



Case Report

A Case Report of Femoral Neck Fracture in an Elderly Patient Managed by Non-operative Korean Medical Treatment : 42 Months Follow-up



Ju-ran Kim¹, Han Mi Gong¹, Seungah Jun¹, Jung Hee Lee¹, Bong Hyo Lee², Hyun-Jong Lee¹, Jae Soo Kim^{1,*}

1 Department of Acupuncture & Moxibustion Medicine, College of Korean Medicine, Daegu Haany University, Daegu, Korea

2 Department of Acupuncture, Moxibustion and Acupoint, College of Korean Medicine, Daegu Haany University, Daegu, Korea

ABSTRACT

Article history:

Submitted: October 26, 2018

Accepted: November 6, 2018

Keywords:

femoral neck fracture, acupuncture, herbal medicine, Korean traditional medicine, Korean medical treatment

This report showed the clinical outcome of an elderly patient with a femoral neck fracture who was treated non-operatively with Korean medical treatment. The patient had acupuncture, herbal medication, moxibustion, and participated in physical rehabilitation for 3 months. The effects of Korean medical treatment were measured every 2 weeks using the numeric rating scale (NRS) and the Harris hip score (HHS). After treatments, the NRS score for hip pain decreased from 8 to 2, and the HHS increased from 0 to 43. A 42-month follow-up showed the patient's NRS score was 0 and the HHS was 61. Furthermore, an X-ray showed complete union of the femoral neck fracture with no suspicion of avascular necrosis. These results suggest that Korean medical treatment can effectively reduce pain and aid rehabilitation in patient with femoral neck fractures with no surgery, resulting in complete union of the fracture.

<https://doi.org/10.13045/jar.2018.00290>
pISSN 2586-288X eISSN 2586-2898

©2018 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 femoral neck is an anatomical structure that receives high mechanical pressure due to the curvature of the proximal femur. So, it is not surprising that femoral neck fractures are common and account for about 50% of total hip fractures [1]. In younger patients, femoral neck fractures occur as a result of high energy trauma such as traffic accidents or falls, whilst in elderly patients, femoral neck fractures occur easily with low energy trauma due to decreased bone density [2]. Around the world, there has been an increasing incidence of hip fractures with each decade, primarily due to improved life expectancies. It is estimated that by 2050, about 6 million people will experience a hip fracture [3].

The routine management for femoral neck fractures is surgery but, in cases of medical contraindications or refusal of surgical treatment, non-operative treatment is performed [3].

Non-operative treatment has a high possibility of bony non-union or mal-union, medical complications, and mortality.

Therefore, it is only considered for patients who are not able to move and have less pronounced pain. Precautionary measures should be taken during non-operative treatment to prevent bedsores, pneumonia, urinary tract infections and deep vein thrombosis [4,5]. There are case reports of non-operative treatment of femoral neck fractures [6,7] and a comparative study of non-operative treatment of femoral neck fractures with surgical treatment [8].

However, in Korea, these studies are limited. There are no studies on non-operative treatment in medicine, and only 1 case of femoral neck fracture in Korean traditional medicine were reported: a case report of a femoral neck fracture treated by Korean medical treatment without surgery [9].

This case report describes effective Korean medical treatment for femoral neck fracture in an elderly patient who had not surgery, and reports the complete union of the fracture site after 42 months.

*Corresponding author.

Department of Acupuncture & Moxibustion Medicine, Daegu Oriental Hospital of Daegu Haany University, 136, Sincheondong-ro, Suseong-gu, Daegu, 706-828, Korea

E-mail: jaice@daum.net

Case Report

Patient

OOO (F/84)

Chief complaint (Onset)

Right hip pain (19 May 2014)

Past History

Hypertension, osteoporosis, uterine myoma, degenerative arthritis in both knees

Present Illness

Pain in right hip began after falling out of bed on May 19, 2014. The patient visited the hospital and had an X-ray of the right hip. No abnormalities were observed. However, by May 22, 2014, the pain had become worse and prevented walking. On May 26, 2014, the patient visited the emergency room of a different hospital where a computed tomography (CT) scan was taken of the right pelvis. The diagnosis of the patient's condition was an intertrochanteric fracture of the right femoral neck that required surgery. The hospital strongly insisted that it should be operated, but the patient and her family refused surgery and opted for Korean medical treatment. The patient's first visit to our hospital was on May 26, 2014.

