



Case Report

Effect of Korean Medicine Treatments for Fat Pad Syndrome of Knee Joint: A Case Report

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ABSTRACT

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Fat pad syndrome is a knee joint condition/disease where acute or chronic inflammation occurs in the fat pad of the knee joint, and it is a cause of anterior knee pain. Fat pad syndrome usually occurs concurrently with other conditions/diseases to collectively cause anterior knee pain. No study to date has reported the treatment of anterior knee pain solely due to fat pad syndrome. Here, we report a case of fat pad syndrome of the knee joint as the sole cause of anterior knee pain in a 49-year-old woman who received integrated Korean medicine treatments (pharmacopuncture, acupuncture, herbal medicine, deep fascial meridian therapy, and chuna). Using patient-reported pain scale scores, the level of the patient's pain was relieved, and her mobility improved. Integrated Korean medicine treatments could be effective for patients who have fat pad syndrome of the knee joint.

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Introduction

The fat pads of the knee joint are composed of extrasynovial and intracapsular adipose tissue that occupies spaces within the knee joint [1]. There are 3 types of fat pads that are located within the anterior compartment of the knee joint: supratrochlear (or prefemoral), quadriceps (or suprapatellar), and Hoffa (or infrapatellar) fat pads [2]. The fat pads act as protective cushions to prevent friction between the patellar tendon and quadriceps muscles, and the distal femur and patella [2-4].

In the Hoffa fat pad, there are lymphocytes, macrophages, granulocytes, and nociceptive nerve fibers which may be involved in anterior knee pain [5]. Hoffa's syndrome/disease is intrinsic to the Hoffa fat pad and was 1st described by Albert Hoffa in 1904 as acute or chronic inflammation of the infrapatellar fat pad

[6]. The inflamed fat pad becomes hypertrophied, which causes impingement between the femur and tibia, and causes further injury and anterior knee pain [7].

Quadriceps fat pad syndrome (QFPS; or suprapatellar fat pad syndrome) is a cause of anterior knee pain which is clinically characterized by pain during deep knee flexion, and tenderness around the quadriceps tendon and patella [3,8,9].

Hoffa's syndrome/disease is diagnosed using magnetic resonance imaging (MRI). However, this is not the case for QFPS and in the absence of clinical symptoms, QFPS cannot be diagnosed solely based on MRI findings because edema of the quadriceps fat pad may present without anterior knee pain [3]. For a diagnosis of QFPS, clinical symptoms within the knee joint should be included [3].

Conservative treatment of Hoffa's syndrome/disease includes

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physical therapy, taping, muscle training, and steroid injection. Operative treatments include fat pad excision and debridement of hypertrophic fibrosis [10]. Hoffa's syndrome/disease pathology is usually successfully managed conservatively with physical therapy [11]. However, a study using Korean medicine treatment for Hoffa's syndrome/disease has not been published. Anterior and medial knee pain can be caused by many diseases, conditions, or syndromes such as osteoarthritis, chondromalacia, and fat pad syndrome, respectively. No study to date has reported the treatment of anterior knee pain solely due to fat pad syndrome. In this case study, a patient was diagnosed with fat pad syndrome for anterior knee pain and was treated with integrated Korean medicine treatments for 32 days.

Case Report

Medical history

A 49-year-old female was admitted to Jaseng Hospital of Korean Medicine Hospital, with pain in both knees, which began in November 2020. The pain was worse for the right knee than the left. She was not under any medication, had no family history, had no underlying diseases, and received no other treatment for knee pain. She 1st visited the hospital on May 24, 2021, and was hospitalized the next day. She was discharged on June 25, 2021.

MRI and radiography

On May 24, the patient underwent an X-ray scan of both knees, which showed no remarkable findings. However, an MRI scan

on May 27 showed soft tissue edema in the anterior suprapatellar fat pad and Hoffa's fat pad, medial collateral ligament injury, and tendinosis of the patellar tendon (Fig. 1). The patient was diagnosed with fat pad syndrome, given the absence of any other articular condition/disease. An MRI of the left knee on June 2 showed no major abnormality except for a sprained anterior cruciate ligament (Fig. 2).

Treatment

Acupuncture/pharmacupuncture therapy

Sterilized, standardized (0.25 × 40 mm), disposable stainless-steel needles were used for electroacupuncture and acupuncture treatment. The needles were inserted at the tender points of both knee joints. On the right knee, additional acupuncture that penetrated EX-LE4 and EX-LE5 was performed. The fat pad was then stimulated 10 times using the needle. In addition, electroacupuncture was performed for 15 minutes twice a day at an intensity of 2 Hz at EX-LE4 and EX-LE5 where the patient felt pain. The patient also received pharmacupuncture (Shinbaro 2) twice a day (2 mL per day) using a 1 mL insulin syringe with a disposable 29 gage × 13 mm needle. The needle was inserted 1 cm deep and a 0.5-1 mL dose was administered per acupoint around the right knee fat pad (Table 1).

