



Case Report

Effects of Korean Traditional Medicine Treatment on Spontaneous Osteonecrosis of the Knee: A Case Report



Soo-Kyung Lee*, Eun-Young Park, June-Haeng Lee, Sun-Woo Kang, Yoon-Jae Won, Myeong-Yeol Yang, Jae-Joon Ha

Department of Acupuncture and Moxibustion, Jaseng Hospital of Korean Medicine, Seoul, Korea

ABSTRACT

Article history:

Submitted: September 27, 2021

Revised: November 19, 2021

Accepted: December 09, 2021

Keywords:

acupuncture therapy, herbal medicine, magnetic resonance imaging, osteoarthritis of knee, osteonecrosis, Korean traditional medicine

Spontaneous osteonecrosis of the knee (SONK) is a common form of osteonecrosis of the knee and mainly affects the medial condyle due to localized vascular insufficiency. We report a case of SONK in a 65-year-old woman who had severe knee pain in her left knee which impeded her capacity to walk beyond 10 minutes. Bilateral knee X-rays revealed degenerative osteoarthritis of both knees and magnetic resonance imaging revealed R/O SONK in the lateral aspect of the medial femoral condyle, as well as a medial meniscal posterior horn root tear, and a Grade 1 medial collateral ligament injury. She was hospitalized at Jaseng Hospital of Korean Medicine for 21 days and received combination therapy including acupuncture, pharmacopuncture, and herbal medicine. Patient-reported scales indicated that her pain and physical functional limitations were alleviated. Combination therapy consisting of Korean traditional medicine may be an alternative non-operative treatment approach for patients with SONK.

<https://doi.org/10.13045/jar.2021.00227>
pISSN 2586-288X eISSN 2586-2898

©2022 Korean Acupuncture & Moxibustion Medicine Society. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

The knee is the 2nd most prevalent localization for osteonecrosis, after the hip [1]. Knee osteonecrosis is usually classified into 2 groups based upon underlying pathophysiological mechanisms: spontaneous osteonecrosis of the knee (SONK; also called primary osteonecrosis) and atraumatic osteonecrosis (also called secondary osteonecrosis) [2].

SONK is considered to be the most common form of osteonecrosis of the knee and mostly affects the medial condyle of postmenopausal women [1,3]. Localized vascular insufficiency results in necrosis of the subchondral bone [4,5]. The lesion is

clinically characterized by a sudden onset of severe knee-joint pain and is not generally associated with systemic disorders or previous corticosteroid therapy [6]. Atraumatic osteonecrosis is typically observed in younger patients [7], and in most cases, it is related to medical conditions such as corticosteroid treatment, alcoholism, sickle cell anemia, systemic lupus erythematosus, and hyperbarism [1,4].

Regardless of the categories, treatment of osteonecrosis aims to cease further progression or defer the onset of end-stage arthritis of the knee. Patients who have SONK can be managed either non-operatively or operatively based on the stage of the disease and symptoms experienced. The decision to treat epiphyseal lesions is

*Corresponding author. Soo-Kyung Lee

Jaseng Hospital of Korean Medicine, 536 Gangnam-daero, Gangnam-gu, Seoul 06110, Korea

E-mail: oldmido@naver.com

ORCID: Soo-Kyung Lee <https://orcid.org/0000-0003-1319-1494>, Eun-Young Park <https://orcid.org/0000-0001-9280-3238>,

June-Haeng Lee <https://orcid.org/0000-0002-0262-8112>, Sun-Woo Kang <https://orcid.org/0000-0003-4844-6696>,

Yoon-Jae Won <https://orcid.org/0000-0002-7141-7597>, Myeong-Yeol Yang <https://orcid.org/0000-0001-8810-6050>, Jae-Joon Ha <https://orcid.org/0000-0002-5904-5006>

©2022 Korean Acupuncture & Moxibustion Medicine Society. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

based mostly on the size of the osteonecrotic area [8]. Currently, non-operative treatment options consist of observation, protected weight bearing, non-steroidal anti-inflammatory drugs, and analgesia, as needed [7]. The etiology of SONK is largely unknown, and there is an unmet demand for an optimal non-operative treatment. In this study, we report the results of using Korean traditional medicine to treat a patient for SONK at Jaseng Hospital of Korean Medicine.

