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Outpatient Physical Therapy Following Surgical Debridement of Osteochondritis Dissecans of the Talar Dome: A Case Report

Angela Serrani

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The patient signed an informed consent allowing the use of medical information for this report and received information on the institution’s policies regarding the Health Insurance Portability and Accountability Act.
The author acknowledges Mike Fillyaw, PT, MS for assistance with case report conceptualization.
Abstract

**Background:** Osteochondritis Dissecans (OCD) is an alteration of subchondral bone with possible disruption of the surrounding articular cartilage. Hypothesized causes of the chondral defect include repeated trauma or vascular disruption within the joint. Surgical treatment may be used to relieve symptoms of OCD and improve function.

**Purpose:** The purpose of this paper is to describe physical therapy treatment and outcomes for a patient following surgical debridement of OCD of the talar dome.

**Case Description:** The patient was a 27 year old female with a history of frequent ankle sprains. She reported a specific incident earlier this year that led to increased right ankle pain. She had radiographs and an MRI following the incident which revealed OCD of her right talar dome. She underwent surgical debridement of her talar dome and was referred to physical therapy for post surgical care, evaluation, and treatment.

**Outcomes:** During the episode of care, the patient did not make large improvements in strength, range of motion, swelling, or pain. The patient benefited from physical therapy by maintaining her strength and ROM during a period of decreased activity.

**Discussion:** It was suspected that the patient had a tibialis posterior tendon rupture, and that was greatly contributing to her lack of progress in physical therapy. Physical therapy was put on hold for this patient until further imaging could be taken and she could be assessed by a foot and ankle specialist physician.

**Manuscript Word count:** 3,210
Background and Purpose

Osteochondritis Dissecans (OCD) is an alteration of subchondral bone with possible disruption of adjacent articular cartilage.\(^1\) The cause of a chondral defect is unknown but several hypotheses exist. Hypothesized causes include repetitive microtrauma disturbing the vascularity of the talus or non-traumatic disruption of the subchondral blood supply.\(^1\) Although the exact incidence of OCD is unknown, it is suspected that chondral injury may occur in as many as 50% of ankle instability episodes.\(^1\)

The goal of treatment for OCD is to relieve symptoms and improve function.\(^2\) Non-surgical treatment options for patients with OCD of the talus include rest, cast immobilization, and use of non-steroidal anti-inflammatories.\(^2\) Surgical treatment options include excision of the lesion, excision and cutterage, excision combined with cutterage and microfracturing, filling the defect with bone graft, antegrade transmelleolar drilling, retrograde drilling, fixation, and other techniques such as osteochondral transplantation and autologous chondrocyte implantation.\(^2\)

Outcomes following microfracture surgery for this condition yield satisfying results.\(^3\) In this case report, the patient was treated with surgical debridement of the defects in her talus following her diagnosis of OCD.

The purpose of this paper is to describe physical therapy treatment and outcomes for a patient following surgical debridement of OCD of the talar dome. Physical therapists will benefit from this case report by learning through my experience of treating this patient with a unique diagnosis. I will add to the body of knowledge in physical therapy by outlining the treatment of a patient with OCD of the talus and her subsequent outcomes and I will make a reasonable assessment of how her outcomes were related to the treatment provided.
Case Description

Patient History

The patient was a 27 year old female with a history of frequent sprains of either ankle and intermittent bilateral ankle pain over the past 8 years. She reported that in the beginning of March 2014 she “turned the wrong way” while bowling and immediately experienced increased right ankle pain. She had radiographs and an MRI following the initial incident. The radiographs were negative for fracture and the MRI showed an osteochondral defect on her right talar dome. She initially presented to her orthopedic surgeon with complaints of right ankle pain and instability and difficulty maintaining a normal gait pattern. Her medical diagnosis was OCD of the right talar dome. She underwent surgical debridement of the defects in her talus in mid April, 2014 and was referred to physical therapy for post surgical care, evaluation, and treatment of her right ankle. During surgery, the patient’s distal tibia was fractured and the ligaments on the lateral side of her ankle were sprained purposely to allow the surgeon to access her talar dome. Following surgery, more radiographs were taken to ensure proper alignment of her fractured tibia. The patient was non weight bearing on her right lower extremity with the use of crutches for two weeks after the surgery. She then transitioned, for a short period of time, to the use of a walking boot for long distance ambulation. When she presented to physical therapy, she reported use of a short lace up brace at all times when ambulating.