Duration of treatment

May 26, 2014 to August 28, 2014 (95 days of hospitalization).

Radiology

Results of the CT scan (May 26, 2014) indicated an intertrochanteric fracture of the right femoral neck (Fig. 1).

Range of motion test

Range of motion (ROM) was not assessed because the patient had to be absolutely stable.

Treatment

Acupuncture treatment [10]

The acupuncture needles were 0.25 * 30 mm stainless steel standardized, and disposable. (The Eastern acupuncture equipment manufacturer, Boryung, Korea) Acupuncture was administered at GB29, GB30, GB31, GB34, GB36, ST31, ST32 and tender points on tissues including biceps femoris, musculus quadriceps femoris, and musculus tensor fasciae latae, for 15 minutes twice a day.

Herbal medicine

The patient took herbal medication 3 times a day. The herbal medications were Moktongdaeantang-gamibang (MDT-gamibang) and Hyeongbangjiwhangtang-gamibang (HGT-gamibang) [11] (Table 1). MDT-gamibang was taken from May 26, 2014 to July 14, 2014 and HGT-gamibang was taken from July 15, 2014 to August 28, 2014. After discharge, the patient took more HGT-gamibang until December 15, 2014.

Physiotherapy

Transcutaneous electrical nerve stimulation (TENS) was applied using Auto TENS (Homerion HL-3, Japan) using the Auto 3 program, once a day, for 20 minutes, stimulating near to GB30.

Moxibustion treatment

The patient was treated with indirect loess moxibustion (HAITNUM CO.) once a day at CV12 and CV4 [10], and with



Fig. 1. Right pelvis CT (May 26, 2014).

The above figure shows femoral neck fracture. The arrow points to the fracture site.

indirect moxa cone moxibustion (Bongraissuk CO.) twice a day at the same site as the acupuncture sites in this study. In addition, following 6 weeks of hospitalization, the patient was treated with indirect moxibustion with moxa tube of bamboo (Ssuglove CO.) once a day at GB30 to reduce hip pain.

Evaluation

Numeric rating scale

The patient's pain was assessed every 2 weeks using the Numeric rating scale (NRS) [12]. A score of 0 indicated no pain and 10 indicated unacceptable pain.

Harris hip score

The Harris hip score (HHS) [13] was used to assess overall

Table 1. Herbal Composition of 2 Herbal Medications for Daily Dosage.

Moktongdaeantang-gamibang (2014.05.26 - 2014.07.14)		Hyeongbangjiwhangtang-gamibang (2014.07.15 - 2014.12.15)	
<i>Gypsum</i>	20 g	<i>Gypsum</i>	10 g
<i>Rehmanniae Radix</i>	12 g	<i>Rehmanniae Radix Preparata</i>	8 g
<i>Akebiae Caulis</i>	12 g	<i>Corni Fructus</i>	8 g
<i>Poria cocos</i>	8 g	<i>Alismatis Rhizoma</i>	8 g
<i>Osterici Radix</i>	4 g	<i>Osterici Radix</i>	8 g
<i>Saposhnikoviae Radix</i>	4 g	<i>Angelicae Pubescentis Radix</i>	8 g
<i>Schizonepetae Spica</i>	4 g	<i>Plantaginis Semen</i>	4 g
<i>Bupleuri Radix</i>	4 g	<i>Saposhnikoviae Radix</i>	4 g
<i>Gardeniae Fructus</i>	4 g	<i>Schizonepetae Spica</i>	4 g
<i>Coptidis Rhizoma</i>	4 g	<i>Bupleuri Radix</i>	4 g
<i>Angelicae Pubescentis Radix</i>	4 g	<i>Lycii Radicis Cortex</i>	4 g
<i>Alismatis Rhizoma</i>	4 g	<i>Moutan Cortex</i>	4 g
<i>Plantaginis Semen</i>	4 g		
<i>Lycii Fructus</i>	4 g		
<i>Drynariae Rhizoma</i>	4 g		
<i>Achyranthis Radix</i>	4 g		

