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Mini Review

Effectiveness of Current Physiotherapy in Osteoarthritis of the Knee

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Abstract

Osteoarthritis (OA) of the knee is a multifactorial disease that develops with many causes such as aging, obesity, genetic factors, and mechanical load. The main symptoms of OA are the initial degeneration and destruction of knee articular cartilage, and the mechanical load and accumulation of abnormal bone turnover (bone resorption and formation) that occurs in the subchondral bone. Until now, physiotherapy approaches for knee OA have been focused on as the main pathological conditions of articular cartilage destruction and bone changes around the joints. However, in recent years, it has been perceived as a regression change in all joint components, including the meniscus, joint capsule, ligaments, and muscles. The purpose of this review is to explain current physiotherapy methods applied to knee OA patients and the findings of research on this subject.

Keywords: After knee osteoarthritis; physiotherapy; rehabilitation; conservative therapy; total knee arthroplasty

Introduction

Osteoarthritis (OA) of the knee is caused by the mechanical load and accumulation of early degeneration of knee osteoarthritis and its destruction, and abnormal bone turnover (bone resorption and formation) that occurs in the subchondral bone. OA is a multifactorial disease that develops due to many causes such as aging, obesity, genetic factors, and mechanical load. Since 2005, the number of symptomatologic patients with knee OA (40 years and older) in Japan is estimated to be about 8 million. Pathologically, knee OA is a disappearance of chondrocyte extracellular matrix that progresses from a site close to the surface layer of knee OA, fibrillation of the cartilage surface layer, cartilage thinning, crack formation, chondrocyte cluster formation and cells. It is a disease that causes death and changes in osteophyte formation at the periphery of the joint. Based on these pathological changes, clinically, knee joint pain, arthritis, rattling during joint movement, limited range of motion of the knee joint, and local inflammation are exhibited. The purpose of this review is to explain current physiotherapy methods applied to OA patients and the findings of research on this subject.

Purpose of Physiotherapy and Rehabilitation in OA

Knee OA is a target disease for physical therapy in Japan. However, the current situation seems to be that many knee OA patients who receive conservative therapy are given a pamphlet by physical therapists or doctors and are instructed in knee osteoarthritis muscle strengthening exercises before being treated by a physiotherapist. And even if you receive physiotherapy by a physiotherapist, you are only doing vague lower limb muscle strengthening exercises, range of motion exercises, and balance exercises. In addition, physiotherapy interventions have not been standardized, there is little scientific basis, and there are problems such as no comparative study on efficacy or research on cost effectiveness. Looking at the physiotherapy approaches for knee OA so far, articular cartilage destruction and bone changes around the joints have attracted attention as the main pathological conditions. However, in recent physiotherapy approaches, knee OA is seen as a regression change in all joint components, including the meniscus and joint capsule, ligaments, and muscles.

Physical therapy for OA

Confirmation is important as a risk factor for the onset and progression of knee OA [1,2].

1) Patient education and lifestyle guidance: Implementing a self-management program can not only improve function but also reduce medical costs for each patient [3].

2) **Weight Loss Therapy:** Four RCTs (n = 454) matched uptake criteria for changes in pain and function when weight loss

was achieved. The effect size was 0.20 (95% CI 0 to 0.39) for pain and 0.23 (0.04 to 0.42) for physical function at a weight loss of 6.1 kg (4.7 to 7.6 kg). Meta-regression analysis showed that physical dysfunction improved significantly when body weight decreased by 5.1% or more, or 0.24% or more per week [4].

3) Exercise therapy

a. Muscle strengthening exercise: Knee OA patients were subjected to isokinetic muscle strengthening exercise, static stretch + isokinetic exercise, proprioceptive neuromuscular facilitation (PNF) stretch + isokinetic exercise and compared with the symmetric group (no exercise). As a result, pain, activity (Lequesne's index), and peak torque improved in all groups. The static and PNF stretch groups improved the knee joint ROM and the peak torque at an angular velocity of 60 degrees / sec, and the PNF stretch group also improved the peak torque at an angular velocity of 180 degrees / sec [5].

b. Aerobic exercise: As a result of a meta-analysis that integrates the data of multiple papers (4 volumes) on the effect of walking exercise on knee OA patients, an effect on pain and physical function was found. (SMD: 0.48, 95% CI: 0.13 to 0.83 and SMD: 0.35, 95% CI: 0.11 to 0.58, respectively) [6].

c. Coordination exercise: Knee OA patients were trained for 8 weeks (3 times / week) to improve the skillful movement of the foot using a computer. As a result, WOMAC-pain and function ($p < 0.008$), walking time, and knee flexion / extensor muscle strength were significantly improved [7].