The patient lived on a farm with her husband and 4 children; ages 12, 8, 3, and 1. She had family and friends living near by who were available to help with child care following her surgery. The patient’s home had stairs to enter and exit which did not have a functional railing and a full flight of stairs inside which were necessary to access the patient’s living environment.
She was able to use stairs successfully but with increased ankle pain and an abnormal sideways stepping pattern.

The patient had exercised induced asthma, seasonal allergies, and reported a significant weight gain since the surgery due to inactivity. She reported smoking 7-10 cigarettes per day, drinking alcohol infrequently, and no family history of OCD or frequent ankle sprains. The patient’s medications included Tylenol as needed, Buspar and Citrapram daily.

The patient’s goals were to be able to return to her every day activities including caring for her household, 4 children, and animals, to be able to walk without pain, and to be comfortable driving.

**Systems Review**

*Integumentary:* Non pitting edema was present in right foot and ankle. Surgical incision at medial right ankle was fully closed, with no stitches, and no detectable adhesions.

*Musculoskeletal:* Right ankle active range of motion (AROM) was limited in all directions. Right ankle strength was limited in all motions. Patient also exhibited an antalgic gait pattern.

*Cardiovascular and neuromuscular* systems were not examined.

**Clinical Impression 1**

This patient reported a significant history of ankle sprains. Repeated trauma from ankle instability is a hypothesized cause for the formation of osteochondral lesions, leading me to believe that this patient’s OCD of the talus was likely caused by her frequent episodes of ankle instability. Surgical correction of the chondral defects in the talus caused trauma to the surrounding structures including bones and ligaments. This surgery and trauma were followed by a period of ankle immobilization. Inflammation, swelling, and pain were likely due to surgery related trauma and decreased ankle strength and range of motion were likely due to the
subsequent period of immobilization. Her poor gait mechanics were likely caused by a combination of factors including habit, pain, decreased strength, and inflammation.

This patient was chosen as the subject of this case report because her diagnosis is less common than many of the others we see in the outpatient orthopedic setting. She was also selected because she is a relatively young, healthy person without known comorbidities, making it less likely that a concurrent condition would interfere with treatment and outcomes. This patient was slightly overweight, but reported that the weight gain was recent and due to her inability to return to pre-surgery activity levels. Her weight was not enough to cause concern about increased forces through her ankle and I presumed that when she was able to increase her activity levels she would also return to her previous weight. The patient’s cigarette smoking may have contributed to increased bone healing time.4

Potential complications of this surgery include the possibility soft tissue damage such as tendon rupture, as well as the possibility that the chondral defect was not effectively repaired during the surgery.

Planned examination procedures include:

• strength assessment of the lower extremities

• range of motion assessment of the lower extremities

• assessment of swelling in right lower extremity using circumferential measurements

• gait assessment

• Lower Extremity Functional Scale (LEFS)
Examination

Tests and Measures

Strength: Specific muscle strength of this patient’s non-affected left ankle was assessed using manual muscle testing (MMT). Initially, her right ankle strength was not assessed due to tenderness and inflammation but it was assessed upon discharge. The reliability of MMT increases with the experience level of the practitioner but is reliable and the concurrent validity of MMT is also high.

Range of motion: AROM of the patient’s ankles was assessed using goniometry. As long as standardized measurement practices are used within a clinic, goniometry is a reliable way to measure range of motion (ROM) of a joint. Goniometry is valid for measuring the ROM of a joint but can not be used to infer the factors contributing to the joint.

Integumentary: Visual and tactile inspection of the integument surrounding the area of the surgical incision was conducted.

Circumferential Measurement: Circumferential measurements of her ankles were taken to assess the swelling that was present. The patient was supine on the exam table with her foot and ankle in a neutral position and a measuring tape was used. The four measurements taken were figure 8, malleoli, forefoot, and metatarsal heads. A figure 8 ankle measurement has high inter-rater and intra-rater reliability. This measurement has better accuracy when the landmarks are marked and the same examiner carries out the measurements. Ankle circumference measurement has high inter-examiner agreement and excellent reliability. Circumferential measurements are quicker and easier to complete in the clinic than other methods of ankle edema measurement such as water displacement.
LEFS: The LEFS is a written 20 item questionnaire that assesses the patient’s ability to perform everyday tasks. It can be used to evaluate impairment of a patient with a lower extremity musculoskeletal impairment, to measure progress and outcomes, and to set functional goals.

