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Compare the Traditional Chinese Medicine Manipulation With Rehabilitation on In-Patients After Total Knee Arthroplasty

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ABSTRACT

This prospective, randomized, and controlled study was conducted to assess Traditional Chinese Medicine (TCM) for pain control, alone and in conjunction with a standard inpatient rehabilitation program, during the five days immediately following total knee arthroplasty (TKA). Forty-one patients undergoing primary unilateral TKA between February, 2010 and January, 2011 were randomly assigned to one of three groups. Levels of pain were then monitored using a Visual Analogue Scale (VAS). Significant alleviation of pain and diminution of flexion contractures were achieved using TCM, with and without standard rehabilitation. These outcomes support use of TCM immediately post-TKA to facilitate patient recovery.

Osteoarthritis (OA) is one of the most common arthritis of the knee. In China, over 21% of those afflicted are past the age of 60 years [1], and in the US, more than 10 million people have been diagnosed with OA of the knee [2]. Total knee arthroplasty (TKA) is the current treatment for end-stage disease [3] to reduce pain, prevent deformity, and restore stability [3–5]. Most importantly, however, TKA regularly boosts patient activity levels and improves the quality of daily life [3–5]. Approximately 94% of TKA procedures performed in Taiwan are attributable to OA. Because outcomes of TKA are generally good [3–5], a high volume (76,727) of these surgeries has been recorded here between 1996 and 2004 (54.95 per 100,000 persons in 2004) [6], and figures continue to rise annually. Nevertheless, pain in the immediate postoperative period remains a problem and may persist for up to one year, according to some sources [7]. When poorly controlled, such pain may interfere with early attempts at postsurgical mobilization and rehabilitation, resulting in prolonged or incomplete recovery [8,9].

Among the causes of pain immediately following TKA, intraoperative trauma, acute infection, and instability (subsequent to soft tissue imbalance, impingement, or misalignment) are frequently cited [10]. This type of pain not only promotes joint stiffness but also carries emotional overlay (anxiety or depression) [5,9]. It is therefore a major factor in a patient's willingness to ambulate. While the mechanism of acute postoperative pain is highly complex, involving a number of peripheral and central nociceptors and neuropeptides [8,9], research to control pain in the aftermath of TKA is progressing. We hypothesized that early intervention with Traditional Chinese Medicine (TCM) might be of benefit in this setting.

Materials and Methods

The Participants

This prospective, randomized, and controlled study was conducted between February, 2010 and January, 2011 at Chang Gung Medical Foundation (Taoyuan Branch), where roughly 100 primary TKA procedures are performed annually. All participants were over 18 years of age and had been diagnosed with end-stage OA of the knee. The indication for primary TKA was rendered by a single surgical specialist. Details of the trial were fully explained to each patient at the first visit on the day of admission, and signed informed consent was mandatory for all participants. Inclusion criteria were as follows:

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(1) end-stage OA of the knee, (2) submission to unilateral TKA, and (3) compliance with a TCM regimen after primary TKA (control subjects exempted). A total were 45 patients were enrolled, including 18 males and 27 females ranging from 46 to 86 years of age.

Each participant was randomly assigned to one three groups: (1) EXP I, given concomitant physical therapy (PT), TCM, continuous passive motion (CPM), and oral non-steroid anti-inflammatory drugs (NSAIDs); (2) EXP II, given concomitant TCM, CPM, and oral NSAIDs; and (3) control subjects, given concomitant PT, CPM, and oral NSAIDs. Randomization was achieved with the "randbetween" function of Microsoft Excel. Patients corresponding with numerical multiples of three (3x) served as controls (n = 17), while EXP I (n = 15) and EXP II (n = 13) groups were derived from 3x + 1 and 3x + 2 multiples, respectively.

After surgery, any participant with fever, purulent wound discharge, or complications of HemoVac removal was excluded from study. Although none were disqualified on this basis, four patients subsequently withdrew after surgery (two each from EXP I and EXP II groups). Ultimately, 41 patients completed the trial, including 15 males and 26 females of the EXP I (n = 13), EXP II (n = 11), and control (n = 17) groups (Fig. 1). The same surgeon, physical therapist, and Chinese doctor performed all surgeries, PT, and TCM, respectively. PT and/or TCM was initiated following first postsurgical evaluations.

Record Data

Gender, age, weight, height, comorbid conditions, previous surgical history, tourniquet time, and duration of surgery (minutes expended from skin incision to closure) were recorded for each patient. Outcomes were expressed in terms of VAS pain score, active range of motion (ROM) with knee flexion and extension (in supine position), and degree of knee swelling (circumference at 10 cm above the base of the patella) [11,12]. Data were obtained at three points in time—upon HemoVac removal, Day 2 postoperatively, and Day 4 or 5 after TKA (when most subjects were discharged). Active ROM with knee flexion and extension was assessed each time by the same individual with a goniometer [13–15].