Case Report

Medical history

In December 2018, a 65-year-old female patient developed pain in the front of the left knee joint, which was accompanied by a mild redness and swelling. She started to limp in severe pain when she had walked for more than 10 minutes. She visited her local clinics and received a total of 4 Steroid injections in her left knee but she continued to experience severe pain. On December 29th, 2018, she visited Jaseng Hospital of Korean Medicine where a bilateral knee X-ray was performed. Due to the radiographical findings she was scheduled for magnetic resonance imaging (MRI) and was hospitalized on January 8th, 2019.

Radiography and magnetic resonance imaging results

On December 29, 2018, the patient had a bilateral knee X-ray, which revealed degenerative osteoarthritis of both knees, and the severity of the osteoarthritis was graded as a Kellgren-Lawrence Grade 2/3 (Fig. 1). On January 8, 2019, she underwent left knee MRI, which revealed rule out SONK in the lateral aspect of the medial femoral condyle. This was based on observations of an osteophyte in the knee, high-grade chondromalacia of the medial femorotibial condyle, and the lateral facet of the patella (Fig. 2). Additionally, it revealed a medial meniscal posterior horn root tear, Grade 1 medial collateral ligament (MCL) injury, and tendinosis in the distal patellar tendon.

Treatment methods

Acupuncture/pharmacopuncture therapy

Standardized, disposable, sterilized stainless steel needles of 0.25 × 40 mm size (The Eastern Acupuncture Equipment Manufacturer, Boryung, Korea) were used to perform electro-acupuncture (2 Hz) twice a day for 15-minutes at ST35, LI4, LR7, EX-LE4, EX-LE5 and the medial collateral ligament of the knee. SHINBARO2 pharmacopuncture (Jaseng Wonoe Tangjunwon, Namyangju, South Korea) was administered twice a day by injecting 0.5-1 mL per acupoint to EX-LE4 and EX-LE5, using a disposable 29 gauge × 13 mm (1/2") needle, 1 mL/cc insulin syringe (Sungsimmedical, Bucheon, South Korea), to a 1.3 cm depth. The pharmacopuncture

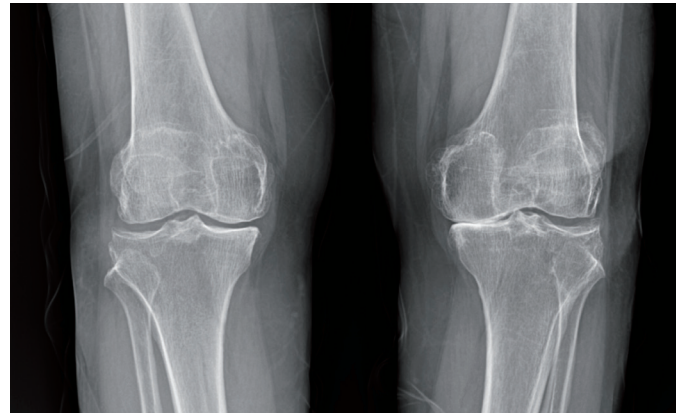


Fig. 1. Bilateral knee X-ray (December 29, 2018). This image shows degenerative osteoarthritis in both knees, with a Kellgren-Lawrence Grade 2 on the left knee and Grade 3 on the right knee.

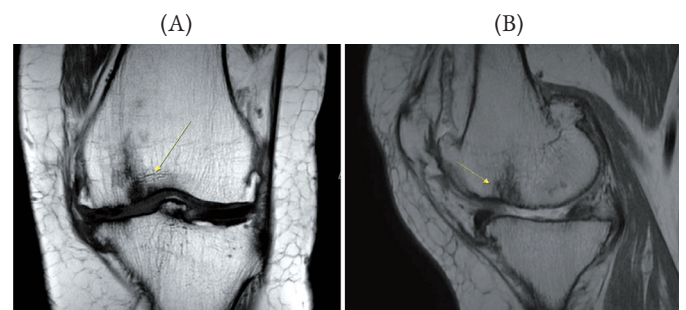


Fig. 2. Magnetic resonance imaging scans (January 8, 2019). (A) Coronal T1-weighted image and sagittal proton density-weighted image. (B) Spontaneous osteonecrosis of the knee in the lateral aspect of the medial femoral condyle.