Refer to Appendix 1 for the LEFS form.

Gait assessment: The patient’s gait was assessed by observing her walking without an assistive device for 20 feet back and forth several times. She was instructed to walk at a self selected pace and was observed from front, back, and each side. Excessive toe out, lack of plantarflexion, and lack of push off on the right side were notable findings.

All measurements and assessment was taken by the same therapist for the sake of reliability.

Refer to table 1 for results of Tests and Measures.

Clinical Impression 2

The findings of weakness, decreased range of motion, impaired gait pattern, pain, and inflammation upon examination are consistent with this patient’s post surgical status. This patient remains an appropriate candidate for this case report. According to the Guide to Physical Therapy Practice, her PT diagnosis is practice pattern 4I: Impaired Joint Mobility, Motor Function, Muscle Performance, and Range of Motion Associated With Bony or Soft Tissue Surgery.

This patient’s impairments include decreased muscle strength in all motions of the right ankle, limited right ankle ROM, poor gait pattern, right lower extremity pain, and inflammation. Her functional limitations are inability to walk, stand, run, drive, bathe, squat, and use stairs. Her disabilities include inability to ambulate in the community and inability to care for her household and children. Her prognosis for improvement is good given adherence to plan of care.

This is based on her motivation to get back to her prior level of function, lack of factors that
might interfere with her recovery, having a supportive family nearby to help her, and her young age. There is an overall clinical outcome of “good and excellent” in 79% of patients treated with surgical correction of OCD, leading me to believe that this patient also has a very good chance of having a favorable outcome following her surgery. At this time no referral or consultation is necessary. Consultation with her surgeon may be called for if progress is not as expected with physical therapy treatment.

Additional tests and measures planned include MMT of the right ankle and more extensive gait analysis. Functional movement analysis may be used once she has begun to make progress. A Lower Extremity Functional Scale will be administered every 12 visits and at discharge.

The initial procedural intervention plan of care was 2 visits per week for 6 weeks. Planned interventions included exercises to increase weight bearing ability, balance, and proprioception, stretching, gait training, and strengthening of her lower extremity to improve gait. Manual therapy techniques planned included soft tissue mobilization, joint mobilizations, PROM, stretching, and ice massage. Other possible modalities for use included electric stimulation, vasopneumatic compression device, and cryotherapy.

**Short term goals (3 weeks):**

- worst right ankle pain in the past two days less than or equal to 5/10
- right ankle active range of motion (AROM) in dorsiflexion (DF) greater than or equal to 0° and in plantarflexion (PF) greater than or equal to 55°
- right ankle strength DF and PF than or equal to 4-/5
- ability to perform step up leading with right foot onto a 4 inch step without pain
- Independence with home exercise program.

**Long term goals (6 weeks):**

- ability to stand for an entire shower without pain
• ability to walk on uneven ground without pain
• ability to complete household care tasks for 30 minutes at a time without pain
• ability to ascend and descend stairs reciprocally without railing without pain
• ability to ambulate community distances with equal step length on each foot using a normal gait pattern

This patient will be discharged from physical therapy upon meeting all of her long term goals or upon gaining the maximum benefit from physical therapy.

Interventions

Coordination, Communication, and Documentation

Each visit was documented in the form of a SOAP note with accompanying flow sheets to record exercises performed. At the 12th and 19th visits a reevaluation was performed and recorded. Reevaluations and progress notes were faxed to the patient’s surgeon before her scheduled follow up visits. Communication with her surgeon also took place in the form of phone calls and voice messages. Communication about treatment choices also took place between my self and several other physical therapists at the clinic.

Patient Related Instruction

The patient was given a home exercise program (HEP) with handouts including pictures of the exercises. (Figure 1). The patient reported complete compliance with her HEP. I also discussed with the patient the importance of proper foot wear. Recommendations were made about the type of supportive sneakers she should be wearing and she was educated about how to choose an appropriate pair of sneakers. The patient also received instructions to ice her ankle and elevate her foot as often as possible and to avoid walking long distances and spending extended periods of time on her feet. She reported that she was as compliant with rest, ice, and elevation as she could be while caring for four young children.
Procedural Interventions

Procedural intervention for this patient changed focus several times over the course of her treatment based on changes in her condition. (Table 2). During visits 1 through 5 the patient was still experiencing inflammation due to her postsurgical status and weakness due to her postsurgical period of immobilization. The focus of treatment during this phase was to decrease inflammation, improve ROM and strength, and improve her abnormal gait pattern. During this phase, progress in gait pattern, decreased inflammation, and improved strength and ROM were expected. Manual interventions of soft tissue mobilization, joint mobilizations, and PROM were provided to reduce inflammation and pain and increase ROM. Therapeutic exercises were used to help build strength and improve gait, with a goal of the patient being able to ambulate with a normal, pain free pattern. Through visit 5 the patient was making progress as expected.