Herbal medicine

Shinbaro herbal medicines Chungpajeon, Chungsinbarohwan, and Gwanjeolgo were prescribed 3 times a day (Table 2).

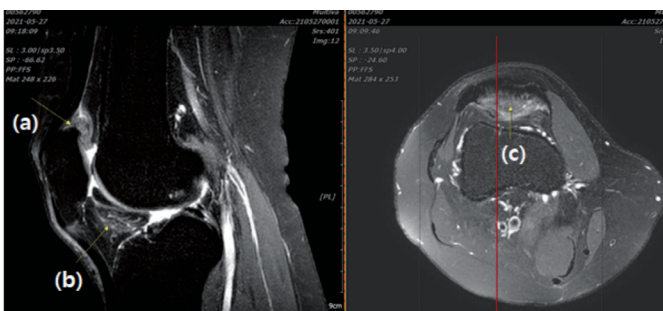


Fig. 1. Magnetic resonance imaging of the right knee (May 27, 2021). Tissue edema in the anterior suprapatellar fat pad (arrow A, C) and Hoffa's fat pad (arrow B).



Fig. 2. Magnetic resonance imaging of left knee (June 02, 2021). Anterior cruciate ligament sprain (arrow).

Table 1. Pharmacupuncture.

Pharmacupuncture prescription	Herbal medicine components (g/mL)	Administered	Daily dose
SJ3-SBO Shinbaro 2	Paeonia lactiflora (0.0027) Ostericum koraenum Kitagaw (0.0013) Aralia continentalis (0.0013) Cortex Eucommiae (0.0013) Achyranthis Radix (0.0013) Rhizoma Cibotii (0.0013) Radix Ledebouriellae (0.0013) Acanthopanax Cortex (0.0013) Scolopendra subspinipes mutilans (0.0013)	Day 1 to Day 32	2 vials (2 mL/vial)

Table 2. Herbal Medicine Prescriptions.

Herbal prescription	Herbal medicine components (g/pouch)	Administered	Daily dose
JG120H Chungpa-jeon	Acanthopanax Cortex 5.000 Eucommiae Cortex 5.000 Ledebouriellae Radix 5.000 Achyranthis Radix 5.000 Cibotii Rhizoma 5.000 Atractylodis Rhizoma 2.500 Amomi Semen 2.500 Geranium thunbergii 2.500 Zingiberis Rhizoma 1.250 Ledebouriellae Radix 0.250 Glycyrrhiza uralensis 1.667 Lasiosphaera Seu Calvatia 7.500	Day 1 to Day 32	3 pouches
JHHM002 Chungsinbaro-hwan	Poria cocos (Schw.) Wolf 0.156 Ginseng Radix Alba 0.078 Achyranthes bidentata Bl. 0.052 Asini Gelatinum 0.019 Rehmanniae Radix 0.623 Cervi Cornus Colla 0.065 Mel 0.312 Cibotii Rhizoma 0.052 Eucommiae Cortex 0.026 Saposhnikovia Radix 0.013 Acanthopanax Cortex 0.013 Scolopendra Corpus 0.013 Atractylodis Rhizoma Alba 0.052 Bovis Fel. 0.026	Day 1 to Day 32	3 pouches
JHHF073 Gwanjeolgo	Rehmannia glutinosa 3.268 Wolfiporia extensa 1.634 Apis cerana Fabricius 1.634 Ginseng Radix Alba 0.817 Achyranthes bidentata 0.204 Asini Corii Collas 0.102 Cervus nippon Temminck 0.340	Day 1 to Day 32	3 pouches

Table 3. Herbal Medicine Prescriptions for Deep-fascia Meridian Therapy.

Prescription	Herbal medicine components (g/pack)	Administered	Area
Deep fascia meridian therapy	Rhei Rhizoma 50 Asiasari Radix 50 Angelica dahurica 50 Salviae miltiorrhizae Radix 50 Ledebouriellae Radix 40 Carthami Flos 30 Paeoniae Radix Rubra 30 Angelica gigas 25 Aconiti Lateralis Preparata Radix 20 Saussureae Radix 15	4-5/wk totaling 21×	Right knee

Chuna therapy

The patient received Chuna therapy once a day to relieve tension in the muscles around the knee joint and hamstring. She also received myofascial release and muscle energy technique around the knee joint and hamstring muscle.

