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Treatment of finger problems in climbers with the local-osteopathic Isele-method: a Pilot study

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ABSTRACT

Climbing and Bouldering is a trend sport and is fashionable. The growing number of athletes is connected to an increase of complaints in relation to with/of the fingers. However, the available scientific literature is mainly focused on injuries of the annular pulley-system of the flexor tendons with an emphasis on major injuries, e.g. rupture of the ring ligaments and their surgical management. Although only a minority of these cases require surgical intervention, and not all symptoms come from a rupture, it seems that the field of climbing-related injuries is only insufficiently covered. To date, none of the conservative therapeutic approaches can be considered gold standard. Conservative finger therapy is mainly focused on the rehabilitation process following the ruptures described above. In the context of the present pilot- and feasibility study 61 patients with undefined climbing-related finger symptoms underwent a new local osteopathic therapy, involving Isele-methods and Isele-techniques. In contrast to established conservative therapeutic concepts, all patients were only treated once and received neither advice concerning therapy or behaviour nor a specific training program. The only requirement was that climbing was prohibited for a minimum of 48 hours after treatment. Any change regarding the finger injury or symptoms was assessed at three occasions via a patient interview and questionnaire including a visual analogue scale. A clear benefit could be observed for all surveyed areas, specifically regarding possible intensity and extent of the training. Furthermore, a notable relief of pain and other symptoms during climbing, as well as an increase in quality of life were reported by patients. Although the Isele-methods were reported to be somewhat painful, they were consistently evaluated positively by the patients.

Keywords:

Isele-method, conservative finger therapy for climbers, finger injuries / therapy, sport climbing, pilot studies

INTRODUCTION

Outdoor sports and especially climbing are very popular nowadays. The German Alpine Association has more than one million members, almost 500.000 of these members are presumed to be climbers. [1] Examples for different disciplines of climbing are climbing, bouldering and speed climbing which can be performed outdoors, indoors and as competition sports. Competition climbing can be considered a relatively new discipline. With an increasing level of performance, injuries are likely to increase as well. Finger injuries are most common. Figure 1 shows two different grip positions of a hand during climbing: the crimp grip position (a) and the sloper grip position (b). It has been shown that the highest force acting on the finger pulley system is caused by the crimp grip position (a). [2]

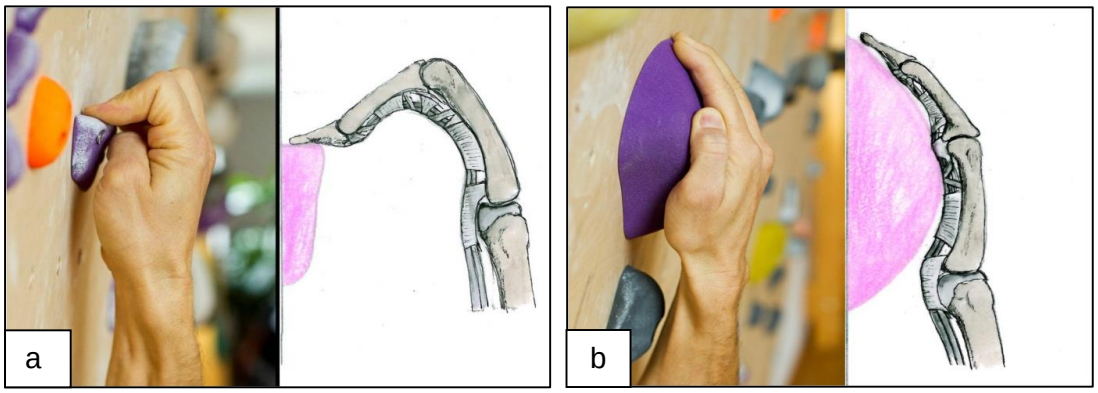

Figure 1: (left = a) Crimp grip position and (right = b) sloper grip position during climbing.

If an additional force is present during a crimp grip position, for example a loss of the foothold, the load on the pulley system can lead to a pulley rupture. Such eccentric movements are reported to be one main cause of pulley injuries. Another reported mechanism that leads to pulley injuries is the crimp grip position followed by a concentric movement such as a dynamic climbing move. [3] Hand positions in finger pockets often lead to lateral forces or torsion forces of finger structures and can cause injuries of collateral ligaments or muscles. [4, 5] In the literature, a syndrome called ‘climber’s finger’ is described as a painful finger condition caused by complete ruptures, stretching or tearing of pulleys and muscles. Yamaguchi [6] and Seidner [7] describe a climber’s finger as a result of a pulley rupture, whereas Wimmer [8] reported a pulled ligament or annular pulley to be the reason for a climber’s finger. Leading experts in the field of climbing injuries Schöffl and Hochholzer agree that the expression ’climber’s finger’ is medically undefined but commonly used when patients suffer from general finger pain caused by climbing.