At visit 6 the patient presented with increased inflammation and pain in her ankle. It was assumed that the pain and inflammation were a result of the gains in ROM the patient had made and the increased weight bearing through the injured ankle. At this time, interventions were focused on reducing pain and inflammation through the use of manual therapy techniques including soft tissue mobilization, joint mobilizations, and ice massage. During visits 7 through 10 the same types of manual therapy were used but the exercise program was increased to include ROM, balancing, and weight bearing practice. Although the patient’s ankle was still inflamed and painful at each visit, exercises were still performed to prevent further loss of strength and ROM. During visits 11 through 13 manual therapy remained the same, balancing exercises were progressed and eccentric calf lowering was added. Rock Tape was applied in overlapping fan patterns for swelling reduction.
At visit 14, it became more evident that the patient was not able to maintain a correct foot position in a weight bearing position. She fell into a position of flattened longitudinal arch with all weight bearing activities. It was suspected that weight bearing with her foot in a flattened position contributed to her pain and inflammation. Thus, during visits 14 through 19, the exercises remained the same but other treatment techniques were altered. Manual therapy was reduced to gentle soft tissue mobilization to assist with swelling reduction. Modalities including electrical stimulation, ice, and vasopneumatic compression were used for swelling reduction and pain control and low dye taping\(^{13}\) was used to support the patient’s longitudinal arch and correct foot position during weight bearing.

**Outcome**

The patient made minimal progress with regards to reduced swelling and pain and increased ROM during the initial phase of treatment. Following the 6\(^{th}\) visit progress was minimal and she continued to regularly experience increased swelling and pain. Swelling was essentially unchanged from evaluation to visit 19. Ankle strength upon MMT was improved from evaluation to visit 19 but the patient was still lacking fully functional ankle strength. (Table 1). Improvement made in AROM was likely due to increased joint mobility and muscle length after the patient’s period of immobilization.

None of the patient’s long term goals were met. After the 19 visits she still reported fluctuating pain levels and decreased functional mobility. Her physician suspected she might have a partial or complete tibialis posterior tendon rupture and he sent her for an MRI to examine the condition of the tendon. The patient reported to us at a later date that the metal hardware in her ankle created an artifact on the MRI, obscuring a clear view of the tendon in question and that she was referred to a foot and ankle specialist for more detailed imaging procedures. Due to
the traumatic nature of her initial ankle surgery, it is likely that the tendon rupture was a result of
the surgery. The signs of tendon rupture were not initially evident because the patient was
immobilized and wearing an ankle brace after surgery.

Discussion

This case highlights the importance of doing detailed assessment and reassessment of
patients who have had any type of traumatic surgery. While the purpose of this case report was
fulfilled, it is difficult to assess the effectiveness of PT treatment for this patient because of the
suspected tendon injury. The patient’s inability to weight bear with a normal foot and ankle
position remained a limiting factor in progressing her gait pattern through out PT treatment.

Due to her surgical status and suspected tendon injury, it is possible that without the PT
treatment, her pain and swelling would have been worse and she would have continued develop
weakness in the affected ankle and lower extremity. She also benefited from the communication
between her physical therapist and doctor in returning for a follow up visit when her healing was
not progressing as planned. The patient did demonstrate a14 point increase in her LEFS score,
showing a slight improvement in her functional abilities. The minimally clinically important
difference for the LEFS is 9 points, meaning that her improvement on the test correlates to a
clinical improvement in function. Another benefit of PT for this patient was the emotional
support of her physical therapist. Having someone who was truly concerned about not just the
status of her ankle, but also about how she was functioning on a daily basis was important to this
patient as she dealt with the challenges of having such a life affecting injury.