Table 1. Pharmacopuncture Administered to the Patient.

Pharmacopuncture prescription	Herbal medicine components (g/mL)	Administered	Daily dose
SJ3-SBO SHINBARO2	Paeonia lactiflora (0.0027) Ostericumkoraenum (Max) Kitagaw (0.0013) Aralia continentalis (0.0013) Cortex Eucommiae (0.0013) Achyranthis Radix (0.0013) RhizomaCibotii (0.0013) Radix Ledebourriellae (0.0013) Acanthopanax Cortex (0.0013) Scolopendrasubspinipesmutilans (0.0013)	Day 1–Day 21	2 vials (2 mL/vial)

components, schedule, and daily doses are presented in Table 1.

Herbal medicine

Mabalgwanjeol-tang and Bogangyeongol-hwan was prescribed for severe knee pain (the patient's chief complaint). The anti-inflammatory effects of Mabalgwanjeol-tang and Bogangyeongol-hwan may alleviate symptoms of bone loss-associated diseases [9]. The medicine prescribed for the patient was prepared at Jaseng Hospital of Korean Medicine. The herbal components, daily doses, and, schedule are shown in Table 2.

Conventional medicine

While hospitalized, a family physician consulted with the patient regarding frequent urination and it was recommended that conventional medicine should be taken when the symptom reoccurs. Detailed information of the medicine prescribed by the physician is provided in Table 3.

Assessments

All assessments used for patient evaluation were performed on admission day, the 14th day of hospitalization, and discharge day (the 21st day of hospitalization).

Numeric Rating Scale

The numeric rating scale (NRS) was used to assess the degree of the patient's overall subjective experience of pain. It ranged from 0 (no pain) to 10 (worst possible pain).

Western Ontario and McMaster Universities Osteoarthritis Index

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) is a useful questionnaire for patients with knee pain to qualify their pain. It consists of 24 questions regarding subjective symptoms such as pain, stiffness, and physical function. The index is out of a total of 96 possible points, with 0 being the least amount of pain and 96 being the worst.

European Quality of Life-5Dimensions

The European Quality of Life-5Dimensions (EQ-5D) is a survey of quality of life that consists of 5 categories: self-care, mobility, usual activities, anxiety/depression, and pain/discomfort. The utility value was calculated using the Tariff scoring system where 0 denotes death and 1 denotes complete health status.

Range of Motion and specialty tests

Range of motion (ROM) is a measurement of the movement of a specific joint or body part. In this case, the patient's movements of flexion, extension, and lateral bending of both knees were assessed,

Table 2. Korean Traditional Medicine Herbal Prescriptions Administered to the Patient.

Herbal prescription	Herbal medicine components	Administered	Daily dose
Mabalgwanjeol-tang	LasiosphaeraSeu Calvatia 12 g, Ginseng Radix 8 g, Achyranthis Radix 8 g, Glycyrrhizae Radix 4 g, HordeiFuctusGerminatus 4 g, Osterici Radix 4 g, TestudinisPlastrum 4 g, Saposhnikoviae Radix 4 g, Amomi Fructus 4 g, Astragali Radix 4 g, AngelicaePubescentis Radix 4 g, Aconiti Tuber 2.8 g	Day 2–Day 21	Extract of 100 mL, 3×/d
Bogangyeongol-hwan	Poria cocos Wolf 0.623 g, Panax ginseng radix 0.311 g, Achyranthes japonica 0.156 g, Equus asinus L., gelatinized 0.014 g, Rehmannia glutinosa 0.623 g, Cervus nippon L. 0.015 g, Apis mellifera 0.623 g, Calvatia gigantea Lloyd 0.519 g, Drynariafortune (Kunze ex Mett.) J. Sm 0.115 g	Day 2–Day 21	3 pouches/d

Table 3. Conventional Medicine Administered to the Patient.