function of the patient's hip, condition, and ability to be active. This method is routinely used to evaluate improvements after hip surgery and includes a pain index, function index, deformity index, and ROM assessments.

The pain index is grouped according to the degree of pain, the effect on activities, and whether medication was taken.

The function index is composed of daily activities (stair use, using public transportation, sitting, and managing shoes and socks) and gait (limp, support needed, and walking distance).

The deformity index is assessed by limitation of flexion, abduction, and internal rotation, and difference in leg length. The ROM was evaluated for flexion, abduction, adduction, internal rotation, and external rotation [13] (Appendix 1).

The HHS has a maximum of 100 points covering pain (1 item, 0–44 points), function (7 items, 0–47 points), absence of deformity (1 item, 4 points), and ROM (2 items, 5 points). A total score of 70 or less is regarded as poor hip function, 70–80 is fair, 80–90 is good, and 90 or more is excellent hip function [13].

Treatment progress (Figs. 2,3)

First day of hospitalization

At the time of admission, there was no pain at rest, but when the patient moved they suffered severe pain, their NRS score was 8, and their HHS was 0 for all indexes. Active ROM was not measured as the patient was advised not to move.

2 weeks of hospitalization

Following 2 weeks of hospitalization the patient's pain had decreased as shown by an NRS score of 6, and a HHS of 10,

indicating improvements in pain index assessments. Ankle pumping exercises were performed to prevent weakening of the femoral muscle whilst maintaining restricted movement in bed.

4 weeks of hospitalization

After 4 weeks of hospitalization, the level of pain had decreased further and the patient's NRS score was 5, and the HHS was 21, with improvement in the pain index and active ROM increased by 30° in flexion and 5° in abduction. Manual raising of the right lower limb was performed to only 60°, the angle at which the patient complained of severe pain, to prevent contracture (20 repeats, 3 times a day).

6 weeks of hospitalization

The reduction in pain continued at 6 weeks of hospitalization and the patient's NRS score was 4, and the HHS was 23 with an active ROM increase by 80° in flexion and 15° in abduction, adduction, internal rotation and external rotation. Continuous exercise was performed, and pain and ROM improved. The stability standard was reduced from absolute stable to stable.

8 weeks of hospitalization

At 8 weeks of hospitalization the gradual reduction in pain continued and the patient's NRS score was 3, and the HHS was 27, with the ROM increased by 110° in flexion. Sitting time at 8 weeks increased compared with at 7 weeks after hospitalization, with the patient able to sit for about 30 minutes in a high back chair.

10 weeks of hospitalization

The pain decreased by 10 weeks of hospitalization and the

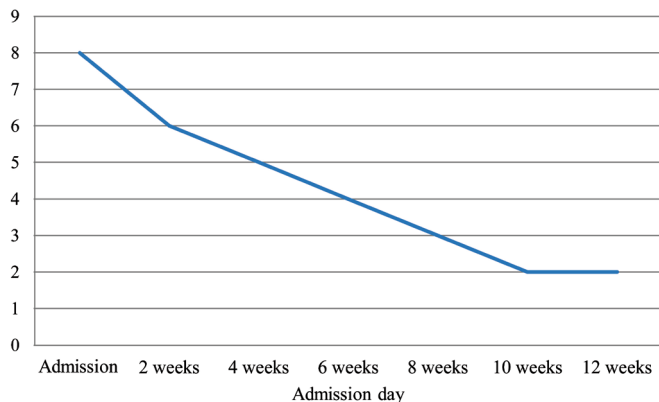


Fig. 2. The change of numeric rating scale during hospitalization.