Maintaining contact with the patient through out her upcoming imaging, specialist
consultation and possible surgery will remain important even though her PT treatment is on hold
at the time of writing this report. She will likely benefit from continued PT in the future, following treatment provided by her foot and ankle specialist.

I suggest more research in the area of conservative management of OCD. Because this patient had such difficulty with surgery complications I think it would be beneficial if patients could be offered non surgical options, but only if those options can be proven effective at treating OCD.


Table 1. Results of tests and measures.

<table>
<thead>
<tr>
<th></th>
<th>Initial</th>
<th>At visit 19</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LEFS score</strong></td>
<td>13/80</td>
<td>27/80</td>
</tr>
<tr>
<td><strong>Right ankle active range of motion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dorisflexion</td>
<td>-15°</td>
<td>-7°</td>
</tr>
<tr>
<td>Plantarflexion</td>
<td>46°</td>
<td>45°</td>
</tr>
<tr>
<td>Inversion</td>
<td>18°</td>
<td>10°</td>
</tr>
<tr>
<td>Eversion</td>
<td>6°</td>
<td>18°</td>
</tr>
<tr>
<td><strong>Right ankle circumferential measurements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Figure 8</td>
<td>52 cm</td>
<td>51.5 cm</td>
</tr>
<tr>
<td>Malleoli</td>
<td>27 cm</td>
<td>26.75 cm</td>
</tr>
<tr>
<td>Forefoot</td>
<td>23 cm</td>
<td>22 cm</td>
</tr>
<tr>
<td>Metatarsal heads</td>
<td>23.5 cm</td>
<td>23 cm</td>
</tr>
<tr>
<td><strong>Right ankle strength (MMT)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dorsiflexion</td>
<td>3-/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Plantarflexion</td>
<td>3-/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Inversion</td>
<td>Not Tested</td>
<td>3+/5</td>
</tr>
<tr>
<td>Eversion</td>
<td>Not Tested</td>
<td>4+/5</td>
</tr>
</tbody>
</table>

Lower Extremity Functional Scale (LEFS), Manual Muscle Testing (MMT)
<table>
<thead>
<tr>
<th></th>
<th>Visits 1-5</th>
<th>Visit 6-10</th>
<th>Visit 11-13</th>
<th>Visit 14-19</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manual Therapy</strong></td>
<td>• STM to ankle, foot, gastroc/soleus</td>
<td>• STM to Achilles, gastroc/soleus, foot, and ankle, Efflourage to medial knee, leg, and foot</td>
<td>• STM to Achilles, gastroc/soleus, foot, and ankle, Efflourage to medial knee, leg, and foot</td>
<td>• STM to Achilles, gastroc/soleus, foot, and ankle, Efflourage to medial knee, leg, and foot</td>
</tr>
<tr>
<td></td>
<td>• Joint mobilizations: AP glide talus on mortise, 1&lt;sup&gt;st&lt;/sup&gt; ray in PF and DF, cuneiforms and cuboid in PF and DF, distraction</td>
<td>• Joint mobilizations: AP glide talus on mortise, cuneiforms and cuboid in PF and DF, 1&lt;sup&gt;st&lt;/sup&gt; TMT in PF and DF, calcaneus inversion and eversion, distraction with PF and DF</td>
<td>• Joint mobilizations: AP glide talus on mortise, cuneiforms and cuboid in PF and DF, 1&lt;sup&gt;st&lt;/sup&gt; TMT in PF and DF, calcaneus inversion and eversion, distraction with PF and DF</td>
<td>• Joint mobilizations: AP glide talus on mortise, cuneiforms and cuboid in PF and DF, 1&lt;sup&gt;st&lt;/sup&gt; TMT in PF and DF, calcaneus inversion and eversion, distraction with PF and DF</td>
</tr>
<tr>
<td></td>
<td>• PROM R ankle in DF and PF</td>
<td>• PROM R ankle in DF and PF</td>
<td>• PROM R ankle in DF and PF</td>
<td>• PROM R ankle in DF and PF</td>
</tr>
<tr>
<td><strong>Tape</strong></td>
<td></td>
<td>• Rock Tape, 2 interwoven fans to anterior and lateral ankle</td>
<td>• Rock Tape, 2 interwoven fans to anterior and lateral ankle</td>
<td>• Low dye taping for arch support</td>
</tr>
<tr>
<td><strong>Modalities</strong></td>
<td></td>
<td>• Ice with foot elevated</td>
<td>• Ice with foot elevated</td>
<td>• Ice with foot elevated</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• E-stim</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Ice with foot elevated</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Vasopneumatic compression system</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• E-stim</td>
</tr>
<tr>
<td><strong>Therapeutic Exercises</strong></td>
<td>• Gait training</td>
<td>• Recumbent bike</td>
<td>• Recumbent bike</td>
<td>• Recumbent bike</td>
</tr>
<tr>
<td></td>
<td>• Recumbent bike</td>
<td>• BAPS board</td>
<td>• BAPS board</td>
<td>• BAPS board</td>
</tr>
<tr>
<td></td>
<td>• BAPS board</td>
<td>• DF stretch on wedge</td>
<td>• DF stretch on wedge</td>
<td>• DF stretch on wedge</td>
</tr>
<tr>
<td></td>
<td>• Weight shifting</td>
<td>• Weight shifting seated on PB</td>
<td>• Weight shifting seated on PB</td>
<td>• Weight shifting seated on PB</td>
</tr>
<tr>
<td></td>
<td>• Treadmill</td>
<td>• Eccentric calf lowering</td>
<td>• Eccentric calf lowering</td>
<td>• Eccentric calf lowering</td>
</tr>
<tr>
<td></td>
<td>• Mini squats</td>
<td>• Tandem stance on foam</td>
<td>• Tandem stance on foam</td>
<td>• Tandem stance on foam</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ankle TB x4</td>
<td>• Ankle TB x4</td>
<td>• Ankle TB x4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Ankle Alphabet</td>
</tr>
<tr>
<td><strong>Home Exercises</strong></td>
<td>• Ankle alphabet</td>
<td>• Towel scrunches</td>
<td>• Towel scrunches</td>
<td>• Towel scrunches</td>
</tr>
<tr>
<td></td>
<td>• Towel scrunches</td>
<td>• Standing gastroc/soleus stretch</td>
<td>• Standing gastroc/soleus stretch</td>
<td>• Standing gastroc/soleus stretch</td>
</tr>
<tr>
<td></td>
<td>• Standing gastroc/soleus stretch</td>
<td>• Standing gastroc/soleus stretch</td>
<td>• Standing gastroc/soleus stretch</td>
<td>• Standing gastroc/soleus stretch</td>
</tr>
</tbody>
</table>

