International Journal of Innovative Research in Medical Science (IJIRMS)
Volume 09, Issue 04, April 2024,
https://doi.org/10.23958/ijirms/vol09-i04/1854

Original article

Conservative Treatment of Degenerative Meniscus: Building Consensus for the Development of a Rehabilitation Program

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Received 14 March 2024; Accepted 26 March 2024; Published 01 April 2024

Abstract

Background: Degenerative meniscus is a common condition, and the current therapeutic approaches lack consistency, leading to uncertain outcomes. The aim is to establish a standardized approach for the conservative management of degenerative meniscus, informed by evidence-based practices and expert input from professionals in related areas. ***Methods:*** The rehabilitation program was developed through a multidisciplinary approach. A systematic review of the existing literature on degenerative meniscus treatments was conducted to identify evidence-based practices. Additionally, experienced professionals from Rehabilitation Medicine, Orthopaedics, and Physiotherapy were consulted to provide their insights and expertise. Consensus meetings were held to integrate these diverse perspectives into a comprehensive rehabilitation program. ***Results:*** The resulting rehabilitation program for degenerative meniscus offers a structured and evidence-based approach. It includes a combination of exercises, physical modalities, and lifestyle modifications tailored to the individual patient's needs. Key components of the program focus on muscles strengthening, improving joint stability, and reducing pain and inflammation. The program also emphasizes patient education to promote long-term self-management. ***Conclusions:*** By bringing together experts from various healthcare disciplines and incorporating evidence-based strategies, this rehabilitation program addresses the current lack of coherence and heterogeneity in degenerative meniscus treatment. It provides a standardized and functional approach to conservative management. The program's emphasis on individualized care and patient education may lead to better treatment adherence and outcomes. Furthermore, collaboration among healthcare professionals ensures a well-rounded and comprehensive approach to addressing the multifaceted nature of degenerative meniscus.

Keywords: ***degenerative, meniscus, conservative treatment, rehabilitation, medicine***

Introduction

Degenerative meniscus lesion (DML) was defined at the 2016 European Meniscus Consensus Projects (2016 EMCP) as a meniscus injury occurring without a history of knee trauma in a patient older than 35 years [1]. Although the pathogenesis is not fully understood, it can be considered as an early stage of osteoarthritis (OA) since it appears to be caused by a slow, osteoarthritis-like degenerative process. It may even be considered as part of normal ageing due to its increased prevalence in older patients [2]. As this type of injury is frequently associated with OA, and because 60% of asymptomatic patients over the age of 50 have a meniscus tear on magnetic resonance imaging (MRI), there is little evidence that knee pain is directly caused by DML [3]. Furthermore, coronal, and lateral (weight-bearing) knee radiographs should be included in the work up of the middle-aged or older patient with knee pain, mainly to diagnose and classify knee OA, and MRI should be reserved only for special indications [1]. The 2016 EMCP, stated in a review of the literature, supports conservative treatment as firstline treatment of DML, especially in patients with coexisting knee OA having a Kellgren- Lawrence (KL) grade at least 2 [4]. However, the conservative treatment proposals are very diverse (in terms of time, type of exercise and sequence of procedures) and usually not very systematised. In this study the main aim is to develop a well-organised and comprehensive rehabilitation program for the DML, based on evidence and expert opinions.

Materials and Methods

This is an exploratory study with the proposal of a rehabilitation program. This program was developed in five stages, according to the methodology recommended in the literature for the elaboration of a formalised consensus [5]: literature review, initial version, reviews by four experts, proofreading by another team of eight experts, and finally the first consensus version (**Figure 1**). A systematic review was carried out in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses PRISMA guidelines [6], in English language, from 2012 to 2022, to identify studies reporting rehabilitation of degenerative meniscus. The following search terms were used in the title and abstract fields:

("meniscus" OR "meniscal") AND ("rehabilitation" OR "physiotherapy") AND ("degenerative" OR "osteoarthritis"). 572 articles were identified, meta-analysis and systematic reviews were selected on a total of 42, after reading the abstract, 31 were excluded since they didn't align with the reviewer's main goals. An initial version of the protocol was written by the authors (version 1, figure 1). Then, it was verified by a small team of experts, namely four Physical and Rehabilitation Medicine (PRM) specialists recognized for its scientific merit and experience in the conservative management of degenerative meniscus. Proofreading of the second version was done by a team of eight experts (from outside the protocol building), including 4 PRM specialists, 2 Orthopaedic Surgeons, and 2 Physiotherapists, all recognized for their competence and experience in this field. A Likert scale from 0 to 10 (0:"I do not agree at all" and 10:"I completely agree"), was used to evaluate the relevance of each topic. An open comment was requested for each item and pertinent remarks were taken into account, even in cases of strong panel agreement (7 to 9). All data expressing personal opinions was treated in a coded manner to ensure confidentiality. Any score below 5 was changed in response to the feedback given. Finally, the first consensus version was presented (final version).

Results and Discussion

All experts completed the questionnaire (attachment 1). The mean score of the 36 rehabilitation items proposed was 8, 95. The lower mean score was 7,71 and the higher was 9,86. No item had a mean score less than or equal to 5, and only 1 item had one grading less than or equal to 5 (**Table 1**). 5 items had minor changes due to comments that were taken into consideration: a) The regularity of functional assessment with KOS-ADLS was changed from "regularly" to "before treatment, at 4 weeks and at the end of the program" to improve accuracy and since the medium standardised effect size and large standardised response mean were found after 4 weeks of physical therapy treatments on the Portuguese version [7]. b) Progressing to running and sports specific exercises were only included in phase 3, since it was highlighted by two different reviewers that it would be safer. c) The possibility of 2 times per day frequency of the program in phase 1 was changed as it was referred to as excessive by reviewers. d) Intensity of aerobic exercise with stationary cycling with progressively increasing resistance was included, assessed by the talk test [8]. e) Ground softness was also included as an important characteristic in phase 2 walking. After those changes were made, a second version of the rehabilitation program was achieved, divided into Phases 0 to 3, with a duration of 8 to 12 weeks [9] (**Table 1**). This version 2 was subjected to proofreading by a panel of independent experts for review. The final proposed program is available in attachment 2, and a summary is presented at table 2.

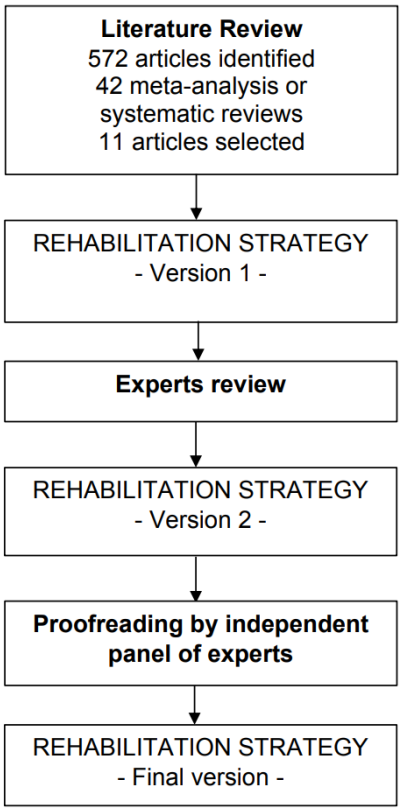

Figure 1: Rehabilitation protocol creation flowchart

Table 1: Topics presented to the independent panel of experts, as Version 2 of the Rehabilitation Protocol.