Schöffl suggest surgical treatment of pulley ruptures only in the case of multiple pulley ruptures. [9] Instead, he suggests that ruptures of only one pulley or a stretching or tearing of the pulley should receive conservative treatment. Conservative treatment includes special taping of afflicted fingers and immobilization for a certain time. Physiotherapy guidelines proposed by Gnecchi [10] and ergo therapy guidelines proposed by Seidner [7] suggest long-term therapy according to fixed exercise regimens.

Otepka was the first to describe an osteopathic treatment of the 'climber's finger' using the fascial distorsion model according to Typaldos [11] to treat fingers and the high velocity low amplitude (HVLA) technique to treat the cervico-brachial area. This osteopathic concept lead to improvement in the climbing of the subject group compared to a control group. Otepka's study lasted more than two years with a rather small sample size of 14. [12]

The following article aims at presenting a new conservative method to treat climbing-related finger conditions. This new method will be introduced as the Isele-method.

MATERIALS AND METHODS

This study is based on a non-blinded clinical trial. Blinding of neither the subjects nor the therapist was attempted. The Isele-method used in this study is new and designed as a pilot study. [13] The design of this study follows recommendations of the Medical Research Council to develop and evaluate therapeutically complex interventions, especially if there is no established therapy. [14]

The study consists of three questionnaires at T1, T2 and T3 answered by subjects and a manual treatment using the Isele-method between the second (T2) and third (T3) questionnaire. The main parameter evaluated via the questionnaires was the intensity of pain before and after treatment using the visual analog scale (VAS). The VAS scale is a measurement instrument for subjective characteristics or attitudes that cannot be directly measured. As there was a waiting time between T1 and T2, subjects themselves were considered the control group (within-subject design).

In the VAS pain scale, 0 represents no pain (or no agreement) and 10 maximum pain (full agreement). This study also aims at evaluating the quality of life, which for climbers is often closely connected to climbing performance. Therefore, the VAS scale was used to examine the climbing volume, climbing intensity, range of motion during climbing, finger pain and finally quality of life (Table 1). Figure 2 depicts the procedure of the study for subjects.

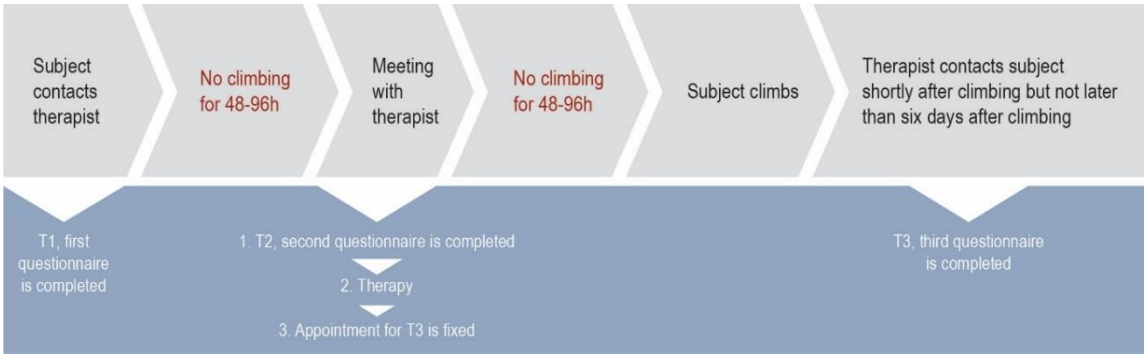

Figure 2: Procedure of the study.

SUBJECT SAMPLING AND CHARACTERISTICS

62 subjects, 19.4% female and 80.6% male, aged between 17 and 48 years with at least one affected finger were recruited. Two climbers did not complete the study because of other (non-climbing related) health conditions (T1=62, T2=61, T3=60). Furthermore, subjects had to climb at a climbing level above grade seven (UIAA) at least three times per month. Excluding criteria were: age below 16, climbers diagnosed with rheumatism, open wounds at afflicted fingers, finger operations during the last 10 weeks or tendovaginitis.

ISELE APPROACH

After completing the T2 questionnaires, a slide caliper was used to measure the distance between the flexor tendon and the bone in the relaxed and the strained position. Only the mainly afflicted finger was measured and compared to this finger of the opposite hand. Through this, the chance of a complete pulley rupture should be ruled out.

