Case Study : The Application of Extracorporeal Shockwave Therapy (ESWT), Transverse Friction Massage and Hold Relax Exercise On Movement and Function of Ankle Joint Due to Calcaneus Spur Dextra

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ABSTRACT

Background: Calcaneal spurs are a common cause of heel pain. Calcaneus Spur is an abnormal bony protrusion condition. It can occur anywhere along the calcaneal tuberosity. It is caused by pressure in the region of the plantar aponeurosis attachment to the calcaneal bone. This causes heel pain, the pain will be more severe when waking up in the morning. Objective: This case study was aimed to determine the effect of Extracorporeal Shockwave Therapy (ESWT), transverse friction massage and hold relax exercise on movement and function ankle joint disorders caused by calcaneus spur dextra. Methods: This case studies were carried out 6 times for 2 weeks on one patient, female 44 years old with calcaneus spur dextra condition by evaluating the degree of pain by using the Visual Analogue Scale (VAS), Joint Range of Motion (RoM) by using a goniometer and functional activity ability of the foot by using Foot Function Index (FFI) questionnaire. Results: There was a decrease of unmotion pain degree from VAS 2 to VAS 0, motion pain degree from VAS 3 to VAS 2, while tenderness pain degree decreased from VAS 7 to VAS 4. There was an increase on movement of plantar flexi ankle joint dextra from (S) 30°-0°-20° to (S) 40°-0°-20°, and the FFI value decreased from 95% to 61% at the end of therapy. Conclusion: The application of intervention Extracorporeal Shockwave Therapy (ESWT), transverse friction massage and hold relax exercise can significantly reduce the motion pain on movement of plantar flexi dextra, tenderness pain around calcaneus, increase the RoM plantar flexi ankle joint dextra, and functional activity ability of the foot as well on calcaneus spur dextra condition.

Key Words: Calcaneus spur, Extracorporeal Shockwave Therapy (ESWT), Transverse Friction Massage dan Hold Relax Exercise, Foot Function Index (FFI), Physiotherapy
INTRODUCTION

Calcaneus is the heel bone and spur is something that stands out. It can be defined that the calcaneus spur is an abnormal bony protrusion on the surface of the calcaneus(Dorland, 2015). The calcaneus spur is a bony projection that forms on the undersurface of the foot or calcaneus. Generally the calcaneus spur is known as the heel spur bone on the surface of the calcaneus which can cause pain when walking and even pain when standing for a long time(Kirkpatrick et al., 2017).

This calcaneus spur condition is more common in women under the age of 49 than men. This is caused by changes in foot biomechanics due to the habit of wearing high heels(Toumi et al., 2014). Calcaneus spur also occurs in obese people with an incidence of more than 50%(Menz et al., 2008). The prevalence of calcaneus spur conditions in the South Sumatra area was found to be 62.7%(Nasution et al., 2020). This condition also spreads from various ethnicities in various countries with an incidence rate of around 55.1% occurring in Australia, 26.5% in India, 15.5% in Thailand and 15.7% in Europe.(Kullar et al., 2014).

The problem of physiotherapy in the condition of the calcaneus spur is the presence of pain in the heel area and the limitations of functional activities such as difficulty walking long distances and standing for too long which causes functional activity to be disrupted.(Tandiyo et al., 2015).

The provision of physiotherapy modalities in the condition of the calcaneus spur aims to reduce pain, reduce spasm in the m.gastrocnemius increase the range of motion of the dextra ankle joint, be able to increase functional ability independently and optimize the ability to walk as much as possible. Physiotherapy modalities that can be given to treat calcaneus spur conditions include using Extracorporeal Shockwave Therapy (ESWT), Transverse Friction Massage and Hold Relax Exercise. ESWT administration can stimulate and reactivate the healing process in the tendons, surrounding tissues and bones through avascular microdisruption which aims to encourage revascularization, release of local growth factors for more normal tissue healing(Loske, 2001). This condition can also be given Hold Relax Exercise which can reduce spasm of the gastrocnemius m. and increase the flexibility of the gastrocnemius muscle.(Alamsyah et al., 2017). Combined with Transverse Friction Massage which aims to reduce pain with a counter irritation effect, release adhesions, and release endorphins in the tissues(Rika, 2011).

