



## Case Report

# The Effects of Korean Medicine Treatment on Posterior Cruciate Ligament Avulsion Fracture: A Case Report



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## ABSTRACT

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The purpose of this case study was to use Korean medicine to treat posterior cruciate ligament avulsion fracture. The patient suffered left knee pain resulting from an avulsion fracture and was hospitalized for 59 days and treated with acupuncture and traditional Korean medicine. The effect of the treatment was evaluated using the Numerical Rate Scale, the Western Ontario and McMaster universities Osteoarthritis Index, and the European Quality of Life Five Dimensions. Following treatment of the pain in the left knee, scores for Numerical Rate Scale, Western Ontario and McMaster universities Osteoarthritis Index, and European Quality of Life Five Dimensions were improved. This study suggested that Korean Medicine could be an effective treatment for posterior cruciate ligament avulsion fractures. Further studies are needed to substantiate this conclusion.

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## Introduction

Avulsion fracture is an indirect trauma fracture. If the extensor muscles of the knee joint are tense and sudden bending force is applied, the ligament contracts and a fracture occurs. The fracture is usually a transverse fracture, and the space between the bone fragments increases [1,2].

The posterior cruciate ligament (PCL) is a knee ligament originating from the medial femoral condyle and attached to the posterior aspect of the tibial bone, leading to an oblique line. This ligament fixes the patella with anterior cruciate ligament to prevent posterior dislocation and hyperextension. Injuries to the PCL lead to backward movement of the tibia and instability of the knee joint. Persistence of this condition results in a degenerative change of the knee joint [3].

The PCL is a ligament strongly attached to the tibia. Thus, avulsion fracture of tibial attachments is common during PCL injuries [4].

In Western medicine, fractures are treated by either surgery where open reduction and an internal fix is made, or without surgery where the fractured limb is fixed to gypsum or a functional brace [1]. It is important to distinguish between indications for each fracture, and perform the appropriate treatment. In the case of an avulsion fracture, surgical fixation is recommended to prevent nonunion of the fracture [5]. Zhu et al [6] reported the merits of high-strength suture fixation under arthroscopy for 18 cases of PCL avulsion injury, all of which were successful. Joshi et al [7] reported improvement in 14 cases of PCL avulsion fractures after performing open reduction and an internal fix, but this treatment is limited to patients with fractures that have just occurred and is not recommended for patients presenting to clinic late.

Currently there is only 1 case report published where an avulsion fracture was treated with Korean medicine, which describes a lateral malleolus avulsion fracture [8]. In this study, we report the results of a patient treated for PCL avulsion injuries with Korean medicine, at the Bucheon Jaseng Korean medicine hospital.

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## Case Report

### Patient

OOO(F/61)

### Chief complaint (Onset)

Pain in the left knee (18 January 2018)

### Past History / Social History

Cancer of the uterus / 157 cm, 52 kg, Smoking (-ve), Drinking (-ve), Occupation: Housekeeper

### Present Illness

Pain in the knee developed after falling down in the street on January 18, 2018. The patient visited the Bucheon Jaseng Korean medicine hospital without receiving medical treatment at any other hospital.

### Duration of treatment

January 20, 2018 to March 19, 2018 (59 days of hospitalization)

### Clinical chemistry

Raised Erythrocyte Sedimentation Rate (ESR) 22 mm/h, low White Blood Cell (WBC) count  $3.90 \times 10^3/\mu\text{L}$ , low Hematocrit (Hct) 35.70%, Urinary occult blood (1+).

### Radiology

(Fig. 1)

Result of the magnetic resonance imaging (20/01/2018)  
Acute avulsion rupture of distal inserted portion, PCL.