4) Orthosis therapy: Knee supporters may reduce knee joint pain. Knee braces are recommended for the treatment of OA, but higher quality clinical studies are needed [8].

5) Physical therapy:

a. Ultrasound: Four studies (n = 341) examining the effects of ultrasound suggested that they were more effective than trying non-specific exercise therapy [9].

b. Spa therapy: The spa therapy group showed significant improvement in all endpoints. On the other hand, the control group did not show any significant changes [10]. The warm water pool treatment group showed significant improvement in all Lequesne index, WOMAC, SF-36, and VAS endpoints. In the control group, only SF-36 after 6 months showed a significant improvement [11].

c. Combined use of physical therapy with exercise therapy: For 100 patients with bilateral knee OA, the pain disability index score showed a significant improvement in each of the following groups:

i. Shortwave diathermy therapy + hot pack + isometric strength training group (n = 20),

ii. Transcutaneous electrical stimulation therapy + hot pack + isometric strength training group (n = 20),

iii. Ultrasound + hot pack + isometric strength training group (n = 20)

iv. Hot pack + isometric strength training group (n = 20),

v. Isometric strength training group (n = 20).

In other words, it was shown that it is optimal to combine shortwave diathermy therapy or transcutaneous electrical stimulation therapy with hot packs [12].

6) Physical therapy intervention after surgical treatment

A. Total knee arthroplasty (TKA): Consider artificial joint replacement in patients with knee OA who do not provide adequate pain relief and functional improvement with a combination of non-pharmacotherapy and medication. Joint replacement is an effective and cost-effective method for patients with severe symptoms with decreased health-related quality of life or functional limitation despite conservative therapy.

i. Continue passive movement (CPM) device: The use of CPM is effective in improving range of motion in the short term. However, it did not affect long-term results. In addition, long-term use of CPM has little effect on improving range of motion [13].

ii. Range of motion movement, slider board movement: Automatic range of motion exercise was an effective method for improving function after TKA, and no significance of passive exercise by a physiotherapist was observed. It is preferable for the physiotherapist to be actively involved in functional exercise focusing on activities of daily living rather than passive exercise of the knee joint [14].

iii. Increasing muscle strengthening exercise: Resistance exercise is effective in strengthening muscle size and strength in patients 1-4 years after TKA [15].

iv. Functional exercise therapy, balance exercise: Improvements in lower limb function were observed in both the functional training program and the group to which balance exercise was added. There was also a high motivation to participate in the exercise. However, no independent effect of balance exercise alone was observed [16].

v. Preoperative physiotherapy and patient education: There was no clear evidence that preoperative education for knee and hip replacement was effective in reducing pain, recovering function, and shortening hospital stays compared to conventional care. However, it is effective in reducing preoperative anxiety [17].

B. High tibial osteotomy (HTO), noncompartmental knee arthroplasty (UKA): No papers could be found on the effects of physiotherapy interventions on HTO and UKA. In recent years, UKA has tended to be recommended over HTO in terms of cost effectiveness and pain relief [1-5].

Future Issues and Prospects

Knee OA has a high prevalence worldwide and is one of the diseases that must be dealt with frequently in physical therapy. The following issues remained in both medical treatment and physical therapy for knee OA.

a. Although there were reports showing the effectiveness of exercise therapy for pain reduction and improvement of living function, there were few intervention studies in Japan.

b. As a result of solving pain and problems of living function, the effect of exercise therapy could be expected in the short term. However, few studies have been examined in the long term.

c. Most of the studies in Europe and the United States have been conducted on the effectiveness of physical therapy after total knee arthroplasty. In Japan as well, it is necessary to conduct clinical studies showing its effectiveness.