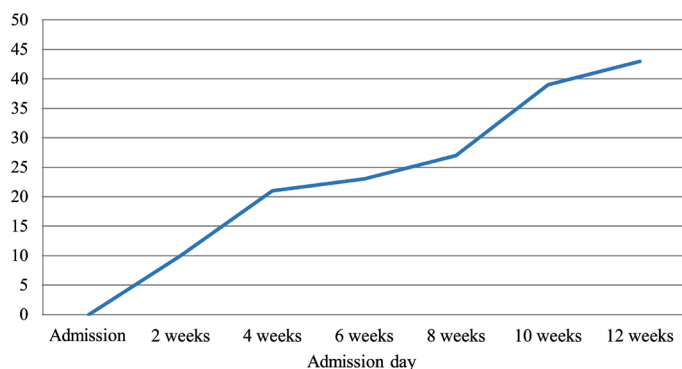


Fig. 3. The change of Harris hip score during hospitalization.

patient's NRS score was 2, and the HHS was 39, with improvement in the pain index, and sitting time increased to about 2 to 3 hours. In addition, manual right hip flexion exercises (20 repeats, 3 times a day) were started.

12 weeks of hospitalization

The pain remained at similar levels with a NRS score of 2, and an HHS of 43, with improvement in the function index. The patient started weight bearing exercises (about 10%-20% of the patient's total body weight, 5 times a day for about 1 minute). Sitting time also increased to about 6 to 7 hours a day.

Follow-up (Fig. 4)

The patient was re-admitted to our hospital 42 months after discharge (August 28, 2014) due to a general condition of deterioration (cold virus). At the time of re-admission, the patient was suffering from dizziness and a dull headache, and was using a wheelchair. According to the next of kin, and before the patient's general deterioration, the patient could not walk unaided because of pain in both knees. A chest X-ray showed cardiomegaly and pulmonary congestion, leading to shortness of breath which would have compounded the patient's inability to walk. At the time of re-admission, the patient's NRS score was 0 and their HHS was 61. An X-ray of the right hip showed arthritis, but there was complete union of the fracture sites and no suspicion of avascular necrosis (AVN).



Fig. 4. Right hip X-ray (February 13, 2018).
The above figure shows complete union of the femur neck fracture after 42 months follow-up.

Discussion

The incidence of fracture of the femoral neck is increasing every year because of extended life expectancy, especially in elderly people and increased activity [2]. However, non-operative treatment of this type of fracture can cause severe complications such as AVN and non-union of the femoral head, so it is important to consider the treatments available, the patient's age and their expectations [4]. Among complications of femoral neck fractures, AVN can occur up to 11%-80%, and non-union can occur up to 30% [4].

The primary goal of femoral neck fracture treatment is to preserve the hip joint and to restore function to previous levels [4,14]. In most cases, surgery is performed. In younger patients, internal fixation is considered as the common surgical method, but in elderly patients, total hip replacement is a priority because of the risk of complications such as fixation failure and AVN of the femoral head [14]. However, the risk of surgery or total hip replacement, such as an increased operating time and bleeding volume, may be greater than internal fixation. In addition, postoperative complications such as dislocation, infection, and loosening of the fixation screw may occur, so careful consideration is necessary [15]. So, some practitioners advocate non-operative treatment [16,17].

In the classification of femoral neck fracture, the Garden classification is widely used to classify fracture according to the degree of dislocation of the femoral neck [4]. Type 1 is described as an undisplaced valgus impacted incomplete fracture. Type 2 is described as an undisplaced fracture. Type 3 is described as a partially displaced fracture. Type 4 is described as a totally displaced fracture [4]. Types 1 and 2 are generally accepted as stable fractures that can be treated non-operatively [6]. In a study, Shuqiange et al [6] investigated the prognosis of non-operative treatment of 115 patients with Garden Type 1 femoral neck fracture regardless of age. Secondary displacement occurred in 41% of the total patients, and among them, 60-80 years old was the most common age group to experience this condition. Faraj [7] reported that the mortality rate was not higher in the non-operative treatment of elderly patients aged 76-98 years with femoral neck fracture, compared with those who underwent surgery. In addition, Gregory et al [8] conducted a retrospective study to compare 1-year outcomes of 80 patients who underwent

