The Effects of Supervised Exercise Program and Kinesiological Tape on the Treatment of Plantar Fasciitis. A Case Study

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ABSTRACT

The plantar fasciitis is a painful condition, which causes dysfunction at the end of lower foot, particularly in walking. The pain appears below from the heel and inward, while another point of pain appears below the arch. This case study purpose was to find the effectiveness of supervised exercise program versus the combination kinesiological tape to rehabilitation fasciitis. In this study, there are selected patients with plantar fasciitis more than three months. One patient participated in this study, who was a soldier. Initially, the patient received supervised exercise program, which contained pressure point pain, concentric, isometric, eccentric exercise, exercise and stretching in plantar fascia, as in the gastrocnemius muscle. Then, the kinesiology tape tested combination with the same exercise program. Treatment was performed overall for four months. Additionally, pain (VAS scale) was measured, the function of the foot (FAAM) and

Key Words: Exercise Program, kinesiology Tape, Plantar Fasciitis
range of motion (ROM) (Goniometer). Patient was examined before treatment and at the end of the exercise program of treatment. The treatment lasted for a total of 4 months.

Also, re-measurement was conducted on the third month after treatment with kinesiological tape (4 months). Special treatment was performed on the patient for 2 months and for the next 2 months a combination of the same exercises and a kinesiology exercise was applied. Then, some significant reduce on pain was found, improved ROM and function, with the exercise program and kinesio-tape in 2 and 4 months of treatment. However, significant improvement was detected in function with the kinesiological tape in combination with the same exercises by 80%.

INTRODUCTION

The plantar fasciitis is a fascia, which is important especially in the maintenance of static function of the foot arch [3]. Furthermore, the plantar fascia is a fibrous ligament tissue, which lengthens the increased loads and acts as a "shock absorbers" to the lower foot. Thus, it reduces the ability to quench the loads [3]. The plantar fasciitis is a musculoskeletal condition of the foot, which affects the quality of life and daily activities on patients-athletes [20]. This is caused due to repetitive minor wounds, usually at the beginning of the medium bent part of the heel [20]. In the United States, every year more than two million people have plantar fasciitis [17]. The treatment appears from conservative treatment, as proposed by the literature, mainly with stretching exercises "playing" an important role in the rehabilitation [17,20].

CASE REPORT

HISTORY

Mr. A., a 23 year-old male, was conscript soldier and showed pain and dysfunction in the left lower leg, in the plantar fasciitis (Figure 1). He is an amateur footballer, though before a few years was an athlete, on the track in 100m and 200m. There was not trauma, but only the use of military boot. Yet, 2 years ago, there was previous injury in football, at the same leg. He sprained it with grade II medial lateral ligament of the ankle. Although, there is another pathology.

EXAMINATION FINDINGS

Patient evaluated and judged normal, to asymmetries in the pelvis and hips.
There was flatfoot to both lower feet. Also, assessment was conducted to all the movements of the left and right lower foot, the plantar flexion and extension, inversion and eversion of the lower foot and the flexion of the toes. Moreover, the joint of the ankle, evaluated actively, passively and by hand (manual) resistance. Furthermore, pain was only detected when bending the toe resistance. Pain was detected on palpation-pressure at the ending plantar fascia in the heel and in the middle course of fascia. Stretching relieves symptoms, and the same does the pressure from therapist or by external force. The patient was asymptomatic in other parts of his body. Also, as the patient was an athlete in the past, used to wear special constructed insoles. Then, the patient was evaluated for neurological symptoms, which were negative. In addition, the lower feet were assessed by clinical tests for instability due to previous sprain. Finally, instabilities were not found in lower foot and balance or proprioception were not reduced.

TREATMENT

EXERCISE PROGRAM

The patient followed a supervised exercise program. This program starts, once the patient is in a stair by pressing 30 seconds on the pain point of plantar fascia (Figure 1). Both treatments showed a significant reduction in pain, but the combination of the tape and the exercises offered a greater effect on patient’s functionality. Then, he stands up on his toes exerting one concentric contraction. Then, while lying on the fingers, isometric contraction exerts to plantar flexion, but with emphasis and to flexural of fingers counting 7 seconds. He begins from the position of isometric contraction and descends to dorsiflexion below the height of the stair, counting 30 seconds slowly. At the end of this eccentric contraction, he holds 2 minutes stretching. As this combination exercise program is carried out simultaneously on both legs at the beginning of treatment and every three weeks was carried out to the affected limb to carry the whole load and then, an additional weight of 10 kg. In 4 months period, the patient was performing the exercise with 40 kg weight on the shoulders. The training program lasted for 2 months, 4 times a week and 3 times a day.
USE OF KINESIOLOGY TAPE COMBINED TO SUPERVISED EXERCISE PROGRAM

Use of kinesiological tape Dream ®K on the plantar fascia (Table 2). The tape was placed by a specialist physiotherapist, placing the foot and fingers to dorsiflexion. The tape was applied to the bases of the metatarsals and had the course of the plantar fascia as well as the course of the Achilles tendon. The therapist does not put tendency on the tape during its placement. Then, he placed a horizontal tape at the point of pain with maximum tendency. The patient wore the tape throughout the day in all his activities. Thus, he continued the supervised exercise program, as mentioned above, in combination with the tape. The tape was used 2 times a week lasting two days at a time in a month.