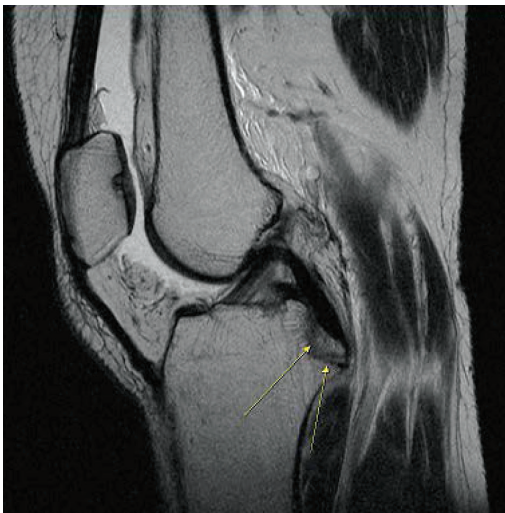


Fig. 1. Left knee MRI (January 20, 2018).

### Range of Motion test

A range of motion test was not performed because the patient's knee was fractured and too painful to perform the test.

### Patient Protection Policy on Patient Information Use

In order to protect the patient's personal information, the patient's medical record was obtained from the Institutional

Review Board (IRB) of the Bucheon Jaseng Korean medicine hospital (IRB NO.: 2018-07-002).

### Treatment

#### Pharmacopuncture therapy

Shinbaro pharmacopuncture (Jaseng Wonoe Tangjunwon, Namyangju, Korea.) was injected at EX-LE4, BL40 and ST35. This pharmacopuncture was administered up to 0.25 cc per session using a disposable 29 gauge  $\times 1/2''$  (12.7 mm) needle 1 cc syringe (Sinchangmedical, Gumi, Korea.) and performed twice a day. The needle depth was 0.5-1.0 cm.

#### Acupuncture treatment

The needles were 0.25 \* 30 mm stainless steel needles (The Eastern acupuncture equipment manufacturer, Boryung, Korea), standardized, and disposable. Acupuncture was administered at ST35, SP9, GB34, ST36, ST34 and Ashi points for a 15-minute duration. This was performed twice a day with electroacupuncture (1 Hz).

#### Herbal medicine

Mabalgwanjeol decoction was prescribed. Mabalgwanjeol decoction is composed of Lasiosphaera Seu Calvatia 12 g, Ginseng Radix 8 g, Achyranthis Radix 8 g, Glycyrrhizae Radix 4 g, Hordei Fuctus Germinatus 4 g, Osterici Radix 4 g, Testudinis Plastrum 4 g, Saposhnikoviae Radix 4 g, Amomi Fructus 4 g, Astragali Radix 4 g, Angelicae Pubescentis Radix 4 g, and Aconiti Tuber 2.8 g. The patient took the medication 3 times a day.

#### Physiotherapy

The patient was in too much pain to receive physiotherapy until the 40<sup>th</sup> day after admission. After the pain improved, the patient underwent interferential current therapy (I.C.T) every other day and received hot compresses (with medicinal herbs) over the painful knee for 20 minutes every other day.

#### Evaluation

##### Numerical Rating Scale

Numerical Rating Scale (NRS) is used to measure subjective pain. The most painful awareness is 10, and the absence of pain is 0 [9]. The patient was evaluated on the admission day, the 14<sup>th</sup> day of hospitalization and discharge day.

##### Western Ontario and McMaster universities Osteoarthritis Index

Western Ontario and McMaster universities Osteoarthritis Index (WOMAC) is 1 of the most useful indicators of pain status questionnaires for patients with knee pain. It consists of 24 questions covering pain, stiffness and physical function. Each item is scored and the higher the score, the more severe the pain [10]. The patient was evaluated on the admission day, the 14<sup>th</sup> day of hospitalization, and the discharge day.

##### European Quality of Life Five Dimensions

European Quality of Life Five Dimensions (EQ-5D) is a survey of quality of life that consists of 5 categories: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The utility value is calculated using the Tariff scoring system, 0 for death and 1 for complete health status. Negative values are measured in some cases [11]. The patient was evaluated on the admission day, the 14<sup>th</sup> day of hospitalization and the discharge day.

