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Physiotherapy Management in Meniscus Injury

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ABSTRACT

Background: Meniscus injury is one of the most common knee injuries in the orthopedic field. This injury often occurs in sports that involve rotating movements, squats/excessive knee joint flexion such as in basketball, soccer or badminton. The medial meniscus is injured more often than the lateral meniscus, and this is due to the tight attachment of the meniscus to the medial collateral ligament of the knee joint, which limits its movement. Injury occurs when the femur rotates about the tibia, or the tibia against the femur, with the knee joint slightly flexed and supporting body weight.

Objective: This study aims to summarize secondary data related to meniscus injuries.

Methods: The research method used was a literature study using secondary data in the form of journals related to the topic of meniscus injury obtained through Google Scholar, Science Direct, and PubMed.

Results: Several studies have shown that someone with a knee injury can be given physiotherapy intervention in the form of exercise that is tailored to the symptoms experienced.

Conclusion: Based on the results of a literature review, neuromuscular and strengthening exercises, Mulligan's squeeze technique with conventional therapy, open and closed kinematic chain and education can improve symptoms after meniscus injury.

Key words: meniscus injury, physiotherapy

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Background

Sport is a form of physical activity that requires body parts to move in a planned, structured and repetitive manner to improve physical fitness.[1] Lately, many people are enthusiastic about running. These activities are also supported by running events, both short distance and long-distance running.[2] In addition to running, many people experienced minor injuries such as strains or sprains. Not infrequently also serious injuries such as fractures, joint dislocations, and meniscus tears. Meniscus injuries are widespread among professional and amateur athletes and are one of the most common indications for knee surgery. Increasing athletic physical activity will increase the risk of injury to this structure. Meniscus injuries are injuries that often occur in sports that involve rotating movements. Sports traumatology with direct or repeated trauma can cause damage to the meniscus.[3]

A meniscus injury is a knee injury that is quite common where the annual incidence reaches 66% per 100,000 people. The ratio of the incidence of meniscus injuries in adults for men is 9/1000 and for women is 4.2/1000. Between the two meniscus, namely the medial and lateral meniscus, the medial meniscus is injured much more often than the lateral meniscus. Injury to the lateral meniscus usually coincides with an ACL injury. In some Northern European countries, the estimated incidence of meniscus tears is 2 per 1000 person-years. The ratio of the incidence of meniscus injuries in adults for men is 9/1000 and for women is 4.2/10000.[4]

A meniscus injury is the rupture of one or more fibrocartilage in the knee. Meniscus injuries can result from a twisting motion of the knee when the leg is bent. The medial meniscus is injured more often than the lateral meniscus, and this is due to the tight attachment of the meniscus to the medial collateral ligament of the knee joint, which limits its movement. The injury occurs when the femur rotates about the tibia, or the tibia against the femur, with the knee joint slightly flexed and supporting body weight. There are two types of meniscus tears, namely traumatic and degenerative tears. Traumatic tears occur in younger patients, which usually occur in athletes due to the twisting force of the flexed knee under heavy loads. This often results in a “bucket

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handle" tear where there is a vertical or oblique tear in the posterior horn to the anterior horn, forming a free portion that remains attached to the anterior and posterior sections. Degenerative tears occur in older patients. Tears are generally caused by age-related degeneration and cause horizontal tears.[5,6]

Methods

The research method used is a literature study using secondary data in journals related to the topic of meniscus injuries obtained through Google Scholar, Science Direct, and PubMed.

Results

There are five studies related to physiotherapy intervention for meniscus injury. Skou and Thorlund designed a 12-week supervised exercise therapy program for young adults with a meniscal tear.[10] The therapy program consisted of 2 sessions per week involving neuromuscular and strengthening exercises. Neuromuscular consisted of knee bend, pelvic lift, plank, side plank, stair climbing, outer thigh and inner thigh exercises using exercise bands, slide-exercise sideways and sideway lunges). Exercises were done as many as 2-3 sets with 10-15 repetitions. Strengthening exercises consisted of one-legged leg press, one-legged knee extension, one-legged knee flexion and kettlebell swings. At the initial stage, the exercise was performed in 2 sets with 15 repetitions, progressing to 3 sets with 12 repetitions, 3 sets with 10 repetitions and 3 sets with 8 repetitions.

Kim examined the effect of gluteus medius strengthening on the knee joint function score and pain in meniscal surgery patients.[7] In this study, there were three intervention groups. The first intervention group performed an isometric hip adduction exercise with a 10 repetition maximum (RM), 10 repetitions, 10 seconds rest between exercises for 20 minutes. The second intervention group performed hip abduction in side-lying exercise with a 10 RM, 10 repetitions, 10 seconds rest between exercises for 20 minutes. The third intervention group performed a combination of hip adduction exercise and hip abduction in side-lying exercise with a time of 10 minutes and a rest of 10 seconds between exercises. All groups performed exercises with a weight of 70% 1 RM, 3 times a week for 5 weeks.

Skou et al. compared the effects of exercise and patient education as treatment of meniscal tears in young adults.[11] The group performed strengthening and neuromuscular exercises with supervision 2 times a week with 2 sets of 15 repetitions, progressing to 3 sets of 12 repetitions, 3 sets of 10 repetitions and 3 sets of 8 repetitions. While in the education group, participants were given individual motivation or support to be able to complete the 12-week exercise.

