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PHYSICAL REHABILITATION BEFORE AND AFTER ARTHROSCOPY

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Abstract: *The paper is a pleading for the rigorous and disciplined program of physical rehabilitation after arthroscopic treatment, reviewing the advantages, indications, and limitations of physical rehabilitation pre arthroscopy, associated or not with the correct application of physical therapy program before arthroscopic treatment.*
The paper aims to compare the benefits of conservative treatment of physical therapy additional to interventional orthopedic treatment, bringing arguments for associate physical therapy program before and after arthroscopic treatment or at least physical therapy after arthroscopy.
Applying physical therapy after arthroscopy provides favorable results associated with the joint function and performance prolong the joint function of arthrosis joint still a period of several years until arthroplasty. A correct and rigorous rehabilitation program provides the ideal patient to arthroplasty: trophic muscles and stable joint, improved functionality and optimal mental preparation for rehabilitation program after orthopedic surgery.

Key words: *physical rehabilitation, arthroscopy, joint function*

1. Introduction

Starting from the definition of Protocol (”Rules or Conduct to be respected in society/ profession”) and *Rehabilitation protocol* (”all forms and practices to be followed by all professionals in rehabilitation”) the paper evaluates the importance of a rigorous and disciplined program of physical rehabilitation after arthroscopic treatment, reviewing the advantages, indications and limitations of physical rehabilitation before arthroscopy, associated or not with the correct application of physical therapy program before arthroscopic treatment..

2. Material and Methods

We searched for papers and

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publications about Physical Rehabilitation Protocols before and after arthroscopy. We searched into the data bases the titles of articles including the key words "Physiotherapy AND arthroscopy" and" Physical therapy AND arthroscopy" and discovered a very limited number of materials. To adjust the results, the inclusion criteria were: English language, protocol included in the research, standards included in the research. The results from database search are resumed into table 1. We also observed the variability of the protocols available online regarding post-operative physiotherapy, following the arthroscopy of the hip, taking into account all aspects, including post-operative restrictions and rehabilitation activities. [6].

Table 1

Results of searching into data bases

	Data Base	**Key words** Physiotherapy AND arthroscopy	**Key words** Physical therapy AND arthroscopy
1.	IEEE/IEL Electronic Library	0	0
2.	Science Direct Freedom Collection Elsevier	3 (2 knee, Temporo-mandibular joint) PROTOCOLS NOT SPECIFIED	3 (*on line protocols for hip*, knee, Temporo-mandibular join) PROTOCOLS NOT SPECIFIED
3.	Scopus, Elsevier	11 (shoulder, hip, knee) NO PROTOCOL	5 NO PROTOCOL
4.	Springer Link Journals	24 NO STANDARD	24 NO STANDARD
5.	Web of Science, Core Collection	5	5

3. Results and Discussions

The literature underlines "a tremendous variability in postoperative rehabilitation protocols after arthroscopy. Although the rehabilitation specialists consider that fast track rehabilitation should be the correct attitude in postoperative there are studies showing a trend toward later mobilization [17].

Multidisciplinary collaboration is necessary both in terms of post-operative care, physiotherapy, regarding the patient's reintegration into daily and professional activities, but also on the development and use of efficient, functional and improved medical devices. There is a need for multidisciplinary teams to be formed by orthopaedic surgeons, physical rehabilitation physicians, design engineers, product and materials engineers, but also software specialists and physiotherapists, with the help of which complex devices can be developed and tested properly. [9], [16], [18]

Post hip arthroscopy is the most commonly applied rehabilitation program, mandatory must be individualized and structured after compiling data related to:

- perioperative impairments revealed by patient history and clinical assessment
- intra-articular pathology found in the intraoperative surgery

- functional limitations assessed after arthroscopy (sequelae and movement compensations).[8]

The rehabilitation goals are focused on:

1. the reduction of pain and swelling,
2. increasing mobility and strength,
3. functional improvement or total recovery if possible (faulty movement patterns are normalized and normal proprioception is restored).

The authors insisted on individualized and not time-based programs.[8]

The surgeons at Banff Sport Medicine (Covenant Health, Banff Mineral Springs, Canada) recommend a program of exercises for 'prehabilitation' before knee or hip arthroscopy, designed as a guideline protocol to assist patients during preparation for surgery, and mandatory applied under the direction of a physiotherapist.

The principle of physiotherapy program is based on the increase of knee's muscles strength and range of motion before surgery, with the main outcome regarding the improvement of the recovery process after arthroscopic surgery. By increasing muscles trophicity through increased stress application on muscles, it improves knee stabilization. Knee arthroscopy is widely used after long periods of joint pain and decreased joint loading during daily activities, factors that influence negatively the muscles of the thigh, especially the quadriceps. The patients-facing the situation of future surgery, are often confronted with muscle atrophy and weakness. [24]

Physiotherapy objectives before arthroscopy are achieved through protocol exercise program:

1.Increase the range of motion in the joint (gain range of motion to maximum amplitude and decrease stiffness)

2. Increase the strength of the muscles in limbs and trunk

3.Increase the cardio-respiratory capacity of effort (fitness)

4.Improve proprioception, coordination, motion, control and balance

5.Increase the stability of the joint

The methodology of application includes:

Frequency:

a. daily
   - 30 minutes of analytical exercises should be performed on lower limb muscles (isometric and isotonic contractions)
   - plus 20-30 minutes of cardio training, from 3 to 5 times per week
   - plus 15-20 minutes of muscle strengthening training, from 3 to 5 times per week
   - 20 minutes of respiratory exercises (increase the respiration capacity, increase amplitude and decrease frequency of respiration, increase voluntary and controlled apnea)

b. biweekly
   - joint low-impact training, activities carried out in a straight line, which does not load much the knee joint, such as cycling, swimming, walking. Patients can progressively practice skiing and hiking.

