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Retrocalcaneal Bursitis & Its Orthotic Management

Sushreesangita Nayak[1], Srikanta Moharana[2]

[1]Department of Prosthetics and Orthotics, SVNIRTAR, Utkal University, Cuttack, India
Corresponding Author: Sushreesangitanayak
Email: *nsushreesangita50[at]gmail.com*
Mobile: +91 9438117407

Abstract: ***Retro calcanealbursitis presents a difficult clinical challenge. The purposes of this study were to 1) describe a new orthotic device used in the treatment of Retro calcanealbursitis and 2) evaluate the effectiveness of this device. The orthotic device consisted of a pad with strap. Three criteria were considered: 1) subjective pain scale, 2) active goniometric measurements, and 3) Toe raise test. The statistical analysis indicated a significant improvement in pain during activity from initial to follow-up and in pain after activity from initial to follow-up. All patients demonstrated improved strength and flexibility. It was concluded that this device may be an effective adjunct to the treatment of retro calcaneal bursitis.***

Keywords: Heel pain, Retrocalcanealbursitis, orthosis

1. Introduction

During contraction of the calf, tension is placed through the Achilles tendon and this rubs against the retrocalcaneal bursa. Excessively tight shoes may also increase friction on the retrocalcaneal bursa. When this friction is excessive due to too much repetition or high force, irritation and inflammation of the bursa may occur. This condition is called a retrocalcaneal bursitis. Most patients with retrocalcaneal bursitis heal well with an appropriate physiotherapy program.

The common treatment programs for retrocalcaneal bursitis include rest, various thermal and electrical modalities, flexibility and strengthening exercises, anti-inflammatory medications, and heel lifts, heel cups, or orthotics. The purposes of this study were 1) to describe a device that may be useful in the conservative treatment of posterior heel pain and 2) to evaluate the effectiveness of this device

2. Methodology

Five patients between the ages of 40-50, who were seen at the SVNIRTAR, participated in the study. All subjects had been previously treated prior to referral with ice, rest, and anti-inflammatory medicines, none of which produced satisfactory relief. Subjects were fitted with a device consisting of a neoprene sleeve containing daily ankle flexibility exercises were performed by each patient. The subjects were evaluated when fitted with the orthotic device and 1 month later.

3. Measurement

Circumferential measurement has to be taken from hind foot to midfoot. Length has to be decided according to the patient. For horizontal strap measurement has to taken from lateral junction to medial junction & twice of that. as per the measurement pattern has to cut & design such a manner that which will give adequate pressure over the side of the bursitis. According to pattern 1 piece of ethaflex 12mm thick is taken little oversize to pattern & shaped according to contour of side (posterior side of calcaneum). Same pad is taken for trial with the patient. Over that suspension straps, angulations & length is decided as per individual patient. Special care is to taken to modify the strap system (to prevent slipping of horizontal strap)

Force distribution-
Application of pad gives total contact hydrostatic pressure over bursa by which microtear of the tendon is prevented. Study says if the straps applied continuously about 28 days the micro tearing effect will be eliminated & healing will takes place. Because though tendon is active during activity but due to force application is static in nature that does not permit to tendon for further injury.

The subjects were evaluated when fitted with the orthotic device and 1 month later. The following criteria were used to judge changes: 1) response on a subjective pain scale questionnaire, 2) active goniometric measurements of ankle flexibility, and 3) performance on a toe raise test for triceps surae strength. The pain scale questionnaire required the subjects to numerically rate their pain on a scale of 0-1 0, with 10 being the worst pain they had ever experienced and 0 being no pain at all. Goniometric measurements of ankle dorsiflexion recorded at 0 and 90' of knee flexion, plantar flexion, inversion, and eversion were made with a 7 inch plastic goniometer (1 5). The toe raise test consisted of recording the number of single leg toe raises the patient could perform consecutively to the point of fatigue or pain rate their pain on a scale of 0-1 0, with 10 being the worst pain they had ever experienced and 0 being no pain at all. Goniometric measurements of ankle dorsiflexion recorded at 0 and 90' of knee flexion, plantarflexion, inversion, and eversion were made with a 7 inch plastic goniometer (1 5). The toe raise test consisted of recording the number of single leg toe raises the patient could perform consecutively to the point of fatigue or pain.

Hydrostatic pressure-
Hydrostatic pressure is what is exerted by a liquid when it is at rest. The height of a liquid column of uniform density is directly proportional to the hydrostatic pressure.

The hydrostatic properties of a liquid are not constant and the main factors influencing it are the density of the liquid

and the local gravity. Both of these quantities need to be known in order to determine the hydrostatic pressure of a particular liquid. Achilles tendinitis, Achilles tenosynovitis &retro calcaneal bursitis are of pathological condition uneven stress concentration of hydrostatic processes contributed ligament fluid in the bioelastic vessel. The intense deviation of weight concentration during repeated use the angular curve is widely responsible for uneven stress concentration & causing unbearing pain at rear side of the calcaneus foot. The affirmations logic say if undue stress concentration is disposed due to outside stress by some mechanism, the pain causing stress is null & void only after prolonged use. Besides that the rear retro stress also crates tangible thermal effect for accelerating the return venous flow & reducing vulnerable acceleration component along with torque component with an appreciable value.