Physical Rehabilitation

At Chang Gung Medical Foundation (Taoyuan Branch), a standard PT program was routinely instituted after TKA. The EXP I and the control groups received PT daily, consisting of isometric and isotonic knee and hip muscle strengthening. For example, active knee extension (supine), horizontal hip joint abduction/adduction, transferring, walking (with appropriate device), and weight bearing were performed.

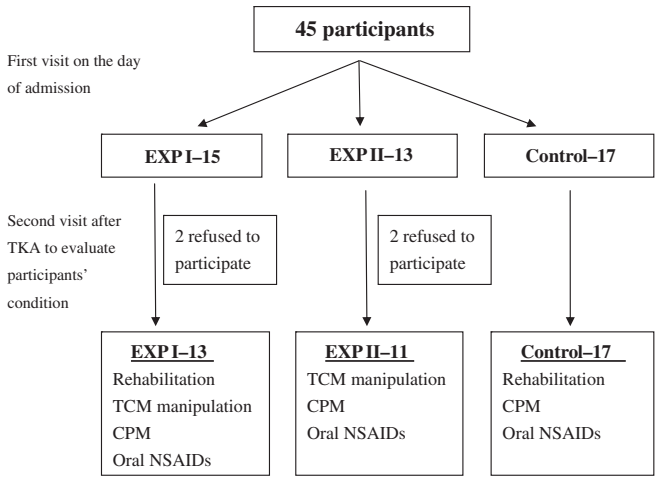

Fig. 1. The flow sheet. TKA = Total Knee Arthroplasty; TCM = Traditional Chinese Medicine; CPM = Continuous Passive Motion; NSAID = Non-steroid Anti-inflammation drug.

TCM Manipulation Procedure

The following TCM regimen was administered to EXP I and EXP II groups (Fig. 2):

Step 1—Light placement of hands on thigh (one on medial distal third and the other on lateral middle third), internally rotating on skin (to include underlying muscle as feasible) but no rotation of femur itself (Fig. 3A). Maintaining tension with rotation, a pushing and pulling force is exerted along the hip joint until the sensation of tension eases (Fig. 3B).

Step 2—Mobilization of the foot (at navicular–talar, calcaneal–cuboid, and subtalar points), ankle (Fig. 3C), and hip joints (Fig. 3D) with rotation and shaking manipulation.

Step 3—Acupressure or massage applied to the calf, lateral lower leg, lateral thigh, gluteal region, and lower back.

Step 4—Slow mobilization of the affected knee as tolerated (3–5 times, if possible).

Wounds were off-limits for manual contact to prevent infection or aggravate inflammation. Approximately 20 min were required to complete the TCM procedure (steps 1–4). Thereafter, patients were asked to maximally flex the affected knee. Patients were also trained in weight bearing, particularly with respect to prevention of falls and the gradual shifting of weight from normal to affected limb. No acupuncture or Chinese herbals were used.

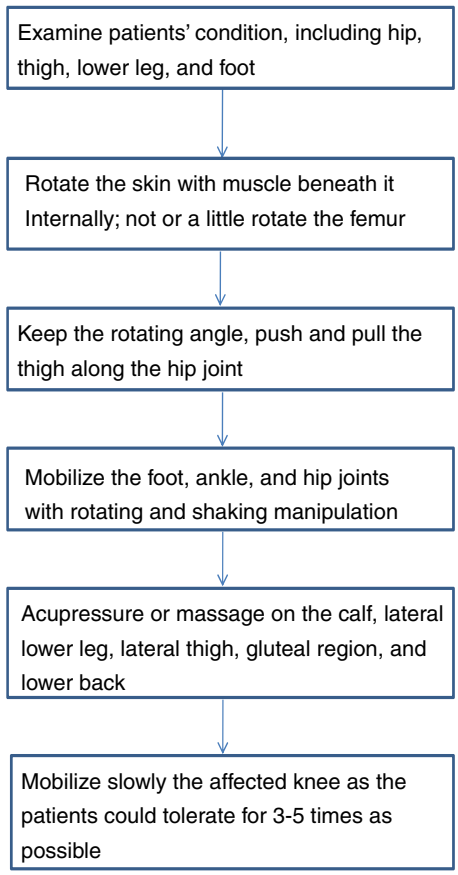

Fig. 2. The steps of TCM manipulation.