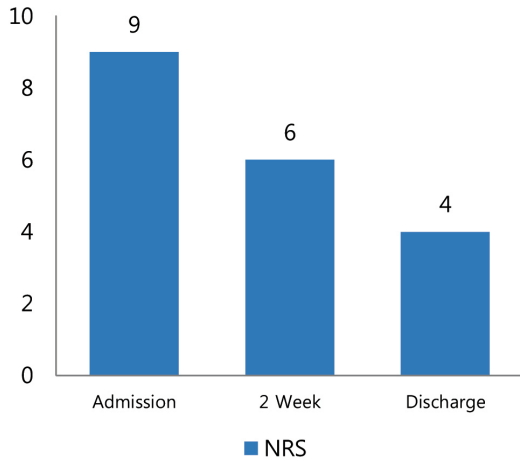


Fig. 2. Changes in the Numerical Rating Scale (NRS).

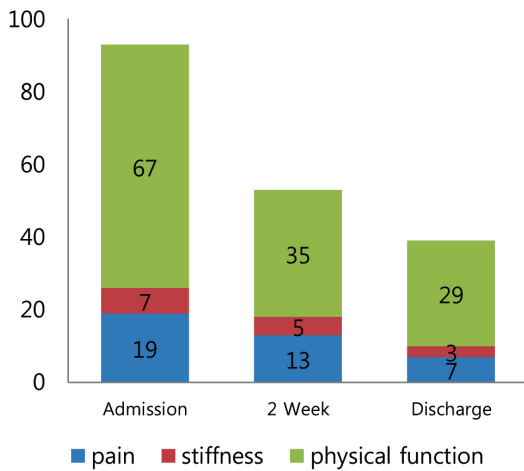


Fig. 3. Changes in Western Ontario and McMaster universities Osteoarthritis Index (WOMAC).

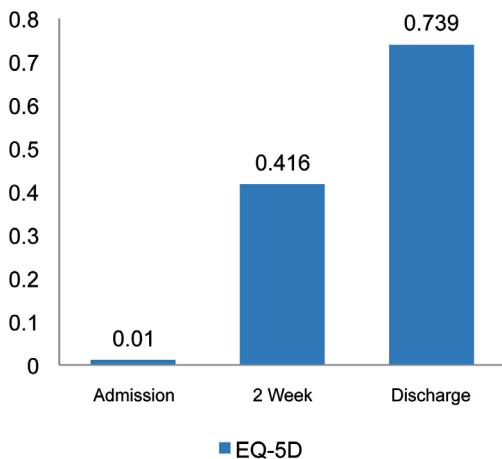


Fig. 4. Changes in the European Quality of Life Five Dimensions (EQ-5D).

Notes

The patient’s condition was checked every morning by monitoring gait time, nighttime pain, etc., which was used as an indicator of the patient’s condition.

Evaluation results

NRS was 9 at the time of admission, 6 after 2 weeks, and decreased to 4 at discharge. (Fig. 2) WOMAC was 93 at the time of admission, 53 after 2 weeks, and decreased to 39 at discharge. In detail, pain decreased from 19 to 7, stiffness from 7 to 3, and physical function from 67 to 29. (Fig. 3) EQ-5D was 0.01 at the time of admission, 0.416 after 2 weeks, and increased to 0.739 at discharge (Fig. 4).

Subjective state of the patient

At the time of admission, the patient fell asleep after pharmacopuncture treatment (due to lack of sleep caused by night pain). After 4 weeks of hospitalization, the patient had an average of 6 hours of sleep without night pain. Initially, the patient could walk for 5 minutes using a crutch. After 6 weeks of hospitalization, the patient could walk for 10 minutes, and although in pain, did not use a crutch. After 8 weeks of hospitalization, the patient walked normally for about 20 minutes without pain and without the aid of a crutch. At the local orthopedic center where the patient used to go, the patient received a good X-ray follow up prognosis for the fractured bone. In the follow-up after the discharge telephone interview, the patient said that she had a good daily life without knee pain.