To locate the pain, subjects were asked to assume a climbing or finger position that causes pain. The exact and individual position of fingers and body in this situation was used as the standard therapy position (STP).

I. „Mädchenthrust“

The first intensity level of the “Mädchenthrust” of the Isele-method is a rather soft testing of compatibility of the following treatment. A traction force is applied, where the proximal part of the finger joint is fixated by the therapist while the distal part of the joint is pulled. Firstly, a stretching of the joint is generated. If possible (pain free), a fast extension by pulling the distal part of the joint is applied (first intensity level) as shown in Figure 3-1. As a further level of intensity, the therapist used his fingers as a fulcrum (Index Crack method) where the joint of the patient is located between the therapists’ fingers. Over traction can thus be avoided (Figure 3-2). For the third intensity level, a device called “Mächenfänger” or “Fingerhülsen” is used to apply a larger lever on the distal part of the finger joint. The fingertip is wrapped with tape and the device is put over the fingertip (Figure 3-3). After treatment, the symptoms causing position (STP) is taken in again. If no relief of pain can be reported, treatment is repeated at different angles.

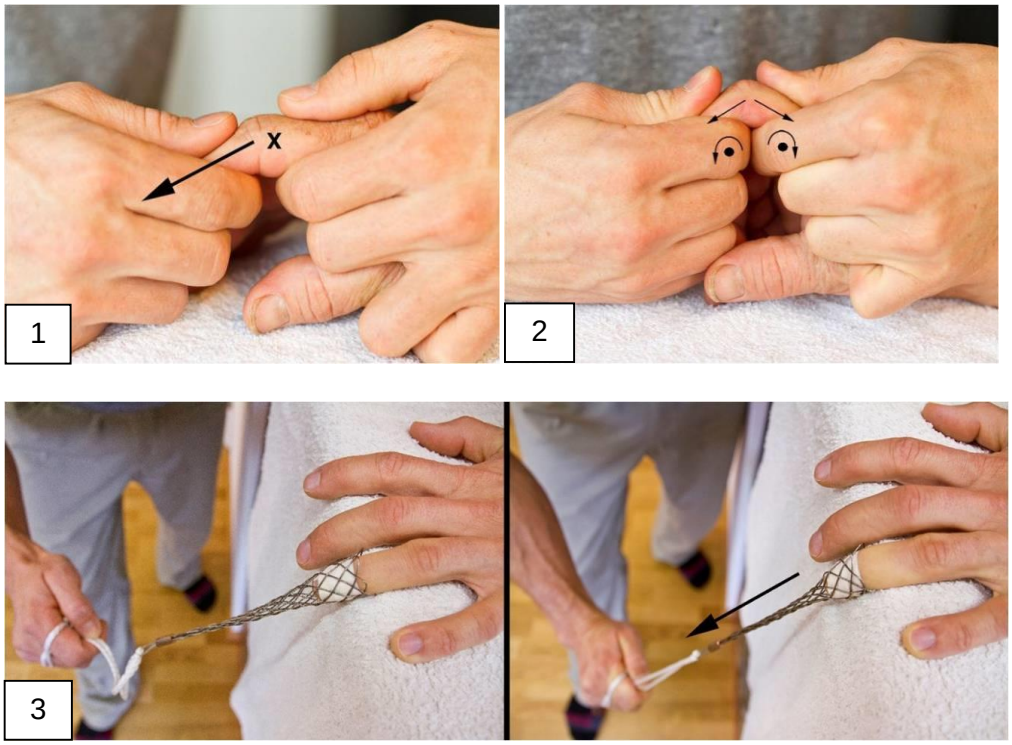

Figure 3: Intensity level 1, 2 and 3 of the thrust.

II. Chopstick Technique

A chopstick is used to trigger the most sensitive point within the afflicted finger (Figure 4). The force is increased to a level of almost 10 in the VAS (visual confirmation). After a certain time, subjects report an ease of pain. If the pain falls below VAS 2, treatment is terminated. If the pain exceeds the tolerance of the subject, treatment is terminated at any time.

Figure 4: Chopstick Technique.

III. Flexor-Lifting

The affected hand is placed flat, the palm is pointing upwards. The osteopath lifts the most painful region of the finger with his fingers. The subject is advised to flex the finger repeatedly as indicated in Figure 5.

Figure 5: Flexor lifting: the direction of lifting is shown by arrows.

