J. Phys. Ther. Sci. 32: 706–709, 2020

The Journal of Physical Therapy Science

Original Article

Treatment of scalene muscles with the Ergon technique can lead to greater improvement in hip abduction range of motion than local hip adductor treatment: a study on deep front line connectivity

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Abstract. [Purpose] This study aimed to investigate the effects of Ergon® instrument-assisted softtissue mobilization of the upper and lower midpoints of the Deep Front Line (DFL) on hip abduction range of motion (ROM). [Participants and Methods] Forty healthy adults (29.3 ± 6.3 years; height: 175.8 ± 7.4 cm; weight: 77.2 ± 9.2 kg) were randomly divided into two groups and received a single 15-minute Ergon treatment in the upper midpoint (scalene muscles) and the lower midpoint of the DFL (hip adductors) on their dominant side. The non-dominant hip served as a control. Pre-and post-therapy active and passive hip abduction ROM at 0° and 90° flexion was examined using a goniometer. [Results] In both experimental groups, active and passive hip abduction ROM on the treated side improved significantly compared to the control side. Scalene treatment led to significantly greater improvement in active hip abduction ROM at 0° and 90° and in passive ROM at 90° compared to local hip adductor treatment. [Conclusion] The application of the Ergon technique on remote parts of the DFL may lead to a significant increase in hip abduction ROM compared to local hip adductors treatment.
Key words: Hip, Deep Front Line, IASTM

(This article was submitted Jun. 11, 2020, and was accepted Aug. 4, 2020)

INTRODUCTION

Based on decades of fascial research, Myers proposed the existence of 12 specific myofascial meridians that control the human body[1)]. These are the Superficial Back Line (SBL), the Superficial Front Line (SFL), the Lateral Line (LL), the Spiral Line, the Superficial Front Arm Line, the Deep Back Arm Line, the Deep Front Arm Line, the Superficial Back Arm Line (SBAL), the Back Functional Line (BFL), the Front Functional Line (FFL), the Ipsilateral Functional Line, and the Deep Front Line (DFL). A review by Wilke et al.[2)] confirmed the existence of the SFL, BFL, and FFL and provided robust evidence of myofascial force transmissions along them.

Given the functional importance of the myofascial lines, we previously conducted two randomized control studies to evaluate the effect of the Ergon® instrument-assisted softtissue mobilization (IASTM) technique (Ergon® IASTM Technique, Athens, Greece) in distant and local points of the SBL and LL to evaluate and compare the effects of remote treatment on myofascial elasticity[3, 4)].These studies showed that Ergon IASTM treatment of either the upper or the lower part of the SBL and the LL may lead to a significant increase in hamstring and hip adductor flexibility, respectively. Both studies[3, 4)] also

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demonstated that applying IASTM techniques to distant points of the myofascial lines led to the same improvement in the elasticity of some areas as that achieved by local treatments.

The DFL starts at the tarsal bones and ends at the lower jaw[1]. It is one of the most important lines, as its proper function is vital for the stabilization of the lumbar, thoracic, and cervical spine. Surprisingly, despite its significant role in connecting and protecting the entire anterior surface of the body supporting the spine, no research has been conducted to evaluate the effect of IASTM techniques on the elasticity of this myofascial line. Therefore, the purpose of this study was to assess the impact of Ergon IASTM applications in the flexibility of certain parts of the DFL. In particular, we investigated the effects of Ergon applications to scalene muscles (upper midpoint of the DFL) and hip adductors (upper midpoint of the DFL) on hip adductor flexibility.

PARTICIPANTS AND METHODS

This was a randomized control study involving 40 healthy adults (20 males and 20 females; age: 29.3 ± 6.3 years; height: 175.8 ± 7.4 cm; weight: 77.2 ± 9.2 kg) recruited from a local district area of western Greece. The inclusion criteria were: a) no injury in the lower extremity or the spine in the previous 12 months and b) decreased hip adductor flexibility (<40°). The participants were randomly divided into two groups of 20 individuals each, using a computer program (randomizer.org) for patients randomization. In one group, Ergon IASTM was applied to the area of the hip adductor muscles (local treatment). The other group received Ergon treatment in the area of the scalene muscles (remote treatment). The Waterloo Footedness Questionnaire was used to determine limb dominance. The intervention was performed on the participants' dominant side, while the non-dominant hip was used as a control. Each participant received a 15-minute treatment, during which Ergon IASTM was applied in the form of short, local strokes on the scalenes or in the form of both short and long strokes on the hip adductor area. The Ergon IASTM Technique was applied to the participants by three authors (KM, PA, and KF) who are Instructors of the Ergon IASTM Technique, having over five years of experience teaching the specific IASTM technique worldwide.

All participants underwent hip abduction ROM measurements before and immediately after treatment by two independent physical therapists who were blind to the study scope. Each participant was placed in the supine position with the non-dominant lower limb off the treatment table to achieve stabilization. A pelvic stabilization belt was also used. The measurements included the evaluation of passive and active hip abduction ROM in the neutral position (0°) and at 90° hip flexion using a goniometer. The study was conducted in the Therapeutic Exercise and Sports Rehabilitation Laboratory of the University of Patras, Greece. The study's experimental design was approved by the Ethics Committee of the Physical Therapy Department of the University of Patras (12739-3/10/2019). All participants were informed about the research processes and signed written consents.

A paired t-test was used for side-to-side comparisons. All statistical analyses were performed using IBM SPSS Statistics version 23. The level of statistical significance was set top <0.05.