**Discussion**

In this case report of an avulsion fracture of the PCL, the patient had improvement of symptoms through conservative Korean medical treatment, without the need for surgery.

A patient who was admitted to Bucheon Jaseng Korean medicine hospital with a PCL avulsion fracture was treated with Korean medicine including acupuncture, pharmacopuncture, and herbal medicine. As a result, the NRS score decreased from 9 to 4, the WOMAC decreased from 93 to 39, and the EQ-5D increased from 0.01 to 0.237. The night pain apparent at the early stages of hospitalization, disappeared after 4 weeks. The patient needed an orthosis in order to walk at the early stages of the hospitalization, but after 20 weeks of hospitalization the patient was able to walk for 20 to 30 minutes unaided by an orthosis. Based on the X-ray follow-up at the local orthopedic surgery, the prognosis for the fractured bone was good.

The pain improvement of this patient was largely affected by Shinbaro pharmacopuncture. Shinbaro is a purified extract composed of 6 oriental herb extracts; Ledebouriellae Radix, Achyranthis Radix, Acanthopanax Cortex, Cibotii Rhizoma, Glycine Semen, and Eucommiae Cortex. It was injected directly into the body using a syringe, and used to treat inflamed lesions and bone disorders [12].

According to Kim et al, the effect of intra-articular Shinbaro (IAS) treatment on monosodium iodoacetate (MIA) induced osteoarthritis in rats, increased bone volume by 40% and bone volume/total volume by 28%, compared with the vehicle-treated MIA control group. Whilst the diclofenac treatment group increased bone volume by 13.8% and bone volume/total volume by 7.7%. The authors reported that Shinbaro inhibited production of prostaglandin E<sub>2</sub> and anti-collagen II antibody, resulting in reduced bone turnover leading to a decrease in bone loss [12].

In oriental medicine, fractures are mentioned in the old book called “seongjechonglog (complete record of holy benevolence)”.

The book [13] said that the patient's overall condition should be considered first when prescribing medicine for a fracture.

The patient of this case study was a housekeeper who mainly complained of fatigue resulting from excessive use of her knee joints. Therefore, a Mabalgwanjeol decoction, which contained Ginseng Radix, Astragali Radix and Glycyrrhizae Radix, was prescribed.

The findings in this study are significant because this is the first case report of treatment for PCL fracture in Korean medicine. According to a review by Bae et al in 2015 [14], where Korean Medicine was used to treat fractures, the authors found that there were a number of publications related to vertebral fractures, ankle and femoral neck fractures, but there were no reports related to knee or tibial bone fractures that have been published. This current study reports the case of a PCL avulsion fracture, which is not a common case to treat in Korean medicine. The success of this study makes it feasible to refer to this study in similar cases in the future.

Secondly, the effectiveness of conservative treatment using Korean medicine for an avulsion fracture was confirmed. In this case, the patient was treated with only Korean medicine treatment (with the exception of basic physical therapy), and symptoms improved. For most patients with an avulsion fracture, surgical treatment is performed using Western medicine [3], preservation therapy is not common, or is performed only after surgery. In Korean medicine, there was only 1 case report in 2015 where a patient with a lateral malleolus avulsion fracture was treated with Korean medicine (including acupuncture, herbal medicine, etc.) [8]. This study confirmed the possibility of conservative treatment of an avulsion fracture using Korean medicine.

Since this was a case study with 1 patient, the level of evidence is not high. In addition, it cannot be said for certain that the pain in the patients left knee was caused only by an avulsion fracture. Despite these limitations, it must be noted that a PCL injury alone is not common in most cases of knee pain [15]. Further studies will be needed to substantiate the findings reported in this study.

### Conflicts of Interest

The authors have no conflicts of interest to declare.

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