hemiarthroplasty and 22 patients who underwent non-operative treatment, among elderly patients (≥ 70 years old). The mortality rate and American Society of Anesthesiologists (ASA) grade were observed. In the non-operative treatment group, the mortality rate reached 50% within 1 year. In the ASA grade, only 32% recovered to \geq Grade 3 with limited activity, and about 5% reached \geq Grade 2 with few restrictions on activity. In the surgical treatment group, the mortality rate was 29% within 1 year, and 38% in the case of ASA Grade 3 or higher.

In Korea, studies on non-operative treatment are insufficient. There have been no publications of non-operative treatment in medicine. In the case of Korean traditional medicine, there has been 1 case report by Kim et al [9] studying a femoral neck fracture in an elderly patient (91-year-old) that underwent non-operative Korean medical treatment for 7 months. In this study, the patient's HHS increased from 0 to 74, and their Visual Analog Scale score for hip pain decreased from 10 to 1.5.

In Korean traditional medicine, *Donggeuibogam* [18] explained that if a fracture occurs, the pain should be managed after conquering and fixation. The *Taepyeonghyeminhwajegukbang* [19] explained the treatment of fractures by trauma. The treatment of a fracture is mainly through the use of blood-activating and stasis-dispelling medicine in the early stages. In the middle stages, when the bones are formed, herbal medicines are used to strengthen the bones and muscles, and in the latter stages, herbal medicines that tonify qi and blood are mainly used to promote recovery of function [20]. There were no books or studies describing femoral neck fracture or hip fracture. In a study by Kim et al [9], a femoral neck fracture was treated by prescribing Bojungikki-tang with *Alismatis Rhizoma* and *Polyporus* instead of blood-activating and stasis-dispelling medicine, because the patient was in poor general condition in the early stages of fracture. When the patient was in a good general condition and started to be rehabilitated, Sipjeondaebotang was prescribed to increase the bony union effect and tonify qi and blood.

In this current study, the patient was diagnosed with femoral neck fracture using a CT scan. The patient's femoral neck fracture was Garden Type 2, but it was unstable and may have caused dislocation or non-union. The patient was strongly advised to undergo surgery, but the patient wanted Korean medical treatment.

At the time of admission, the patient showed general condition deterioration presenting with severe lower limb edema and ileus and urinary disorders. In addition, the patient's heart was not in a good condition and consequently the patient suffered chest discomfort and occasional dizziness. Considering the history of the patient, the patient was judged to be a lesser yang person. Therefore, in order to improve general condition and help circulation in the body, MDT-gamibang was prescribed. MDT is considered as a representative herbal medication for lesser yang person's edema caused by the heat of chest [11]. Therefore, to remove the heat of chest MDT was used with *Gypsum*, *Lycii Fructus*, *Bupleuri Radix* and *Gardeniae Fructus* to lower the heat and *Drynariae Rhizoma*, *Achyranthis Radix* and *Angelicae Pubescentis Radix* to strengthen the bones and muscles. After the patient's general condition improved and the pain reduced, the patient took HGT-gamibang with *Gypsum*, *Bupleuri Radix*, *Moutan Cortex* and *Lycii Radicis Cortex* to increase physical strength.

The acupuncture treatment was performed on GB29, GB30, GB31, GB34, GB36, ST31 and ST 32 which unblocked the meridian and activated collaterals [10]. In addition, to control the pain generated during rehabilitation exercise, the tender points on biceps femoris, musculus quadriceps femoris, musculus tensor fasciae latae and those points supporting the anterior, posterior, and lateral of hip joint were also treated with acupuncture. In the

rehabilitation exercise for femoral neck fracture, it was difficult to find a definite rehabilitation exercise protocol, and only study that it was good to start exercise as fast as possible was found [4].