Topics presented	Avg	Min
All proposed timings, frequencies, intensities and exercises should be individualised to the patient.	9,85	9
Progression to the next stage is dependent on symptomatic tolerance and the achievement of new kinetic and neuromotor skills.	9,43	8
Exercises should be suspended, and the patient reassessed if pain is over 3 in 10 on the NPRS during or after exercise, or if there is pain and swelling the following day.	9,00	7
Avoiding arthrogenic muscle inhibition is important	9,43	7
Functional assessments should be done regularly using the KOS-ADLS to understand the benefits of the program and adapt it to the kinetic requirements of the patient.	8,57	7
Pain intensity should also be assessed by the NPRS	9,43	8
We suggest at least 3 medical appointments: one before the program, one in the 4th week and the last at the end of the program.	9,43	8
At the end of the program, pain should be reduced (less than 2/3 on the NPRS), full extension and functional flexion should be possible, gait should be normal (including on stairs) and the patient should have confidence in the activities of daily living.	8,86	6
The main goals of phase 0 are to provide education, advice and access to information	9,43	7
Patients should feel empowered by having information about their condition, namely basic concepts about pain management and the importance of neuromotor work and low-intensity, low-impact aerobic exercise.	9,86	9
Kinesiophobia should be addressed, as should any other patient concerns.	9,57	9
Weight loss should be advised if the BMI is over 25 kg/m2, and a referral to a nutritionist may be considered.	9,29	8
The main goals of phase 1 are nociception management (pain and swelling) and normalize range of motion with full extension and functional flexion (>120º).	8,57	6
It should focus early on pain and swelling management.	9,85	9
Phase 1 of the program should be done 3 times a week on non-consecutive days and, if possible, twice a day.	8,29	7
To manage pain and swelling, static cryotherapy for 15 minutes, 3 times a day, followed by manual massage with topical NSAIDs (piroxicam, diclofenac or etofenamate, for example).	8,57	7
Consideration of other physical modalities, such as iontophoresis or magnetotherapy.	8,85	8

Oral NSAIDs for a short period of time, if there are no contraindications, when pain intensity is over 3in 10 on the NPRS.	8,57	7
Static stretching of the quadriceps femoris and hamstrings for 30 seconds each.	9,29	7
Proprioceptive neuromuscular facilitation to achieve full extension and flexion in functional ranges (120º).	9,43	8
Open kinetic chain active knee extension and flexion with full range of motion (ROM) - 3 or 4 sets of 10 repetitions.	9,14	8
Stationary cycling at low resistance for 10 to 15 minutes, twice a day.	8,29	7
The main goals of phase 2 are knee and hip muscle strengthening and proprioceptive training.	9,29	7
On this stage the program should be done 3 times a week on non-consecutive days.	9,14	7
Static stretching of the quadriceps, hamstrings, hip abductors and adductors for 30 seconds each.	9,42	8
Concentric quadriceps and hamstring strengthening exercises - 4 sets of 10 repetitions.	8,85	7
Concentric hip muscle (gluteus maximus, medius and minimus, iliopsoas, tensor fascia lata) and gastrocnemius strengthening exercises - 2 sets of 10 repetitions.	8,57	7
Proprioceptive training, progressing from a static double leg stance to a dynamic single leg stance for 10 to 20 minutes, as well as other exercises in disturbance training, with increased kinetic demand and reduced exteroceptive inputs.	9,29	8
Stationary cycling with progressively increasing resistance for 20 to 30 minutes.	9,29	8
Slow walking on even ground for 30 minutes a day.	8,57	7
Aerobic conditioning with use of an exercise bike, elliptical machine and treadmill; walking, eventually progressing to running; and other sport-specific exercises.	7,71	5
The main goals of phase 3 are muscle strengthening, proprioceptive training, and aerobic conditioning.	9,14	6
On this stage the program should be done 3 to 5 times a week	9,00	6
Increasing the knee and hip load for muscle strengthening and adding plyometrics exercises if appropriate.	9,71	8
Proprioceptive and disturbance training with increasing difficulty and instability for 15 to 20 minutes.	9,00	7
Low-intensity and low impact aerobic conditioning progressing to stair training, walking, jogging and possibly running (slowly with low impact).	9,14	7

Avg – average. KOS-ADL - Knee Outcome Survey Activities of Daily Living Scale. Min – minimum. NPRS – numerical pain rating scale. NSAIDs - non steroid anti-inflammatory drugs.

Table 2: Degenerative meniscus conservative treatment protocol

Phase	Duration	Objectives	Detailed
1st medical appointment			
0	Throughout the program	Education and motivation	• Patient education • Addressing kinesiophobia • Advice on weight loss (if BMI >25 kg/m^2)
1	Weeks 1-3	Relief of signs and symptoms, mobility normalization	• Static cryotherapy, manual massage, NSAIDs • Static stretching, PNF techniques to achieve full extension • Open kinetic chain active knee mobilization • Stationary cycling
Re-evaluation medical appointment 1			
2	Weeks 4-8	Neuromotor and aerobic conditioning	• Knee and hip muscle strengthening and static stretching • Proprioceptive training • Stationary cycling
3	Weeks 9-12	Advanced activity phase	• Strengthening and proprioceptive training (progression) • Aerobic conditioning
Re-evaluation medical appointment 2			

BMI - Body mass index. PNF - Proprioceptive neuromuscular facilitation. NSAIDs - non steroid anti-inflammatory drugs.