Based on this, a study was conducted to determine the effect of Extracorporeal Shockwave Therapy (ESWT), Transverse Friction Massage and Hold Relax Exercise on Calcaneus Spur conditions at the Physiotherapy Clinic for Medical Rehabilitation Installation at Siloam Sriwijaya Hospital, Palembang. It is hoped that the results of this study can become a reference for choosing physiotherapy interventions for calcaneus spur conditions, as well as increase public knowledge about the effects of extracorporeal shockwave therapy (ESWT), transverse friction massage and hold relax exercise interventions for patients with calcaneus spurs.

METHODS

This study used the case study method, data collection was carried out by evaluating the degree of pain using the Visual Analogue Scale (VAS), the ankle joint range of motion (LGS) with a goniometer and foot function with the Foot Function Index (FFI) questionnaire. This case study was conducted at the Physiotherapy Polytherapy Medical Rehabilitation Installation Siloam Sriwijaya Hospital Palembang in May 2023. The respondent for this case study was a 44-year-old woman with calcaneus spur dextra, a profession as a hostel kitchen staff and is Muslim.

CASE PRESENTATIONS:
Subjective Examination

The patient complained of pain in the right heel. Complaints get worse when the patient performs activities in a standing position for too long and walks long distances using hard footwear, causing the patient to feel discomfort in the right heel. The patient's complaints will decrease when the patient's right leg is rested. The patient's personal history, the patient is a kitchen staff in a dormitory, when working the patient often stands too long using hard footwear for 8 hours every day. The goal to be achieved is to reduce pain in the right heel, increase the range of motion of the right leg joint and increase the functional ability of the foot.

Physical examination

Basic physical examination studies include aspects of vital signs, inspection and
palpation. Based on the inspection findings, there were no visible signs of inflammation in the right heel. Based on palpation studies, there was tenderness in the right heel and the right gastrocnemius muscle felt stiff (spasm). Findings in the examination of vital signs indicate normal conditions in all aspects (blood pressure, respiratory rate, pulse rate and body temperature).

**Basic Movement Examination**
Examination of basic movements is carried out by examining active movements, checking movements. Passive and isometric motion checks against resistance. On active motion examination, it was found to have limited range of motion of the dextra ankle joint in dextra plantar flexion. On passive motion examination, pain was found on the right plantar flexion movement and ended with a firm end feel. On examination of isometric motion against resistance, the result is that it can resist resistance at a minimum in the dextra ankle joint.

**Specific Examination**
Physiotherapists carry out specific examinations for Calcaneus Spur conditions, namely pain examination using the Visual Analogue Scale (VAS), examination of the Dextra Ankle Joint Range of Motion using a goniometer and examination of the functional ability of the ankle using the Foot Function Index (FFI) questionnaire. The specific inspection results are as follows:

1. Pain check
   Examination of pain using the Visual Analogue Scale (VAS). There are five interpretations of the results, which include:
   a) 0 : No pain
   b) 1-3 : Painlesslight
   c) 4-6 : Painful currently
   d) 7-9 : Painful heavy
   e) 10 : Painful unbearable
   On examination of pain using the Visual Analogue Scale (VAS) it was reported that silent pain and motion pain were mild pain and tenderness was severe pain.

2. Examination of the range of motion of the right ankle joint
   Examination of the range of motion of the dextra ankle joint was carried out using a goniometer. There are 4 movements with normal values as follows:

<table>
<thead>
<tr>
<th>Movement</th>
<th>Normal ROMs</th>
</tr>
</thead>
<tbody>
<tr>
<td>dextra Flexion, Plantar Flexion</td>
<td>S 20°-0°-45°</td>
</tr>
<tr>
<td><strong>Eversion-Inversion</strong></td>
<td>F 20°-0°-30°</td>
</tr>
</tbody>
</table>

On examination of the range of motion of the joints ankle dextra reported that the obtained value S : 300°-0°-200° limited joint range of motion ankle dextra during plantar flexion dextra.

3. Ankle Functional Ability Examination
   An examination of the functional ability of the ankle was carried out using the Foot Function Index (FFI) questionnaire. This instrument is to measure the impact of foot pathology. There are 19 questionnaire items which are grouped into 3 subscales. 7 items in the pain subscale, 7 items in the disability subscale and 5 items in the activity limitation subscale. There is an interpretation of the results, which include:
   1) 0%-25% : Normal (normal ankle function)
   2) 26%-50% : nearby normal (functional ankle close to normal function)
   3) 51%-75% : Abnormal (functional ankle does not function normally)
   4) 76-100% : Severely abnormal (functional ankle is not functioning normally)

On examination of the functional ability of the ankle, it was reported that the FFI score was 95% which indicated that the functional ankle was severely abnormal.