In this study, the patient didn't do the rehabilitation exercise excessively, because the patient wasn't able to walk unaided due to lower limb edema and dizziness before the fracture. During the early stages of the fracture, the patient was absolutely stable. After 2 weeks of hospitalization, the pain began to decrease from NRS 8 to 6, and ankle pumping exercises were started to prevent femoral muscle weakness. After 4 weeks of hospitalization, when the pain alleviated and active ROM became possible, the right lower limb was manually raised to prevent the hip joint's contraction. After that, as ROM increased, the patient sat for longer periods. After 12 weeks of hospitalization, the patient's NRS score had significantly decreased, and weight bearing exercises of about 10%-20% were performed. The HHS increased from 0 at admission, to 43 points at discharge. The results from this study are higher than results reported by Kim et al [9]'s study in the same period, but it is difficult to compare directly.

In this study a case of Garden 2 femoral neck fracture was reported where the patient was treated with Korean medical treatment (without surgery) including acupuncture and herbal medication. The herbal medication was used to elevate the general condition of the patient and promote the union of the fracture. The acupuncture treatment controlled the hip pain and stimulated the surrounding muscles to maintain the muscle strength. In addition, the rehabilitation exercises were performed to recover the ROM of the hip joint.

After 3 months of hospitalization, the patient went home and continued weight bearing exercises at home so, the patient's general condition could gradually improve until she could walk independently. However, the patient's history of pain in both knees, dizziness, chest discomfort and shortness of breath also impacted on the patient's ability to walk.

The patient was readmitted to our hospital 42 months after the treatment for femoral neck fracture, their NRS score was 0 and the HHS was 61. This is a lower score than previously reported by Kim et al [9] where the HHS improved to 74 after 7 months of hospitalization. However, AVN occurred at 6 months post admission, whereas in this case AVN was not observed by X-ray taken at the time of re-admission, despite the patient's age. Furthermore, complete union of the fracture site was observed.

There are few studies about non-operative treatment of femoral neck fracture in Korea. Our study is the first case report for Korean medical treatment on a Garden 2 femoral neck fracture, showing effectiveness with the fracture completely healed 42 months later. This case is more meaningful because there was no report of complete union of the fracture in the previously published study.

There are several limitations to this study. This is a case report of 1 patient and there were other diseases affecting the patient's capacity to walk, so it was not easy to know the precise state of the patient. In addition, it was difficult to come to our hospital because the patient lived in another city. For this reason, we could not perform the intermediate evaluation until the patient visited our hospital 42 months later due to another disease, and we also did not follow-up the patient's condition. There was no report of the degree of union according to common non-operative treatment without Korean medical treatment, so comparison could not be made. And this study could not tell how well our treatment was appropriate for the condition of the patient. Therefore, postoperative rehabilitation or non-operative treatment of femoral neck fracture in Korea needs to be reported, and it is necessary to perform comparative studies between medicine and Korean traditional medicine.

Conflicts of Interest

The authors have no conflicts of interest to declare.