RESULTS

Table 1 presents the hip abduction ROM values of the participants before and after receiving remote (scalene muscles; upper midpoint of the DFL) and local treatment (hip adductors; lower midpoint of the DFL) using the ERGON Technique (N=40).

No significant difference was observed in the effects of the Ergon therapy in either the remote or local area on the untreated (control) side in any measurement (active or passive ROM, 0° or 90°). In contrast, the application of the Ergon technique on the remote and local areas of the treated side led to a significant hip abduction ROM improvement in all measurements. Moreover, the pre- and post treatment comparisons revealed a significant difference in the effects of the Ergon Technique between the remote and local applications.The remote treatment led to significantly greater improvement in active hip abduction ROM at 0° hip flexion (t=2.204, p=0.040) and 90° (t=2.53, p=0.020) and in passive ROM at 90° hip flexion (t=3.23, p=0.004) compared to the local treatment. No significant difference in passive ROM at 0° hip flexion was observed between the treatments (t=0.661, p=0.517).

DISCUSSION

This study aimed to evaluate the effect of the ERGON IASTM technique on hip abduction ROM. Its novelty lies in assessing the technique's effectiveness on DFL mobility with both local (hip adductors) and remote (scalene muscles) treatments. Impressively, treatment of distant DFL tissue, namely the scalene muscles, led to a significant improvement in active and passive hip abduction ROM, comparable to that observed after local applications to hip adductors myofascial tissues. The IASTM application to either remote areas or the area of the hip adductors led to a significant improvement in ROM compared to the control side, which showed no increase in any measurement. These findings are consistent with the results of other studies[5, 6] evaluating the effects of IASTM treatment on soft tissues physiological adaptations. In particular, the significant short-term improvement in joint ROM observed in this study supports the conclusions of two systematic reviews[5, 6] showing

Table 1. Hip abduction ROM of participants at 0° (neutral position) and 90° hip flexion, before and after receiving remote (scalene muscles) and local treatment (hip adductors) using the Ergon technique (n=40)

Hip abduction ROM	Side	Hip measurement position (deg)	Remote treatment: Scalenes (n=20)	Local treatment: Hip adductors (n=20)
Passive	Control side	0° flexion (before)	77.10 ± 8.32	73.15 ± 4.04
		0° flexion (after)	77.30 ± 7.97	73.55 ± 4.18
		90° flexion (before)	66.05 ± 8.48	61.05 ± 4.51
		90° flexion (after)	66.20 ± 8.50	60.65 ± 4.49
	Treatment side	0° flexion (before)	78.10 ± 7.29	72.60 ± 4.21
		0° flexion (after)	89.20 ± 4.59	80.60± 3.85
		90° flexion (before)	67.95 ± 7.77	60.35 ± 6.75
		90° flexion (after)	79.85 ± 7.85	68.20 ± 5.70
Active	Control side	0° flexion (before)	61.90 ± 8.78	63.45 ±3.67
		0° flexion (after)	62.00 ± 9.21	63.75 ± 3.41
		90° flexion (before)	53.95 ± 7.16	57.20 ± 4.68
		90° flexion (after)	53.60 ± 6.90	56.85 ± 4.54
	Treatment side	0° flexion (before)	58.50 ± 7.06	62.55 ± 5.08
		0° flexion (after)	73.35 ± 8.67	71.75 ± 4.82
		90° flexion (before)	54.35 ± 6.23	52.75 ± 6.13
		90° flexion (after)	63.60 ± 5.97	61.25 ± 5.05

All values are mean ± SD. ROM: range of motion.

that IASTM can improve patient functionality and significantly increase joint ROM immediately after application. Another recent study found that this improvement can be maintained even for a week[4].

Remote DFL treatment led to more significant improvement in active hip abduction ROM at 0° and 90° and in passive ROM at 90° compared to local treatment. These findings are also wholly consistent with the results of studies[3, 4] evaluating the effect of remote and local treatments on parts of the SBL and LL. In particular, it has been reported[3] that IASTM applications to distant points of the SBL lead to improvement in the elasticity of some areas comparable to that achieved by local treatments. Moreover, Simatou et al.[4] showed that Ergon IASTM treatment of the LL is more effective in increasing hip adduction ROM than foam rolling and stretching. In the same study[4] the application of IASTM techniques to remote parts of the LL was as effective as local treatments in terms of improving hip adduction ROM[4]. The underlying mechanism of remote IASTM treatments may be related to cortical adaptations and central pain modulatory system processes associated with reduced stretch tolerance and neurophysiological adaptations. Another explanation may be provided by the theory of mechanical force transmission via connective tissue. Several studies have shown that fascial structures transfer strain to neighboring skeletal muscles[7–9]. Based on that theory, it can be assumed that the treatment of specific points located in the upper part of the DFL can affect a more significant portion of the DFL and, therefore, lead to more significant adaptations than the treatment of the lower part of the DFL.

The findings of this study should be evaluated against its limitations. The study was not blinded, and the sample consisted of healthy participants. Another significant limitation is that we only assessed the short-term effects of the Ergon IASTM technique. Furthermore, more valid measurement tools, such as electrogoniometers, could perhaps have ensured greater validity of the measurements.

In conclusion, Ergon IASTM of either the scalenes or hip adductors may lead to a significant increase in hip abduction ROM after just one treatment session. Impressively, treatment of remote points of the DFL, namely the scalene muscles, led to greater improvement in hip abduction ROM than local hip adductors treatment. Further research is needed to support these novel findings,which can significantly modify treatment strategies for preventing and rehabilitating fascial pathologies.

Conflict of interest

None.

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