goal for the surgeon is to achieve an alpha angle lower than 50 degrees. This angle is measured by first drawing the best fitting circle around the femoral head, then a line through the center of the

***Corresponding author:** Alessandro Aprato, Department of Orthopaedics, Traumatology and Rehabilitation, University of Torino, Viale 25 aprile 137 int 6, 10133 Torina, Italy, Tel: +393386880640; E-mail: ale_aprato@hotmail.com

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neck and the center of the head, then from the center of the femoral head, a second line is drawn to the point where the superior surface of the head-neck junction first departs from the circle; the angle between these two lines is the alpha angle. Although alpha angle reliability has been questioned, this measure is the most used worldwide and showed a good correlation with intraoperative findings [6-9]. Not only the alpha angle is important but also the amount of resection is essential to decide timing for weight bearing. Mardones [10] in a cadaver study, suggested that 30% of the femoral neck diameter could be resected safely, although such resection decreased the energy required for a fracture.

Early full weight bearing (before six weeks post op), poor bone quality (osteopenia or frank osteoporosis) and intensive post-operative activity have been described as risk factors for this complication, although neck fracture has been described also in patient without those peculiarities [11]. Therefore some authors [4,12] proposed rehabilitation protocols with six weeks of protected weight-bearing, especially in patients with poor bone quality or aged >40 years.

Six weeks were suggested by Nassif et al., [13], who despite some weaknesses in their study, suggested that osseous re-modeling occurs in most of hips after osteochondroplasty with toe-touch weight-bearing for six weeks. The authors also reported complete re-cortical-isation of the resected margins at a mean of 20 months after surgery and literature showed also that there is no recurrence of cam deformity at 2 years after femoral neck osteoplasty for femoroacetab-ular impingement [14].

On the other hand, several authors [11-13] allow their patient to bear weight as tolerated after surgery if they have no risk factors. Byrd [15] underlined that the recovery strategy depends on the extent of pathology and the subsequent procedure. In his report, for simple labral debridement and re-contouring of the acetabular rim, the athlete could bear weight as tolerated immediately after surgery. The athlete was allowed to bear full weight, but he or she needs to use crutches to avoid twisting movements during the first four weeks. If the labrum was refixed, then the repair site was protected during the early healing phase by protected weight-bearing for the first four to six weeks.

Since there is no consensus on this topic, Jayasekera et al., [16] designed a case-control study that showed there is no need to enforce a defined period of partial weight bearing on crutches after hip arthroscopic surgery, irrespective of the procedure undertaken. Results demonstrated no significant difference in postoperative modified Harris Hip Score between the two groups (four weeks partial weight bearing on crutches versus fully weight bear immediately after surgery if comfort allowed) at six weeks and six months after surgery.

Immediate post-operative period

Early postoperative movement is considered the best prevention for adhesions after hip arthroscopy [17], although adhesions pathophysiology has not been studied in detail. Adhesions tend to develop between the capsular side of the labrum and the capsule but they have also been described in the peripheral compartment between the femoral neck and the capsule.

Willimon et al., [18] reported that an early physiotherapy (with-in four post-operative hours) rehabilitation program including cir-cumduction exercises performed multiple times per day significantly reduces the revision arthroscopy rate and may reduce the incidence of adhesions. The author recommended continuous passive movement immediately post-operatively and exercise focused on range of movement improvement as soon as pain allows. Stationary bicycles without resistance have also been recommended in the second day after surgery.

Range of motion exercises

Sherry [19] suggested that after hip arthroscopy there often is a significant amount of reflex inhibition and poor muscle firing due to the penetration of the hip with the arthroscopic instruments and the large amount of traction applied to the hip during the arthroscopy. The author underlined the importance of crutches for the first week or two after surgery in order to minimize abnormal forces on the back and pelvic joints while developing muscle coordination and strength to support the hip and to achieve a normal gait pattern.

Nho et al., [20] are more conservative and suggested a standardized postoperative rehabilitation protocol: 6 weeks of hip immobilization and passive Range of Motion (ROM), then 6 weeks of active ROM, followed by 12 weeks of hip strength and conditioning.

Based on their large experience, Philippon et al., [21] recommended limitation of active hip flexion for 4 weeks, based on clinical observation, to minimize the risk of hip flexor tendonitis while Byrd [22] suggested to avoid twisting movements during the first 4 weeks.

Edelstein et al., [11] and Enseki et al., [23,24] underlined the importance of ROM precautions (avoid excessive early flexion and abduction, avoid forced external rotation and extension for 3-4 weeks to protect anterior capsule) for individuals undergoing procedures to address capsular laxity of the hip (thermal modification or plication).

Selkowitz [25] suggested that excessive activation of the Tensor Fasciae Latae (TFL) during therapeutic exercises may be counterproductive in the treatment of disorders in which excessive hip internal rotation may be a contributing factor. Several hip exercises may be helpful because they preferentially activated the gluteal muscles while limiting recruitment of the TFL: the most common used ones are clam, quadruped hip extension, unilateral and bilateral bridge, squat and sidestep. Gluteal, quad, and iliopso as isometrics performed in prone position are recommended to promote neutral hip position and limit anterior soft tissue tightness.

Malloy et al., [26] recommended focusing on the tranversus abdominus and multifidus for lumbar spine stability with transfers. As the patient progresses, more emphasis is placed on gluteal muscle strengthening especially the gluteus medius and hip abductors due to their role of frontal plane stability of the pelvis in functional activities such as gait. The progression of external rotator strength-ening is recommended to begin with partially loaded, band-resisted, external rotation using a stool. Once the patient can maintain stability in the frontal plane (appropriate hip abductor strength), they can initiate resisted hip external rotator strengthening in a full-weight bearing position.