Kasturi et al. identified the effectiveness of Mulligan's squeeze technique as an adjunct to conventional therapy to decrease pain and improve range of motion (ROM) in meniscal tears.[9] In this study, the first group was given Mulligan's squeeze technique with 3 sets of 10 repetitions in one session and hold for 10 seconds, and conventional therapy (static quadriceps, static hamstrings and vastus medial obliques strengthening, active hip, knee and ankle ROM exercises, multiple angle isometrics and gait training) with a dose of all exercises performed 10 repetitions, hold for 10 seconds. Meanwhile, the second group was only given conventional therapy with the same dose.

Kachanathu et al. explored the effect of open and closed kinematics chain exercises in the management of meniscal injuries.[3] This study consisted of two intervention groups, namely, the open kinematics chain (OKC) group and the closed kinematics chain (CKC) group. Both groups were treated with short wave diathermy for 20 minutes post-exercise. Each training session lasted for 30 minutes, as many as 5 sessions per week with a total period of 2 weeks. Ten minutes of warm-up was allowed before training. Exercises in the open kinematics chain (OKC) group consisted of hamstring curls, gravity-assisted supine wall slides, resisted step-ups and chair scoots. Exercises in the closed kinematics chain (CKC) group consisted of unilateral closed chain extension, resisted mini squats, unilateral closed chain flexion and half squats.

Discussions

Meniscus injuries are prevalent in sports, especially those requiring twisting and sudden changes in direction, such as football, basketball, netball, and alpine skiing. Meniscus injuries, especially sports-related injuries, involve rotational forces. A common mechanism of meniscus injury is a varus or valgus force directed at the flexed knee. When the foot is in a support position and the femur is rotated internally, the valgus force applied to the bent knee can cause a medial meniscus tear. Varus forces on a flexed knee with an externally rotated femur can cause lateral meniscus lesions. The medial meniscus is more firmly attached than the relatively mobile lateral meniscus, and this may result in a greater incidence of medial meniscus injury.[5]

According to Kim, meniscus injuries can result in pain, stiffness, crepitus, and functional limitations in addition to muscle atrophy in the vastus medialis oblique between the quadriceps. Prolonged imbalance of the vastus medialis oblique and vastus lateralis muscles will result in excessive lateral movement of the patella when the knee is extended. Incorrect movement of the patella during movement can cause excessive load on the subchondral bone. This will result in lower extremity malalignment. The knee joint's instability can alter the lower extremity's neuromuscular control system, followed by abnormal changes in the core muscles that control the hip joint, such as the gluteus maximus and gluteus medius. Muscle malfunction and decreased muscle activity cause adduction and internal rotation of the hip joint during walking with excessive weight, which can increase the Q-angle, and later cause genu valgum. Therefore, it is essential to strengthen the vastus medialis oblique and gluteus medius to help increase muscle strength and improve the symptoms of knee joint meniscus injuries.[7]

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According to research conducted by Kim, the Lyshom knee scoring scale in groups I and II increased and the VAS score decreased, while group III experienced more improvements such as reduced pain and increased functional ability. The squat exercise is a closed kinetic chain exercise that uses various joints and muscles in one movement. This is an effective and safe intervention method because the contraction of the muscles around the knee is increased, and tension on the anterior cruciate ligament is minimized. In the squat intervention, a pillow is placed between the knees to maintain a neutral position and a semi-squat of up to 45 degrees of flexion is performed to selectively strengthen the vastus medialis oblique and induce isometric hip joint adduction.[7] Hip joint abduction exercises in the recumbent position are considered open kinetic chain exercises. A study on hip muscle strengthening by Distefano et al. revealed that the gluteus medius had the greatest muscle activity in the lying position, so that there was an increase in muscle contraction.[8]

Meniscus injuries are usually associated with pain, decreased knee joint stability, decreased muscle strength and balance. Kachanathu et al. showed that post meniscus injury participants in groups A and B each received open kinematics chain (OKC) and closed kinematics chain (CKC), showed an increase in hamstring muscle strength and balance. This exercise can increase muscle contraction around the knee that is weak after a meniscus injury. However, the CKC group showed better improvement than the OKC group. This is supported by the observation of previous studies where CKC is known to increase stabilization of the knee.[3]

In Kasturi et al. study, 40 participants with meniscus injuries were divided into two groups, the parameters measured were pain, joint range of motion and physical disability. All parameters were measured on day 1, week 4, and week 6 after the completion of the intervention in both groups. All of these parameters improved in both groups, but better results were shown in group I (mulligan's squeeze technique and conventional therapy). The recommended exercises for post meniscus injury are exercises aimed at increasing the range of joint motion, joint stability, strength and elasticity. The manual mulligan technique treats pain, limited ROM and symptoms associated with a post meniscus injury.[9]

According to Skou et al., neuromuscular and strengthening exercises are appropriate for post-meniscus injury rehabilitation. Parameters such as pain, function in daily living, function in sports recreation and quality of life improved after the intervention was given. Neuromuscular exercises focus on improving sensorimotor control and joint stability through functional exercise. Strengthening exercises focus on increasing strength and muscle mass using free weights or machines. Problems that occur when a person has undergone meniscus repair surgery are limited joint range of motion and decreased muscle strength, so it is recommended to increase joint range of motion and muscle strength.[10,11]

Conclusion

Based on the results of a literature review, neuromuscular and strengthening exercises, Mulligan's squeeze technique with conventional therapy, open and closed kinematic chain and education can improve symptoms after meniscus injury.

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