METHODS

The patient was evaluated before treatment (0 weeks) in the first and second month of treatment with supervised exercises. Also, the patient was measured in the first month after the end of treatment (4 months). The third month was considered as the baseline prior to treatment with kinesiological tape. Final reassessment was conducted in 4 months period, i.e. in the 1st month of treatment with the combination of tape and exercises. Pain was measured by VAS scale (cm), the range of motion by the goniometer (°) and the function by questionnaire Foot and Ankle Ability Measure (FAAM). The questionnaire included 28 questions of patient’s
function. Then, the patient was requested to mark the functionality according to the answers of the questions from 0 to 100% of functionality. However, the patient was also requested to describe the function as Normal, Almost Normal, Abnormal and Severely Abnormal. Plantar fasciopathy is a clinical term who characterizes pain in the heel and extends in plantar fascia [2,9]. The term plantar fasciosis is sometimes used, because of the existence degeneration of the fascia. The most admissible term is plantar fasciitis, because it has the same diagnosis [9]. An important treatment of plantar fasciitis is also strengthening, bracing, kinesiotaping and manual therapy techniques [14,18]. Significant short-term improvement was detected in the kinesiological tape of plantar fasciitis [4]. A systematic review of the year 2014 did not support the use of kinesio-tape in clinical practice, both in plantar dermatitis and in other conditions, such as low back pain and neck pain [6]. These outcome measures were used regarding the systematic review of Costa, et al., (2014) [6,24].

RESULTS

Patient’s outcome measures were measured before the treatment of supervised exercise program. The pain rest was 5 of 10 and the gait pain 8 of 10. Functionality was described as abnormal with 60% score (Table 1). The range of motion in 0 weeks to the plantar flexion was 35°, the extension was 10°, the inversion was 28° and eversion was 8° (Table 2). The first month of treatment with supervised exercises, the pain rest was reduced by 2 centimeters of 10, while pain function-walking at 3/10. Also, the function described as almost normal and was granted by the patient with 65%. The range of motion in plantar, dorsal flexion and inversion increased with 2 degrees, while the eversion increased with 1°. In the re-evaluation of the 2nd month, i.e. at the end of the treatment only with exercises, the pain rest and gait reduced by one centimeter. Function was characterized almost normal in 65%. Additionally, the range of motion in plantar flexion increased with 3°, in dorsiflexion with 2°, while the inversion at 30° and eversion increased with 1°. Then, the patient was evaluated in the third month before treatment with the kinesiological tape and the same exercise program. The pain rest widened by 2 points, gait pain by 1 centimeter and the function was described as abnormal by 70%. Also, there was reduction of range of motion in all the foot moves with 1°. The final evaluation was on the 4th month, namely after one month of treatment with kinesiological tape. The pain rest was 2/10, the gait pain-activity 4/10, and the function was improved to 80% to almost normal. The range of motion on the foot movements increased by 1°.
### Table 1

**Results for pain and function**

<table>
<thead>
<tr>
<th>Outcome measures</th>
<th>0 months (Exercises)</th>
<th>1st month (Post treatment)</th>
<th>2nd month (Post treatment)</th>
<th>3rd month (Pretreatment with tape)</th>
<th>4th month (Post treatment with tape and same exercises)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain rest</strong></td>
<td>5/10</td>
<td>3/10</td>
<td>2/10</td>
<td>4/10</td>
<td>2/10</td>
</tr>
<tr>
<td><strong>Pain gain-activity</strong></td>
<td>8/10</td>
<td>5/10</td>
<td>4/10</td>
<td>5/10</td>
<td>4/10</td>
</tr>
<tr>
<td><strong>Function</strong></td>
<td>Abnormal 60%</td>
<td>Almost Normal 65%</td>
<td>Almost Normal 65%</td>
<td>Abnormal 70%</td>
<td>Almost Normal 80%</td>
</tr>
</tbody>
</table>

1 Function measured by Foot and Ankle Ability Measure (FAAM).

### Table 2

**Results for range of motion**

<table>
<thead>
<tr>
<th>Motion</th>
<th>0 months (Exercises)</th>
<th>1st month (Post treatment)</th>
<th>2nd month (Post treatment)</th>
<th>3rd month (Pretreatment with tape)</th>
<th>4th month (Post treatment with tape and same exercises)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plantar flexion</strong></td>
<td>35°</td>
<td>37°</td>
<td>40°</td>
<td>39°</td>
<td>40°</td>
</tr>
<tr>
<td><strong>Dorsiflexion</strong></td>
<td>10°</td>
<td>12°</td>
<td>14°</td>
<td>13°</td>
<td>14°</td>
</tr>
<tr>
<td><strong>Inversion</strong></td>
<td>28°</td>
<td>30°</td>
<td>30°</td>
<td>29°</td>
<td>30°</td>
</tr>
<tr>
<td><strong>Eversion</strong></td>
<td>8°</td>
<td>9°</td>
<td>10°</td>
<td>9°</td>
<td>10°</td>
</tr>
</tbody>
</table>