Phases of rehabilitation

Most of the authors divided their rehabilitation protocol in three or four phases and only when the healing milestones of each protocol were achieved the patient may progress to the next level of activity. Philippon [27] identified resisted terminal knee extension, resisted knee flexion, and double-leg bridges as appropriate for phase I and resisted hip extension, stool hip rotations, and side-lying hip abduction with wall-sliding for phase II; the author also suggested that hip clam exercises with neutral hips should be used with caution in patients

with hip flexor tendinitis. In phase III the author protocol prescribes prone heel squeezes, side-lying hip abduction with internal hip rotation, and single-leg bridges.

Eldestein et al., [17] proposed four phases of rehabilitation. The goal of Phase I (0-6 weeks), the protective phase, is to progressively regain 75% of full ROM and normalize gait while respecting the healing process. The aim of Phase II (6-12 weeks) is to achieve independence in daily activities with little or no discomfort. Phase III (12-20 weeks) goals strive to accomplish pain free, non-compensated recreational activities and higher demand work functions. Phase IV (20–28 weeks) requires the patient be independent with home and gym programs and be asymptomatic and pain free following workouts. The primary goal of this phase was not only to return to a pain free competitive state, but also to avoid both breakdown and any type of an acute inflammatory response during the process.

Malloy [26] described similar four phases of rehabilitation but emphasized the importance of initial protection and restoration of lumbo-pelvic stability before neuromuscular re-education. Milestone of this protocol was the restoration of normal gait without pain or compensation and only when achieved the patient may advance in the rehabilitation process. The authors' experience leads them to state that patients who are prematurely advanced in their rehabilitation while having impairments (abnormal gait patterns, pelvic and hip instability, inadequate strength and endurance, inappropriate trunk and neuromuscular control, overuse, inadequate mental confidence in the injured side, discontinuation of a maintenance program) often have difficulty with progression through the later phases of rehabilitation.

Also Cheatham [28] presented an equivalent four-phase rehabilitation program for a high school football player who underwent hip arthroscopy with a labral repair and chondroplasty. Phase I, II and III were similar to the other authors' proposal while the focus of Scott's phase IV was to work towards returning to competition.

The postoperative rehabilitation protocol of Nho et al., [20] is more conservative: 6 weeks of hip immobilization and passive Range of Motion (ROM), then 6 weeks of active ROM, followed by 12 weeks of hip strength and conditioning.

Similarly, Sherry [19] described three rehabilitation phases. Phase I (0-6 weeks) with focus on protection of the post-surgical hip through limited weight bearing and education on avoiding pain with range of motion exercises. Phase II (begins after meeting phase I criteria, about 4-6 weeks): regain and improve muscular strength, progress off crutches for all surfaces and distances, single leg stand control. Phase III (about 10-12 weeks): improve muscular strength and endurance, good control and no pain with sport and work specific movements, including impact activities.

Most of the authors agree that there establishment of limb and trunk neuromuscular control is paramount to preventing compensatory imbalances that can lead to continued irritation or re-injury.

Furthermore several authors stated that tendonitis of the hip flexor or adductors, joint edema and irritation, soft tissue imbalance and faulty movement patterns and low back or sacral-iliac pain are common rehabilitation complications if patient rehabilitation progress too fast.

To avoid those complications, Wahoff et al., [29] developed a criteria driven algorithm for safe integration and return to sport rehabilitation. They placed emphasis on the minimum criteria to advance through rehabilitation phases including healing restraints, patient reported outcomes, range of motion, core and hip stability, postural control, symmetry with functional tasks and gait, strength, power, endurance, agility and sport-specific tasks.

In order to standardize those criteria, Getz et al., [30] proposed a measuring tool that predicts functional post-operative progression and determine patient advancement within a rehabilitation protocol. The Hip Stage-Screening Tool (HSST) was proposed as a means to aid post-operative progression for patients and the medical team. Despite the low statistical value of their study, the authors recommend to quantify patient progression to aid the advancement of rehabilitation.

Sport return

Arthroscopic treatment of intra-articular pathologies in professional athletes resulted in a 80-96% rate of return to elite-level sport [31] while about 70% of recreational athletes is able to return to their pre-injury level of sport. [32]

Most of the opinion leaders [15,21,31,32] agree that return to full competitive activity should usually be recommended between twelfth and sixteenth post-operative weeks and a recent review [33] showed that 70% of surgeons recommended 12 to 20 weeks as timeframe to sport return while 85% of surgeons recommended that patients need to be able to reproduce all motions involved in their sport without pain as leading criteria. Unfortunately up to date, in literature there is no evidence to support this recommendation.

Conclusion

Most of the published studies are based on authors' personal experience and often present poor evidence for their conclusion. Furthermore heterogeneity of published rehabilitation protocols does not allow clear conclusions on several topics. There is a consensus only on the indications for immediate post-operative passive motion and for sport return around the twelfth and sixteenth post-operative weeks but further studies will be necessary to support those statements with higher level of evidence. Multicentre clinical trials such as Palmer's study should be encouraged because their results will help the clinicians in their daily practice.

Furthermore several steps of rehabilitation should be studied and their possible improvement of clinical results evaluated in order to define the best rehabilitation protocol after hip arthroscopy.

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