Conclusion

OA is a condition that requires physiotherapy and rehabilitation. It is understood from the literature that OA is common and causes serious disability, but there is no consensus on its treatment. Therefore, in Japan as well, it is necessary to carry out high-quality analytical research focusing on the effects of therapeutic intervention through multicenter joint research utilizing a comprehensive health care database.

Disclosure of Conflicts of Interest

For this study, none of the authors have a COI status to disclose.

References

1. Louboutin H, Debarge R, Richou J (2009) Osteoarthritis in patients with anterior cruciate ligament rupture: a review of risk factors. Knee 16: 239-244.
2. Liden M, Sernert N, Rostgard-Christensen L (2008) Osteoarthritic changes after anterior cruciate ligament reconstruction using bone-patellar tendon-bone or hamstring tendon autografts: a retrospective, 7-year radiographic and clinical follow-up study. Arthroscopy 24: 899-908.
3. Jessep SA, Walsh NE, Ratcliffe J (2009) Long-term clinical benefits and costs of an integrated rehabilitation programme compared with outpatient physiotherapy for chronic knee pain. Physiotherapy 95: 94-102.
4. Christensen R, Bartels EM, Astrup A (2007) Effect of weight reduction in obese patients diagnosed with knee osteoarthritis: a systematic review and meta-analysis. Ann Rheum Dis 66: 433-439.
5. Weng MC, Lee CL, Chen CH (2009) Effects of different stretching techniques on the outcomes of isokinetic exercise in patients with knee osteoarthritis. Kaohsiung J Med Sci 25: 306-315.
6. Fransen M, McConnell S, Hernandez-Molina G (2008) Exercise for osteoarthritis of the knee. Cochrane Database Syst Rev CD004376.
7. Lin DH, Lin CH, Lin YF (2009) Efficacy of 2 non-weight-bearing interventions, proprioception training versus strength training, for patients with knee osteoarthritis: a randomized clinical trial. J Orthop Sports Phys Ther 39: 450-457.
8. Rannou F, Poiraudeau S, Beaudreuil J (2010) Role of bracing in the management of knee osteoarthritis. Curr Opin Rheumatol 22: 218-222.
9. Rutjes AW, Nüesch E, Sterchi R (2010) Therapeutic ultrasound for osteoarthritis of the knee or hip. Cochrane Database Syst Rev 20: CD003132.
10. Fioravanti A, Iacoponi F, Bellisai B (2010) Short- and long-term effects of spa therapy in knee osteoarthritis. Am J Phys Med Rehabil 89: 125-132.
11. Sherrman G, Zeller L, Avriel A (2009) Intermittent balneotherapy at the Dead Sea area for patients with knee osteoarthritis. Isr Med Assoc J 11: 88-93.
12. Cetin N, Aytar A, Atalay A (2008) Comparing hot pack, short-wave diathermy, ultrasound, and TENS on isokinetic strength, pain, and functional status of women with osteoarthritic knees: a single-blind, randomized, controlled trial. Am J Phys Med Rehabil 87: 443-451.
13. Lenssen TA, van Steyn MJ, Crijns YH (2008) Effectiveness of prolonged use of continuous passive motion (CPM), as an adjunct to physiotherapy, after total knee arthroplasty. BMC Musculoskelet Disord 29: 60.
14. Kim TK, Park KK, Yoon SW (2009) Clinical value of regular passive ROM exercise by a physical therapist after total knee arthroplasty. Knee Surg Sports Traumatol Arthrosc 17: 1152-1158.
15. LaStayo PC, Meier W, Marcus RL (2009) Reversing muscle and mobility deficits 1 to 4 years after TKA: a pilot study. Clin Orthop Relat Res 467: 1493-500.
16. Piva SR, Gil AB, Almeida GJ (2010) A balance exercise program appears to improve function for patients with total knee arthroplasty: a randomized clinical trial. Phys Ther 90: 880-894.
17. McDonald S, Sarah E, Hetrick (2008) Pre-operative education for hip or knee replacement. The Cochrane Reviews.

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