Deep fascia meridian therapy

The patient received deep fascia meridian therapy to relieve muscle tension and right knee pain. Deep fascial meridian therapy

involves herbal medicine steam therapy for 30 minutes. Herbal medicine ingredients can penetrate directly into the area of pain and have a pharmacological effect in combination with the effects of steam (Table 3).

Assessments

Patient-reported scales

The patient's subjective overall degree of pain was measured using

the numeric rating scale (NRS). To assess functional disability of the knee joint, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was used. The European Quality of Life 5 Dimensions (EQ-5D) was used for assessing the patient’s quality of life. A score of 1 indicates the best health condition, whereas 0 indicates the poorest health condition.

Range of motion and special provocative test

Range of motion was measured to assess movement of a specific joint. In this case, knee joint movement for flexion, extension, and lateral bending was measured. Special provocative tests such as the stress varus test and the stress valgus test were also performed to check for other knee conditions/diseases.

Ethics statement

The patient’s medical records and personal information were obtained from the Institutional Review Board of Jaseng Hospital of Korean medicine (IRB file no.: 2021-08-001). This research did not involve any animal experiments.

Progress note

On the day of admission May 25, 2021, the patient had deep anterior pain in both knees. Fat pad syndrome was diagnosed using MRI, and the right knee was worse than the left. Pain in both knees worsened when the patient walked or went up and down the stairs, especially in the right knee. Her NRS scores were 3 for the left knee and 5 for the right knee, and her WOMAC score was 44. Pressure pain was also observed in the adipose tissue around the patella tendon of the right knee. After 15 days of hospitalization, the overall knee pain started to decrease, her NRS scores dropped to 1 in her left knee and 2 in her right knee, and her WOMAC score was 20. On the day of discharge (June 25, 2021), the patient reported their best overall physical function and minimal pain with a NRS score of 1 for both knees, and a WOMAC score of 4 (Figs. 3–5). The EQ-5D was 0.349 on the day of admission, and 0.718 following 2 weeks of hospitalization, and 0.728 on the day of discharge (Fig. 6).

On the day of discharge, overall pain in both knees was significantly reduced when walking, and going up the stairs, and the pain was intermittent. Pressure pain around the right patellar

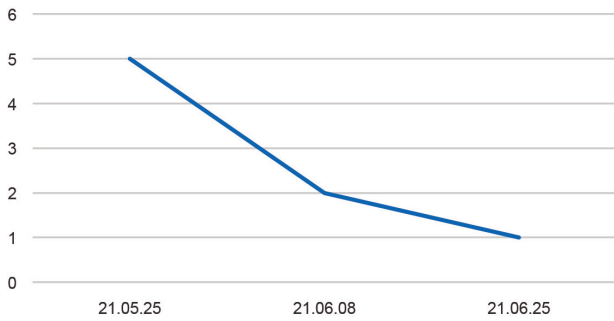


Fig. 3. Changes in the level of pain in the right knee as measured by numeric rating scale scores.

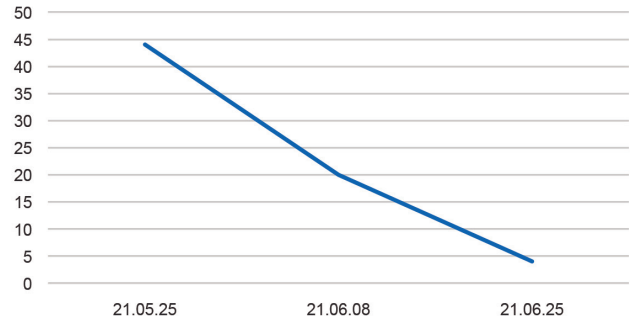


Fig. 5. Changes in the Western Ontario and McMaster Universities Osteoarthritis Index scores over time.

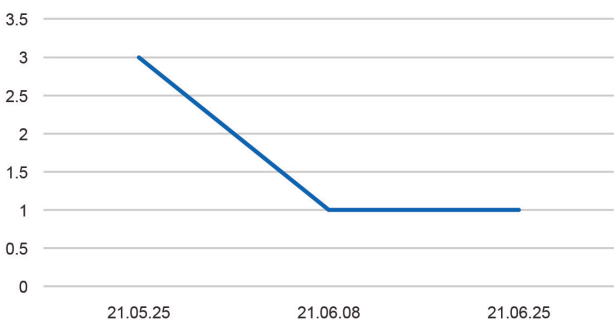


Fig. 4. Changes in the level of pain in the left knee using numeric rating scale scores .