Product	Dose	Medical purpose	Administered	Ingredients per daily dose
Ciprobay	2× tablets (291mg/d)	Acute uncomplicated cystitis	Days 9&10, Days 19&20	Ciprofloxacin hydrochloride 582 mg

without assistance. To confirm the problem, specialty provocative tests such as the valgus and varus stress tests were performed.

Ethics statement

The patient’s medical records were obtained retrospectively and approved for use by the Institutional Review Board of Jaseng Hospital of Korean Medicine (IRB file no.: 2021-08-008).

Progress note

On the day of admission, the patient had severe left knee pain which impeded her ability to walk more than 10 minutes. If she exceeded this time limit, she experienced mild swelling and

redness developed. At the time of admission, the NRS score for the patient’s knee pain was 6, following 2 weeks of treatment it was 3, and at discharge the NRS score had decreased to 2 (Fig. 3). The WOMAC score was 53 at the time of admission, 45 after 2 weeks, and 41 at discharge. In detail, her pain score decreased from 15 to 8, which was the most significant decrease; her physical function decreased from 37 to 32; and her stiffness remained at a score of 1, which was the same score as assessed upon admission (Fig. 4). The EQ-5D score was 0.692 at admission, 0.704 after 2 weeks, and 0.715 at discharge (Fig. 5). The ROM of her left knee was within normal limits at admission through to discharge, and the valgus and varus stress tests were negative at admission through to discharge.

Discussion

Various case reports and systematic reviews concerned with treatment of SONK have been published, but further understanding of the potential of Korean traditional medicine as a treatment for SONK is necessary. Combination therapy consisting of acupuncture, pharmacopuncture, and herbal medicine in this case was used to treat SONK and relieved the patient’s pain and improved their physical function during 3 weeks of hospitalization.

In addition to SONK, this case presented with degenerative osteoarthritis, a medial meniscal posterior horn root tear, and a MCL injury, making it difficult to be sure of immediate improvement in symptoms with surgical treatment of SONK alone. The patient was also at risk of surgery due to old age. Despite taking non-steroidal anti-inflammatory drugs for a long time, there was no improvement, and to improve her overall level of pain she received Korean traditional medicine treatment.

The patient’s pain was most remarkably reduced after acupuncture/pharmacopuncture therapy. Pharmacopuncture is an acupuncture technique that entails the direct stimulation of acupoints with herbal extracts, which may work faster than the conventional form of acupuncture [10,11]. SHINBARO

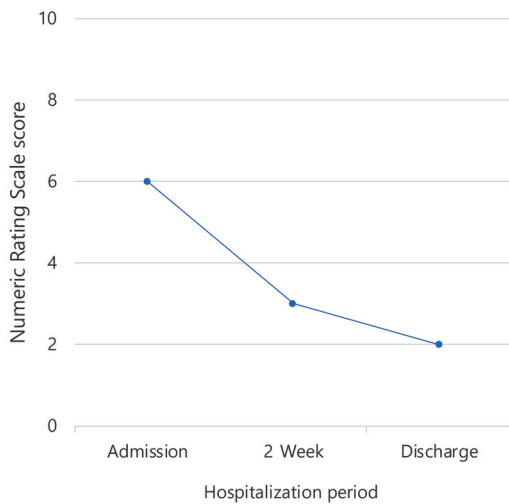


Fig. 3. Changes in the numeric rating scale scores during the hospitalization period.