In axiomatic condition the theory of momentum & thermal effect in discussed from light mechanics & thermodynamics

Th-1 $dp = \lim_{ds \to 0} m . \frac{ds}{dt}$

$$p = \lim_{v \to 0} m . v$$

p= momentum caused by calcaneum at gait cycle
$\boldsymbol{ds/dt}$ = transient velocity restricting the exaggerated moment of calcaneus
Th-2 $\boldsymbol{\Delta E = P . dv}$
ΔE=
Net energy applied through retrocalcaneal straps
P= *pressure applied*
dv= *volumetric change*

Case Study 1

Result: This orthosis was trialed with 5 patients & repeated fallow up was also done. After using 7 days pain is significantly reduced. But according to study pain & swelling was reduced almost within 28 days. Subjects were placed in the orthotic for continuous wear until their pain subsided to the point they were comfortable participating in daily activities

Table 1: Pain scale questionnaire results of initial and 1 month follow-up examination (mean + SD)

	initial	Follow-up	t-value
Pain at rest	2.1±1.3	0.23±0.61	1.95
Morning pain	1.3±1.6	0.56±0.75	1.2
Pain during activity	5.4±1.8	1.56±1.6	3.4
Pain after activity	6.3±1.3	1.7±1.3	4.8

Table 2: Range of motion measurements initial and 1 month follow-up, involved and uninvolved extremities (mean ± SD)

		Dorsiflexion	Planterflexion	Inversion	Eversion
Involved	Initial	- 8.75±9.7	63.42±1.89	26.41±7.8	3.9±3.6
	Follow up	- 1.62±8.75	65.32±11. .9	24.47±12	7.91±4.6
	t-value	1.87	0.1	0.4	1.2
Uninvolved	Initial	- 3.1±6.1	67.91±11.7	25.35±6.8	8.6±2.91
	Follow up	1±7.8	64.23±13.5	28.33±11.8	8.1±1.2
	t-value	1.3	0.3	0.27	0.29

Table 3: Toe raise test results of involved and uninvolved calf at initial and 1 month follow-up examinations (mean * SD)

	initial	Follow-up	t-value
involved	19.35±13.91	25.41±9.2	1.68
uninvolved	33.35±8.95	32.27±8.75	0.8

4. Results

Results of the pain scale questionnaire are presented in Table 1. Fifty percent of the patients reported pain at rest when they were initially fitted with the orthotic but only 12.5% reported pain at rest after 1 month of orthotic use. Those patients with pain at rest reported a 38% reduction in pain on the questionnaire after 1 month of orthotic use. Fifty percent of the patients reported morning pain when they were initially fitted with the orthotic and 12.5% reported morning pain after 1 month of orthotic use. Those patients with morning pain reported a 20% reduction in pain on the questionnaire after 1 month of orthotic use. One hundred percent of the patients reported pain during activity when they were initially fitted in the orthotic and 62.5% reported pain during activity after 1 month of orthotic use. Those patients with pain during activity reported a 45% reduction in pain on the questionnaire after 1 month in the orthotic device. One hundred percent of the patients experienced pain immediately following their activity when they were initially fitted in the orthotic and 75% reported pain following activity after 1 month of orthotic use. Those patients with pain after activity experienced a 60% reduction in pain on the questionnaire after 1 month of orthotic use.

The toe raise test results, standard deviations, and t values are reported in Table 3. Again, no significant differences were demonstrated, how-ever, considerable improvement was noted in the involved leg from initial to follow-up. All patients improved and were able to return to their sport of choice

5. Discussion

On the toe raise test, there was a notable improvement in the number of repetitions on the involved as compared to the uninvolved side. Since our test was performed to the point of fatigue or pain, the improvement was probably attributable to decreased pain. The device may prove to be effective in treating both preadolescent-cents and athletes. A prescription of rest in these populations is often ineffective due to noncompliance. This device appears to protect the pathological area while still allowing activity and full ROM. The open face design of the device may help to minimize pistoning while holding the pad in the correct position on the heel.

The indications for this device are specific yet have a common denominator. The area of pathology normally has little protection; this device may provide physical protection, thus allowing inflammation to resolve itself.

6. Conclusion

It is a simple design. Retrocalcaneal bursitis managed by surgical procedures is a complex process which has a lot of disadvantages. Most of surgeon may not advice to undergo surgery for management of Retrocalcaneal bursitis. this is the modification of strapping system utilizing the principle of hydrostatic (total contact) above injured area which restrict the range of movement around the insertion point at Achilles tendon for which, reduce the micro tearing effect of tendon fibers. With this strapping management we found better results over 5 patients. Further study has to be carried out by applying this strapping system with number of patient. Improvements were noted in flexibility and strength of the plantar flexors and subjective com-plaints of pain were reduced following 1 month of use of the orthotic device. Within the limited scope of this study, it appears that this device may be effective as an adjunct to the conservative treatment of retro calcaneal bursitis. The principles of this device address the causative factors involved and reduce the potential for mechanical microtrauma. However, further research is needed to compare various conservative treatments of retro calcaneal bursitis.

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