424  Table 2. Procedural interventions.

425  Soft tissue mobilization (STM), Anterior/posterior (AP). Passive range of motion (PROM), Dorsiflexion (DF), Plantarflexion (PF), Tarsal metatarsal joint (TMT), Physioball (PB), Therabands (TB)
Figure 1. Diagrams of patient’s home exercises.

Ankle alphabets were performed with the right ankle, 2 times per set, 1 set per session, 2 sessions per day. Toe curl was performed with the right foot, 20 times per set, 2 sets per session, 2 sessions per day. Both lower leg stretches were performed with right leg behind body, held for 30 seconds, repeated 3 times, 2 sessions per day.
Appendix 1. Lower Extremity Functional Scale.

We are interested in knowing whether you are having any difficulty at all with the activities listed below because of your lower limb problem for which you are currently seeking attention. Please provide an answer for each activity.

Today, do you or would you have any difficulty at all with:

(circle one number on each line)

<table>
<thead>
<tr>
<th>Activities</th>
<th>Extreme Difficulty or Unable to Perform Activity</th>
<th>Quite a Bit of Difficulty</th>
<th>Moderate Difficulty</th>
<th>A Little Bit of Difficulty</th>
<th>No Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Any of your usual work, housework, or school activities.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b. Your usual hobbies, recreational or sporting activities.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c. Getting into or out of the bath.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d. Walking between rooms.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>e. Putting on your shoes or socks.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>f. Squatting.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>g. Lifting an object, like a bag of groceries from the floor.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>h. Performing light activities around your home.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>i. Performing heavy activities around your home.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>j. Getting into or out of a car.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>k. Walking 2 blocks.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>l. Walking a mile.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>m. Going up or down 10 stairs (about 1 flight of stairs).</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>n. Standing for 1 hour.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>o. Sitting for 1 hour.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>p. Running on even ground.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>q. Running on uneven ground.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>r. Making sharp turns while running fast.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>s. Hopping.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>t. Rolling over in bed.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Column Totals:

SCORE: _____/80

Error (single measure): ±5 scale points
MDG: 9 scale points
MCID: 9 scale points