References

- [1] Fractures of the neck of femur. In: The Korean Fracture Society. Principles of fracture management, 1st ed. Seoul (Korea): Beommun; 2013. p. 593-612. [in Korean].
- [2] Gierer P, Mittlmeier T. Femoral neck fracture. *Unfallchirurg* 2015;118:259-269. [in German].
- [3] Lee SH [Dissertation]. Analysis of the risk factor related with in-hospital-mortality of femoral neck fractures patients who underwent arthroplasty. Busan (Korea): Donga University; 2017. Available from: <http://www.riss.kr/link?id=T14721758&outLink=K>. [in Korean].
- [4] Yoon HK, Dan JM. Femoral neck fracture. *J Korean Hip Soc* 2010;22:13-19. [in Korean].
- [5] Kwak HJ [Dissertation]. Bipolar hemiarthroplasty for femoral neck fractures in patients more than 75 years old. Gyeongsan (Korea): Yeungnam University; 2011. Available from: <http://www.riss.kr/link?id=T12580828&outLink=K>. [in Korean].
- [6] Shuqiang M, Kunzheng W, Zhichao T, Mingyu Z, Wei W. Outcome of non-operative management in Garden I femoral neck fractures. *Injury* 2006;37:974-978.
- [7] Faraj AA. Non-operative treatment of elderly patients with femoral neck fracture. *Acta Orthop Belg* 2008;74:627-679.
- [8] Gregory JJ, Kostakopoulou K, Cool WP, Ford DJ. One-year outcome for elderly patients with displaced intracapsular fractures of the femoral neck managed non-operatively. *Injury* 2010;41:1273-1276.
- [9] Kim SJ, Lee HJ, Lee YE, Lee BH, Lee YK, Lim SC et al. A case report of patient with femoral neck fracture treated non-operative Korean medical treatments. *J Korean Acupunct Moxib Soc* 2013;30:175-183. [in Korean].
- [10] Korean Meridians & Acupoints Society Teaching Material Editing Committee. Details of Meridians & Acupoints: A guidebook for college student the first. Wonju (Korea): Uibang; 2009. p. 203, 205, 853-860, 864, 873, 968, 998. [in Korean].
- [11] Department of Sasang Constitutional Medicine. Sasang Constitutional Medicine, 6th ed. Seoul (Korea): Jipmoon; 2012. p. 394-395, 399-400. [in Korean].
- [12] Shim SY, Park HJ, Lee JM, Lee HS. An overview of pain measurements. *Korean J Acupunct* 2007;24:77-97. [in Korean].
- [13] Nilsdotter A, Bremander A. Measures of hip function and symptoms: Harris Hip Score (HHS), Hip Disability and Osteoarthritis Outcome Score (HOOS), Oxford Hip Score (OHS), Lequesne Index of Severity for Osteoarthritis of the Hip (LISOH), and American Academy of Orthopedic Surgeons (AAOS) Hip and Knee. *Arthritis Care Res* 2011;63:S200-S207.
- [14] Lim KH [Dissertation]. Internal fixation for undisplaced femur neck fractures over 70. Daegu (Korea): Keimyung University; 2015. Available from: [shttp://www.riss.kr/link?id=T13866873](http://www.riss.kr/link?id=T13866873). [in Korean].
- [15] Schnependahl J, Betsch M, Petrov V, Bottner F, Thelen S, Grassmann JP, et al. Recovery after hip fractures: influence of bipolar hemiarthroplasty on physical disability and social dependency in the elderly. *Hip Int* 2011;21:751-756.
- [16] Raaymakers EL. The non-operative treatment of impacted femoral neck fractures. *Injury* 2002;33:C8-C14.
- [17] Raaymakers EL, Marti RK. Non-operative treatment of impacted femoral neck fracture: a prospective study of 170 cases. *J Bone Joint Surg Br* 1991;73:950-954.
- [18] Heo J. *Treasured Mirror of Eastern Medicine* first. Seoul (Korea): Bubin; 2009. 1597 p. [in Korean].
- [19] Jin SM. *Formularies of the bureau of people's welfare pharmacy*. China: Sunpoongsa; 1976. p. 220-227. [in Chinese].
- [20] Ahn HL, Shin MS, Kim SJ, Choi JB. Effects of Neutral Eohyeol(Yuxue) herbal acupuncture and Dangkisoo-san(Danguixu-san) on fracture healing in the early stage in rats. *Korean Med Rehabil* 2007;17(1):1-16. [in Korean]

Appendix 1.