This investigation resulted in the establishment of a rehabilitation strategy for the conservative treatment of DML based on data from the literature and expert opinion. All the experts contacted answered the inquiry, and there was agreement on the majority of the protocol's proposed items. To obtain the final version, 5 minor adjustments were made in response to the feedback given by the experts. Rehabilitation of the degenerative meniscus is based on three main dimensions, namely advice and access to information, symptomatic management and advanced neuromotor control stimulation [9]. With conservative treatment, the patient may perceive a gradual improvement in symptoms over 6 weeks and be back to normal daily activities by 12 weeks [10]. It should focus early on pain and swelling management [11] as it is impossible to adequately rehabilitate any structure with pain, contracture, or joint effusion. Physical modalities may be prescribed, namely cryotherapy, iontophoresis and low or medium frequency electrical stimulation. Non-steroid anti-inflammatory drugs (NSAIDs) may initially be prescribed for a short period of time to reduce nociception if no medical contraindication exists. One of the first concerns should be maintaining knee range of motion, particularly active full extension, and functional flexion (>120º) [4,12]. Nociceptive control allows the progressive introduction of therapeutic exercise aimed at maintaining joint mobility and muscle strength, closed kinetic chain (CKC) proprioceptive training and aerobic conditioning [9,12]. Concerning the kinetic dimension, the recommend are as following: - Quadriceps femoris, hamstring, gluteus maximus, medius and minimus, iliopsoas, tensor fascia lata and gastrocnemius strengthening, and low impact dynamic / concentric work, according to symptomatic tolerance [13,14]. - Knee disturbance training with CKC and a neuromuscular regimen that incorporates single leg exercises on varied surfaces and plyometric to enhance the posture of the trunk and lower limbs [15]. - Aerobic conditioning with use of an exercise bike, elliptical machine and treadmill [16]. - Prescription and regular monitoring of home exercises to improve muscle strength and endurance, and muscle flexibility, as well as balance and proprioception in daily life activities. The level of information provided on the topic, as well as patient's motivation for the program are important factors in increasing compliance to home-based work.

We also mention the possibility of promoting a shorter version of the current program, to be applied to selected patients.

Conclusions

The first therapeutic proposal for symptomatic degenerative meniscus should be conservative. Advice and access to information, control of the noxious environment, maintenance of joint mobility, muscle strengthening of the quadriceps and hamstrings, proprioceptive stimulation and aerobic conditioning should be promoted. Kinesiophobia should be controlled, and functional evolution assessed with specific tools. We were able to develop a consensus strategy for DML rehabilitation management by employing a rigorous methodology. This proposal will need proper prospective validation to confirm its feasibility and effectiveness. A randomised control trial with patients matched for age and functionality would be extremely useful. The first therapeutic proposal for symptomatic degenerative meniscus should be conservative. Advice and access to information, control of the noxious environment, maintenance of joint mobility, muscle strengthening of the quadriceps and hamstrings, proprioceptive stimulation and aerobic conditioning should be promoted. Kinesiophobia should be controlled, and functional evolution assessed with specific tools. We were able to develop a consensus strategy for DML rehabilitation management by employing a rigorous methodology. This proposal will need proper prospective validation to confirm its feasibility and effectiveness. A randomised control trial with patients matched for age and functionality would be extremely useful.

Declarations

Ethics approval and consent to participate

Not applicable.

Data Availability

Readers can access the data underlying the findings of the study upon request to the correspondent author.

Conflicts of Interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

Funding Statement

There was no financial or other type of support to this study.

Authors' contributions

JPP contributed to the design, definition of intellectual content, manuscript review, and guarantorship. LRB contributed to the literature search, data analysis, manuscript preparation, and manuscript editing. JP contributed to data acquisition and manuscript preparation and editing. SR contributed to statistical analysis, manuscript preparation, manuscript editing. All authors read and approved the final manuscript.

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