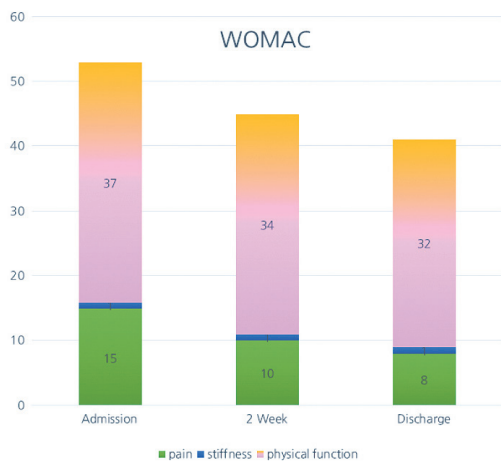


Fig. 4. Changes in the Western Ontario and McMaster Universities osteoarthritis index scores during the hospitalization period.

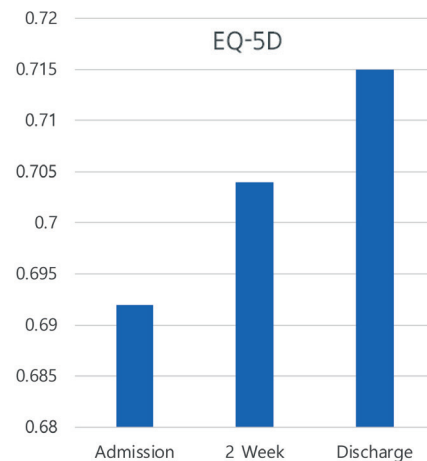


Fig. 5. Changes in the European Quality of Life-5 Dimensions Index during the hospitalization period.

is a purified extract obtained from a mixture of 6 oriental herbs (Lederburiellae Radix, Achyranthis Radix, Acanthopanax Cortex, Cibotii Rhizoma, Glycine Semen, and Eucommiae Cortex). SHINBARO has been used to treat some bone disorders and inflammatory diseases. Kim et al reported that intra-articular administration of SHINBARO inhibited prostaglandin E2 and anti-Type 2 collagen antibody production, and regulated the balance of inflammatory mediators, enzymes, and cytokines in the monosodium iodoacetate-induced osteoarthritis rat model [12].

Yamamoto et al reported that the primary event leading to SONK were subchondral insufficiency fractures [6]. It has been reported that bisphosphonates delay the need for surgery in patients who have SONK, and promote repair of the fracture [5,13,14]. It has been reported that the mechanisms of action of Bogangyeongol-hwan may induce alkaline phosphatase activation in osteoblasts, increase calcified bone matrices, and reduce osteoclast formation [9]. Therefore, Bogangyeongol-hwan may alleviate the symptoms of bone loss-associated disease and protect against SONK mechanisms, such as bisphosphonate [9].

An analysis of the main components of Mabalgwangjeol-tang, Lasiosphaera Seu Calvatia and Achyranthes Bidentata Radix, revealed anti-inflammatory effects [15]. In animal models of arthritis, extracts consisting of Achyranthes bidentata and Atractylodes japonica have been reported to be effective in the treatment of arthritis [16].

On Day 9, the patient was diagnosed with bladder inflammation due to urinary frequency and was prescribed 2 courses of ciprofloxacin. It is unlikely that this symptom was adversely associated with Korean medicine treatment for SONK. However, taking this antibiotic is a limitation of this study because oral medication other than herbal medicine was taken and so the effects of other medicines cannot be excluded from the outcome of this study.

This was a case study of 1 patient, therefore the level of evidence is not high. In addition, it cannot be said with certainty that the pain in her left knee was caused by SONK alone. She also had a medial meniscus tear and a MCL injury. The patient needs to be assessed further using follow-up MRI. In spite of these limitations, this is the 1st case report of SONK using Korean medicine combination therapy including acupuncture, pharmacopuncture, and herbal medicine. Further studies are needed.

Conclusion

This case study may demonstrate the efficacy of Korean traditional medicine in alleviating pain and overcoming functional limitations within a short time period in a patient with SONK, a medial meniscal posterior horn root tear, and a MCL injury. Therefore, a combination therapy consisting of traditional Korean medicine may be a potential alternative non-operative treatment for patients with SONK.

Conflicts of Interest

The authors have no conflicts of interest to declare.

Ethical Statement

This research did not involve any human or animal experiment.