<h1 style="margin: 0;">Harris Hip Score</h1>	Hip ID: _____
	Study Hip: <input type="checkbox"/> Left <input type="checkbox"/> Right
	Examination Date (MM/DD/YY): / /
	Subject Initials: _____
Medical Record Number: _____	

Interval: _____

Harris Hip Score							
<p>Pain (<i>check one</i>)</p> <p><input type="checkbox"/> None or ignores it (44)</p> <p><input type="checkbox"/> Slight, occasional, no compromise in activities (40)</p> <p><input type="checkbox"/> Mild pain, no effect on average activities, rarely moderate pain with unusual activity; may take aspirin (30)</p> <p><input type="checkbox"/> Moderate Pain, tolerable but makes concession to pain. Some limitation of ordinary activity or work. May require Occasional pain medication stronger than aspirin (20)</p> <p><input type="checkbox"/> Marked pain, serious limitation of activities (10)</p> <p><input type="checkbox"/> Totally disabled, crippled, pain in bed, bedridden (0)</p> <hr/> <p>Limp</p> <p><input type="checkbox"/> None (11)</p> <p><input type="checkbox"/> Slight (8)</p> <p><input type="checkbox"/> Moderate (5)</p> <p><input type="checkbox"/> Severe (0)</p> <hr/> <p>Support</p> <p><input type="checkbox"/> None (11)</p> <p><input type="checkbox"/> Cane for long walks (7)</p> <p><input type="checkbox"/> Cane most of time (5)</p> <p><input type="checkbox"/> One crutch (3)</p> <p><input type="checkbox"/> Two canes (2)</p> <p><input type="checkbox"/> Two crutches or not able to walk (0)</p> <hr/> <p>Distance Walked</p> <p><input type="checkbox"/> Unlimited (11)</p> <p><input type="checkbox"/> Six blocks (8)</p> <p><input type="checkbox"/> Two or three blocks (5)</p> <p><input type="checkbox"/> Indoors only (2)</p> <p><input type="checkbox"/> Bed and chair only (0)</p> <hr/> <p>Sitting</p> <p><input type="checkbox"/> Comfortably in ordinary chair for one hour (5)</p> <p><input type="checkbox"/> On a high chair for 30 minutes (3)</p> <p><input type="checkbox"/> Unable to sit comfortably in any chair (0)</p> <hr/> <p>Enter public transportation</p> <p><input type="checkbox"/> Yes (1)</p> <p><input type="checkbox"/> No (0)</p>	<p>Stairs</p> <p><input type="checkbox"/> Normally without using a railing (4)</p> <p><input type="checkbox"/> Normally using a railing (2)</p> <p><input type="checkbox"/> In any manner (1)</p> <p><input type="checkbox"/> Unable to do stairs (0)</p> <hr/> <p>Put on Shoes and Socks</p> <p><input type="checkbox"/> With ease (4)</p> <p><input type="checkbox"/> With difficulty (2)</p> <p><input type="checkbox"/> Unable (0)</p> <hr/> <p>Absence of Deformity (All yes = 4; Less than 4 =0)</p> <p>Less than 30° fixed flexion contracture <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Less than 10° fixed abduction <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Less than 10° fixed internal rotation in extension <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Limb length discrepancy less than 3.2 cm <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <hr/> <p>Range of Motion (<i>*indicates normal</i>)</p> <p>Flexion (*140°) _____</p> <p>Abduction (*40°) _____</p> <p>Adduction (*40°) _____</p> <p>External Rotation (*40°) _____</p> <p>Internal Rotation (*40°) _____</p> <hr/> <p style="text-align: center;">Range of Motion Scale</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">211° - 300° (5)</td> <td style="width: 50%;">61° - 100 (2)</td> </tr> <tr> <td>161° - 210° (4)</td> <td>31° - 60° (1)</td> </tr> <tr> <td>101° - 160° (3)</td> <td>0° - 30° (0)</td> </tr> </table> <hr/> <p>Range of Motion Score _____</p> <hr/> <p>Total Harris Hip Score _____</p>	211° - 300° (5)	61° - 100 (2)	161° - 210° (4)	31° - 60° (1)	101° - 160° (3)	0° - 30° (0)
211° - 300° (5)	61° - 100 (2)						
161° - 210° (4)	31° - 60° (1)						
101° - 160° (3)	0° - 30° (0)						