Physiotherapy Program
The physiotherapy process is carried out for the patient as long as the patient attends all treatment sessions at the hospital. The patient comes to the physiotherapy poly. The aim of the intervention is to reduce pain in the heel, increase the range of motion of the ankle joint and improve the functional ability of the foot. The table below describes the interventions carried out.
RESULTS

1. Pain Examination Results
   The results of pain examination using the Visual Analogue Scale (VAS) are as follows:

   The graph above shows a decrease in silent pain from VAS 2 to VAS 0, motion pain from VAS 3 to VAS 2 and tenderness from VAS 7 to VAS 4 at the end of therapy.

2. Examination Results of Joint Range of Motion Ankle Dextra
   The results of examining the range of motion of the dextra ankle joint using a goniometer are as follows:

   The graph above shows an increase in the range of motion of the dextra ankle joint S: 300-00-200 becomes S: 400-00-200.

3. Ankle Functional Ability Examination Results
   The results of examining the functional ability of the ankle using the Foot Function Index (FFI) are as follows:

   The graph above shows a functional increase from a score of 95% which indicates a severely abnormal to a score of 64% which indicates an abnormal ankle.

DISCUSSION

1. Pain reduction using the Visual Analogue Scale (VAS)
   Pain reduction that occurs in calcaneus spur conditions is an effect of Extracorporeal Shockwave Therapy (ESWT) which occurs through hyperstimulation of nociceptors/gate control theory of pain transmission, changes in pain receptor neurotransmission, and by increasing local pain inhibitory substances which then stimulate nociceptive C fibers which play a role in analgesia and increases neuropeptide release thereby causing fibroblast stimulation and vasodilation (Reilly et al., 2018). In addition to the ESWT intervention, Hold Relax Exercise intervention was given. Hold Relax Exercise aims to reduce spasm in the m.gastrocnemius, reduce shortened muscle tension so as to increase muscle flexibility (Alamsyah et al., 2017). Giving Extracorporeal Shockwave Therapy (ESWT) and Hold Relax Exercise can be combined with Transverse Friction Massage.
which aims to release adhesions, release endorphins so that it will cause a counter irritation effect, namely a little pressure and light pushing on the tissue thereby reducing pain transmission (Rika, 2011).

2. Increased Range of Motion of the Dextra Ankle Joint

An increase in the area of joint motion (LGS) of the dextra ankle joint in conditions of the calcaneus spur is the effect of transverse friction massage aimed to release adhesions, improve blood circulation, and reduce pain directly, using pressure techniques at one point, the spread of metabolic substances is controlled and inhibited so that pain is reduced (Dianingtias & Prasetyo, 2021). Reduced pain also has an impact on increasing the range of motion of the joints. Combined with the provision of Hold Relax Exercise namely exercise-specific method of Proprioceptive Neuromuscular Facilitation (PNF) which can trigger an autogenic inhibition mechanism so that there is a decrease in muscle tension through stimulation of the Golgi tendon organ (GTO), this mechanism causes a decrease in stretching resistance which can increase flexibility and increase joint range of motion (Nasution et al., 2020).

3. Ankle Functional Activity Improvement

The increase in the functional activity of the legs in the condition of the calcaneus spur is the effect of the modalities Extracorporeal Shockwave Therapy (ESWT), Transverse Friction Massage and Hold Relax Exercise. This Extracorporeal Shockwave Therapy (ESWT) intervention emits shock waves that can destroy damaged tissue and initiate recovery in the damaged area by facilitating the formation of new blood vessels and stimulating local growth factors (Wang, 2012). Apart from ESWT, giving Transverse Friction Massage can cause hyperemia traumatic friction which can produce a lot of vasodilation and increase blood flow to the tissue can result in reduced pain thus improving the functional foot (Dianingtias & Prasetyo, 2021). Providing Hold Relax Exercise which aims to reduce spasm in the m.gastrocnemius, reduce shortened muscle tension so as to increase muscle flexibility (Alamsyah et al., 2017).

CONCLUSION

After 6 times of therapy, it can be concluded that physiotherapy interventions using Extracorporeal Shockwave Therapy (ESWT), Transverse Friction Massage and Hold Relax Exercise can reduce pain in the heel, increase the range of motion of the ankle joint and increase the functional ability of the ankle in patients with Calcaneus Spur conditions.

REFERENCES


Rica, T. (2011). The combination of exercise therapy and ultrasound (us) intervention is better than massage and ultrasound (us) for reducing pain in plantar fasciitis. 1–9.