The range of motion was measured by goniometer (°).
DISCUSSION

The purpose of this case study was to compare a supervised exercise program along with kinesiology tape versus exercise program alone, in the rehabilitation of a patient with plantar fasciitis. In the results of this case study, the pain rest and the walking-activity pain improved compared to the baseline measures at the end of the intervention. However, the pain, the functionality and the range of motion were not maintained in the next evaluation, which showed that the exercise program should be continued in order to have long-term results. In addition, rest and walking pain were reduced at the 4th month (at the end of the kinesiology tape along with exercise program). Finally, the most important improvement in functionality was found in kinesiology tape along with exercise program, compared to the exercise program alone. The improvements in outcome measures did not differ greatly, for both programs, though the patient expressed greater satisfaction with the kinesiology tape, when he performed his activities. Moreover, the patient did not stop to practise and play football and that was difficult for the therapy to be effective. The combined exercise therapy along with kinesiology tape may have taken longer, because only the short-term effectiveness was measured.

Several studies have shown that exercises and especially stretching exercises are effective in the management of plantar fasciitis [5, 6, 17, 22]. Also, a significant improvement in pain and functionality were found in randomized controlled trials, where the main subject was the use of kinesiology tape [2, 24] and the shock wave treatment [2]. The shock wave treatment using the topical corticosteroid showed a significant improvement in pain and function in the first 2 months of the intervention [8]. Also, a randomized controlled trial, has shown a significant improvement in pain with the use of myofascial release, in both functionally or statically and also with static stretching (passive) [19]. In two case studies, the combined exercise program with isometric, concentric, eccentric and stretching, have shown significant improvement in patients with tendinopathy of supraspinatus [7], as well as lateral elbow tendinopathy [23]. Furthermore, in a randomized study, a significant improvement was found in patients with plantar fasciitis by using iontophoresis acetic acid, in combination with LowDye tape [16]. A significant reduction in pain and thickness of plantar fasciitis was found with the use of kinesiology tape along with traditional electrotherapy, compared to traditional electrotherapy alone [24]. Also, there are various techniques for applying the kinesiology tape, but most importantly, it is not used as a unique treatment, but in combination with traditional physiotherapy [24]. However, there was no significant difference in functionality between the two groups and showed that there was no significant improvement in kinesiology tape [24]. This is contradicted to this case study. In addition, the orthotics showed short-terms benefits in pain and func-
tionality in patients with plantar fasciitis [13]. In a systematic review, it refers to a theoretical reduction of pain and improvement of functionality in plantar fasciitis with the using of orthotics [1]. In addition, it showed a significant improvement in corticosteroid injection in relation with the control group [12]. The ultrasound was non-statistically effective in relation with corticosteroid injection, but both treatments were effective in patients with plantar fasciitis [21]. Additionally, a study showed a significant improvement in chronic plantar fasciitis with the treatment of platelet rich plasma injection [15]. A major development was observed in patients with plantar fasciitis that they followed a program of stretching with exercises [11]. However, there were no differences between stretching exercises combined to strength training exercises in relation with stretching exercises alone [11]. Which demonstrates the effectiveness of stretching of fascia in relation with strength training [11]. Ultimately, none treatment can be a unique treatment. Thus, there must be a combination of physiotherapeutic techniques to achieve effective therapy. In addition, it is needed to conduct studies to find the best combination of exercises or other physiotherapy techniques.

Limitations that characterize this study are that it was done in a single patient, the findings were subjective and there was not a control group. Also, the combined exercise program along with kinesiology tape were done for a short time, so it’s hard to find their long-term results. Additionally, the intervention was not reassessed a month or more after the end of treatment to find if there was preservation of the patient’s outcomes. Furthermore, the patient did not comply with reducing his / her activities during treatment with the possibility of treatment not to be effective. This study does not mention a rich bibliographic background because of the few articles that were found. Further studies are needed to demonstrate the effectiveness of therapeutic intervention with kinesio-tape and other interventions. It is important that new studies of high methodological quality be conducted, in order to result in clinical efficiency between different techniques [6].

CONCLUSION

The supervised exercise program, but also, the use of kinesiological tape improved pain, functionality and patient’s range of motion with plantar fasciitis in 2 and 4 months of treatment. The use of tape showed more significant benefit to improving patient’s functionality in relation with only the exercise program.
REFERENCES


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