References

- [1] Mont MA, Baumgarten KM, Rifa'i A, Blumke DA, Jones LC, Hungerford DS. Atraumatic osteonecrosis of the knee. *J Bone Joint Surg Am* 2000;82:1279-1290.
- [2] Assouline-Dayana Y, Chang C, Greenspan A, Shoenfeld Y, Gershwin ME. Pathogenesis and natural history of osteonecrosis. *Semin Arthritis Rheum* 2002;32:94-124.
- [3] Pape D, Filardo G, Kon E, van Dijk CN, Madry H. Disease-specific clinical problems associated with the subchondral bone. *Knee Surg Sports Traumatol Arthrosc*. 2010;18:448-462.
- [4] Heyse TJ, Khefacha A, Fuchs-Winkelmann S, Cartier P. UKA after spontaneous osteonecrosis of the knee: A retrospective analysis. *Archives of orthopaedic and trauma surgery*. *Arch Orthop Trauma Surg* 2011;131:613-617.
- [5] Kraenzlin ME, Graf C, Meier C, Kraenzlin C, Friedrich NF. Possible beneficial effect of bisphosphonates in osteonecrosis of the knee. *Knee surgery, sports traumatology, arthroscopy*. *Knee Surg Sports Traumatol Arthrosc* 2010;18:1638-1644.
- [6] Yamamoto T, Bullough PG. Spontaneous osteonecrosis of the knee: The result of subchondral insufficiency fracture. *J Bone Joint Surg Am* 2000;82:858-866.
- [7] Karim AR, Cherian JJ, Jauregui JJ, Pierce T, Mont MA. Osteonecrosis of the knee. *Annals of translational medicine*. *Ann Transl Med* 2015;3:6.
- [8] Patel D, Breazeale NM, Behr CT, Warren RF, Wickiewicz TL, O'Brien SJ. Osteonecrosis of the knee: Current clinical concepts. *Knee Surg Sports Traumatol Arthrosc*. 1998;6:2-11.
- [9] Chung H-J, Cho L, Shin J-S, Lee J, Ha I-H, Park H-J et al. Effects of JSOG-6 on protection against bone loss in ovariectomized mice through regulation of osteoblast differentiation and osteoclast formation. *BMC Complement Altern Med* 2014;14:184.
- [10] Park J, Lee H, Shin B, Lee MS, Kim B, Kim J. Pharmacopuncture in Korea: a systematic review and meta-analysis of randomized controlled trials. *Evid Based Complement Alternat Med* 2016;2016:4683121.
- [11] Strudwick, M, Hinks R, Choy SB. Point injection as an alternative acupuncture technique—an exploratory study of responses in healthy subjects. *Acupunct Med* 2007;25:166-174.
- [12] Kim WK, Chung H-J, Pye Y, Choi TJ, Park HJ, Hong J-Y et al. Effects of intra-articular SHINBARO treatment on monosodium iodoacetate-induced osteoarthritis in rats. *Chin Med* 2016;11:17.
- [13] Shen Z, Chen Z, Xie Z, Xu Y, Wang T, Li J et al. Bisphosphonate for spontaneous osteonecrosis of the knee: A protocol for systematic review and meta-analysis of randomized controlled trials. *Medicine* 2020;99:e23123.
- [14] Jureus J, Lindstrand A, Geijer M, Roberts D, Tägil M. Treatment of spontaneous osteonecrosis of the knee (SPONK) by a bisphosphonate: A prospective case series with 17 patients. *Acta Orthop* 2012;83:511-514.
- [15] Bu H, Li X, Hu L, Wang J, Li Y, Zhao T et al. The anti-inflammatory mechanism of the medicinal fungus puffball analysis based on network pharmacology. *Inform Med Unlocked* 2021;23:100549.
- [16] Han S/-B, Lee CW, Yoon LD, Lee J-H, Kang JS, Lee KH et al. Prevention of arthritic inflammation using an oriental herbal combination BDX-1 isolated from *Achyranthes bidentata* and *Atractylodes japonica*. *Arch Pharm Res* 2005;28:902-908.