The progression of the exercises should be from simple to complex, from easy to difficult, with the gradual increase in the number of repetitions, and the progression and complexity stages modified at 6-8 weeks.[24]

Control and proper execution gained and fulfilled through repetition. This is the reason why patients need guidance and correction of a professional

physiotherapist.

Increased knee pain or swelling after exercises are symptoms that mandatory require the end of training session and indicates the need for rest, ice application, compression and elevation of knee, and medical assessment.

The benefits of post-arthroscopy are obvious, related to the reduction of time until complete recovery after surgery and the low risk of postoperative complications, including deep vein thrombosis. [26]

3.1. Interventions of physiotherapists after arthroscopy:

3.1.1 **Therapists must teach patients** how to perform specific exercises, to increase muscle strength and endurance, but also for aerobic training, in order to reduce pain and increase mobility. It is necessary to take into account the disease or health status of the individual, especially of comorbidities or the presence of other chronic conditions of the locomotor system. The adaptation of the physiotherapy program is compulsory, intense training activities can negatively affect the health of patients with multiple locomotor disorders / dysfunctions. [2] Patients' adherence to the types of exercises is improved if the physiotherapy program is individualized, the patient is supervised and corrected for defective performance, and most often involves re-training the patient after discharge. [13, 14]

3.1.2 Especially regarding patients with arthrosis, therapists need to consider the **use of mobility aid.** Adaptive mobility devices must be prescribed after a rigorous assessment regarding the joint maximum capacity of loading. [1]

3.1.3 **Neuromuscular training** is aimed towards improving the nervous system's capacity to engender a muscle contraction fast and optimal, train and improve coordination and balance and to give the patient's the necessary tools for relearning adequate movement patterns and skills. [21]

3.1.4 **Mental benefits**: increases self-confidence, is stress buster, and reduce pain.

3.1.5 **Provide optimal education** on daily living, professional activity adjustment and self-management regarding physical activity. In most cases, patients who suffer from arthritis tend to avoid or to eliminate physical activities or exercises. [26] A good patient education practice needs appropriate muscle and joint loading training by which patients can be reassured that training will not accelerate joint degeneration. [25]

3.1.6 **Provide fair advice on medical devices** like orthotics or braces. Orthoses may alter joint-loading but the evidence-based medicine research to support the use of orthoses and for knee osteoarthritis is weak. [7]

If other knee joint elements, except cartilage, are affected, or there is laxity, or the biomechanics is modified, then physiotherapists can assess the knee and make fair

recommendations regarding orthosis, based on joint deficiency and patient's needs.

3.1.7 **Communication**- The physiotherapists shall communicate efficiently both, with the physician and the patient, to provide increased standards of care and to ensure the proper outcomes. [23]

The rehabilitation guidelines after hip and knee arthroscopy are organized 4 phases. The physiotherapy objectives and the progression criteria of each stage are resumed in Table 2.

Table 2

Four phases Rehabilitation Protocol after hip and knee arthroscopy

PHASES	OBJECTIVES	PROGRESSION CRITERIA
Phase 1 1 to 4 weeks	The main objective in the first phase of rehabilitation immediately after arthroscopy is the protection and restoration of **independent mobility**.	1. Minimum pain with the exercises of Phase 1.
		2. Increased ROM. [14], avoiding excessive flexing, ab- duction, internal rotation [1, 11]
		3. Adequate muscle activation in all exercises (isometric contraction exercises for thighs, pelvis and trunk, promote stability in the lumbar spine) [14, 17]
		4. Remove canes [18,19]
Phase 2 4 to 8 weeks	The overall objective of this phase is to perform activities of **daily living independently and pain-free**	1. Normal gait without pain [20,22]
		2. Full range of motion [1, 5]
		3. No joint swelling, muscle pain or irritation
		4. Adequate neuromuscular control in functional activities
Phase 3 8 to 12 weeks	Phase 3 (6^{th} to 8^{th} postoperative week) depending on the patient; goals: helps restore even more resistance and muscle strength, improves cardiovascular capacity and optimizes neuromuscular control, balance and proprioception.	1. The patient performs all exercises from Phase 3, painlessly and properly [9, 21]
		2. Cardiovascular capacity similar to preoperative step
Phase 4 Activity return	Phase 4 aims to return to competition (athletes)	Phase 4 aims to return to competition precautions to consider at this stage include all activities must be able to perform pain-free. Usually there are no specific training [5], [18]

Another rehabilitation treatment consists of the application of:

- ultrasound therapy,
- cryotherapy applied post surgery to decrease pain, bulge, muscle spasm, and decrease inflammation,
- massage,
- joint mobilization, calf raises, steps-ups, extensor exercise,
- ergometric bicycle [11].

4. Conclusions

Existing protocols for rehabilitation after arthroscopy are some models to be followed designed by medical schools with experience in rehabilitation. These protocols are not very strict and are more designed as rules to be followed based on kinetic objectives of rehabilitation after arthroscopy. Applying physical therapy after arthroscopy provides favorable results associated with the joint function and performance prolong the joint function of arthrosis joint still a period of several years until arthroplasty.

Physiotherapists build and adapt specific exercise programs that are tailored to the particular needs of the individual, are the most important rules in rehabilitation.

The adherence of patients to training exercises increase as long as the physiotherapy programs are individualized, taught face to face, adapted, controlled, and involve continuity and condescension.

A correct and rigorous rehabilitation program provides the ideal patient to arthroplasty: trophic muscles and stable joint, improved functionality and optimal mental preparation for rehabilitation program after orthopedic surgery.

As hip arthroscopy is continuing to be applied in the general population the rehabilitation protocols and techniques are consequently necessary to be developed.

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