Case Report

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

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ABSTRACT

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.

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...
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 29, 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 8, 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

Table 1. Pharmacopuncture Administered to the Patient.

<table>
<thead>
<tr>
<th>Pharmacopuncture prescription</th>
<th>Herbal medicine components (g/mL)</th>
<th>Administered</th>
<th>Daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SJ3-SBO SHINBARO2</td>
<td>Paeonia lactiflora (0.0027)</td>
<td>Day 1–Day 21</td>
<td>2 vials (2 mL/vial)</td>
</tr>
<tr>
<td></td>
<td>Ostericum koreanum (Max)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kitagaw (0.0013)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aralia continentalis (0.0013)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cortex Eucommiae (0.0013)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Achyranthis Radix (0.0013)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rhizoma Cibotii (0.0013)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Radix Ledebouriellae (0.0013)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acanthopanax Cortex (0.0013)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scolopendra subspinipesmutilans (0.0013)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 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).

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

<table>
<thead>
<tr>
<th>Herbal prescription</th>
<th>Herbal medicine components</th>
<th>Administered</th>
<th>Daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mabalgwanjeol-tang</td>
<td>Lasiosphaera Seu Calvatia 12 g, Ginseng Radix 8 g, Achyranthis Radix 8 g, Glycyrrhiza Radix 4 g, Hordei Fuctus Germinatus 4 g, Osterici Radix 4 g, Trudinisi Plastrum 4 g, Saposnokio Radix 4 g, Amomi Fructus 4 g, Astragali Radix 4 g, Angelicae Pubescentis Radix 4 g, Aconiti Tubers 2.8 g</td>
<td>Day 2–Day 21</td>
<td>Extract of 100 mL, 3×/d</td>
</tr>
<tr>
<td>Bogangyeongol-hwan</td>
<td>Poria cocos Wolf 0.623 g, Panax ginseng radix 0.315 g, Achyranthes japonica 0.156 g, Equus asinus L., gelatinized 0.014 g, Rehmannia glutinosae 0.623 g, Cervus nippon L. 0.015 g, Apis mellifera 0.623 g, Calvatia gigantea Lloyd 0.519 g, Drynariafortune (Kunze ex Mett.) Sm 0.115 g</td>
<td>Day 2–Day 21</td>
<td>3 pouches/d</td>
</tr>
</tbody>
</table>

**Table 3. Conventional Medicine Administered to the Patient.**

<table>
<thead>
<tr>
<th>Product</th>
<th>Dose</th>
<th>Medical purpose</th>
<th>Administered</th>
<th>Ingredients per daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciprobay</td>
<td>2× tablets (291mg/d)</td>
<td>Acute uncomplicated cystitis</td>
<td>Days 9&amp;10, Days 19&amp;20</td>
<td>Ciprofloxacin hydrochloride 582 mg</td>
</tr>
</tbody>
</table>
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
is a purified extract obtained from a mixture of 6 oriental herbs (Ledebouriea Radix, Achyranthis Radix, Acanthopanacis 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 biphosphonate [9].

An analysis of the main components of Mabalgwanjeol-tang, Lasiopsisa 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 a 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