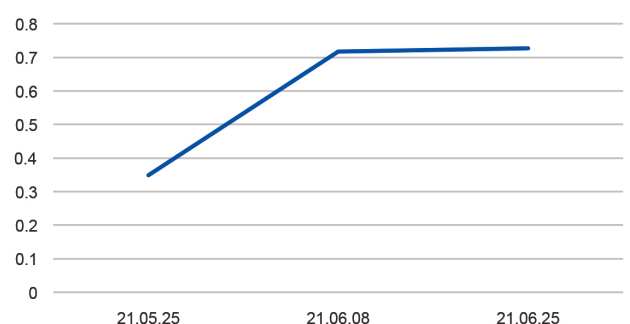


Fig. 6. Changes in the European Quality of Life 5 Dimensions scores over time.

Table 4. Range of Motion and Special Provocative Tests.

Date	ROM						Special test					
	Flexion		Extension		Lat. Bending Rt		Lat. Bending Lt		Stress varus		Stress valgus	
	Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt
21.05.25	135	135	0	0	5	5	5	5	(-)	(-)	(-)	(-)
21.06.08	135	135	0	0	5	5	5	5	(-)	(-)	(-)	(-)
21.06.25	135	135	0	0	5	5	5	5	(-)	(-)	(-)	(-)

Lat., lateral; Lt., left; ROM, range of motion; Rt., right.

tendon had also decreased. Findings on both range of motion and special provocative test were all normal at admission, 15 days after hospitalization, and discharge (Table 4). No side effects occurred during hospitalization.

Discussion

Acupuncture is generally used to control acute and chronic pain. The pain relief from acupuncture is related to descending inhibitory systems [12], whereas electroacupuncture inhibits pain by promoting endogenous opioid secretion [13]. Pharmacopuncture is a combination of herbal medicine and traditional acupuncture, which is characterized by both mechanical and chemical stimuli. Pharmacopuncture is used in a variety of conditions/diseases, particularly musculoskeletal conditions/diseases [14]. Shinbaro pharminoacupuncture uses extracts that are effective anti-inflammatory [15] and nerve regeneration [16] agents. When injected into the fat pad, it may suppress inflammation, relieve pain, and improve function.

GCSB-5 (traditional name: Chungpa-Jeon) which was prescribed in this case consists of *Achyranthes bidentata* Blume, *Saposhnikovia divaricata* Schischkin, *Glycine max* Merrill, *Cibotium barometz* J. Smith, *Acanthopanax sessiliflorum* Seem, and *Eucommia ulmoides* Oliver. GCSB-5 has been reported to have neuroprotective, anti-inflammatory, and cartilage-protective effects in vivo and in vitro [17].

Orthopedic manual therapy is known to be effective at improving knee function and reducing pain by solving knee joint kinematical problems [18]. Joint mobilization, a manual therapy technique, reduces pain through a neurophysiological mechanism which inhibits Type 4 nociceptor pain and activates Type 2 mechanoreceptor feedback [19]. Chuna therapy is a Korean version of manual therapy, that is based on the principles of Korean medicine for the balance and functional recovery of orthopedic structures [20]. It also acts using the same mechanism as joint mobilization. Besides reducing pain, there are also several joint mobilization and manual techniques in Chuna therapy which work towards improving knee joint function in patients with fat pad syndrome by enabling mobility and tension relief in the connective

tissues around the knee. Deep fascia meridian therapy can also relieve muscle tension through the transfer of heat.

The findings of this case report should be interpreted in light of the limitations of this study. Firstly, it was a study of only one case of fat pad syndrome in knee joints. Secondly, since this study has no control groups, we could not verify whether the patient outcomes were due to the effectiveness of the treatment. Thirdly, an assessment of the effectiveness of each treatment could not be performed since the treatments were performed integrally. However, this case study is meaningful since it is the 1st study to report anterior and medial knee pain caused solely by fat pad syndrome. As a result of this study, integrative Korean medicine treatment may be an alternative option for conservative treatment of fat pad syndrome, however, randomized controlled trials are needed to determine safety and its efficacy.

Conclusion

This case report describes the efficacy of a combination of Korean medicinal treatments used to treat fat pad syndrome of the knee joint. Improved mobility and an overall reduction in pain occurred during hospitalization. Combination Korean medicine treatments could be a treatment option for patients diagnosed with fat pad syndrome of the knee joint.

Conflicts of Interest

The authors have no conflicts of interest to declare.

Ethical Statement

This research did not involve any human or animal experiment.

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