STATISTICS

Most of the collected data is analyzed descriptively. The main outcome variable is the change from ‘VAS pain’ while climbing before and after the intervention. These values were determined in accordance with the distribution of the data by paired Student’s t-test or Wilcoxon signed rank test. Data are compared by using the mean change between T1 and T2 (waiting time before treatment) and those of T2 and T3 (with treatment in-between). Parametric and nonparametric tests are applied to determine the change in the secondary objective parameters according to the distribution of data. All tests are calculated on two sides, a level of $\alpha=0.05$ is considered significant. The analyses are performed using *IBM SPSS Statistics 21*.

RESULTS

Table 1 summarizes the VAS (interquartile range (IQR)) values expressed by the subjects at different times T1, T2 and T3.

Table 1: Values expressed by subjects at different times of the study in the VAS. VAS=0 represents pain free whereas VAS=10 represents maximum symptoms. The Interquartile Range (IQR) is given (the upper and lower quartiles are given in brackets).

VAS	**Questionnaire time**		
	T1 (n=62)	**T2 (n=61)**	**T3 (n=60)**
	Median (IQR 25; 75)		
Restriction of the range of motion during climbing	2,5 (0,75; 4,0)	2 (0,0; 4,0)	0,5 (0,0; 2,0)
Pain intensity during climbing	5 (3,0; 7,0)	5 (3,0; 7,0)	2 (1,0; 4,0)
Restriction of the range of motion in everyday life	1 (0,0; 3,0)	1 (0,0; 3,0)	0 (0,0; 1,0)
Pain intensity in everyday life	2 (1,0; 3,0)	2 (1,0; 3,0)	1 (0,0; 2,0)
Restriction of quality of life caused by finger pain	5 (3,0; 6,0)	5 (3,0; 7,0)	2 (1,0; 3,5)
Restriction of training volume	5,5 (3,75; 7,25)	5,0 (3,0; 8,0)	2 (0,0; 3,75)
Restriction of training intensity	7 (5,0; 8,0)	7,0 (4,5; 8,0)	2 (0,0; 4,0)

The highest VAS values before treatment with the Isele-method were detected for the restriction in trainings intensity (T1=T2=**7**), pain intensity during climbing (T1=T2=**5**) and restriction of quality of life caused by finger pain (T1=T2=**5**). These findings confirm the assumption that training and climbing is an essential part of life for a climber and quality of life is closely connected to climbing practice. Between T1 and T2, no significance was found. In contrast to that, all changes of the VAS values between T2 and T3 were statistically significant

with a value for p=.000. Between T2 and T3, a clear decrease of the median VAS values was observed for all characteristics.

Table 2 shows the localization of pain reported by subjects in the questionnaires at T1, T2 and T3.

Table 2: Localization of symptoms with the subjects' hands

Area		**Questionnaire No.**		
		T1 (n=62)	**T2 (n=61)**	**T3 (n=60)**
		N (%)		
Afflicted Hand	Right	15 (24,2)	16 (26,2)	23 (38,3)
	Left	20 (32,3)	20 (32,8)	22 (36,7)
	Both	27 (43,5)	25 (41,0)	10 (16,7)
	None	--	--	5 (8,3)
Afflicted Finger (right)	Thumb	2 (3,2)	1 (1,6)	--
	Index	8 (12,9)	7 (11,5)	5 (8,3)
	Middle	29 (46,8)	28 (45,9)	19 (31,7)
	Annular	22 (35,5)	23 (37,7)	15 (25,0)
	Little	2 (3,2)	3 (4,9)	1 (1,7)
Afflicted Joint (right)	MCP	19 (30,6)	17 (27,9)	13 (21,7)
	PIP	31 (50,0)	32 (52,5)	22 (36,7)
	DIP	9 (14,5)	15 (24,6)	9 (15,0)
Afflicted Finger (left)	Thumb	2 (3,2)	1 (1,6)	--
	Index	9 (14,5)	9 (14,8)	5 (8,3)
	Middle	29 (46,8)	31 (50,8)	17 (28,3)
	Annular	21 (33,9)	20 (32,8)	16 (26,7)
	Little	3 (4,8)	4 (6,6)	3 (5,0)
Afflicted Joint (left)	MCP	20 (32,3)	22 (36,1)	16 (26,7)
	PIP	37 (59,7)	41 (67,2)	21 (35,0)
	DIP	11 (17,7)	13 (21,3)	6 (10,0)

Between the T1 and T2, the symptoms decreased in two (3.3%) cases to only one hand. After therapy (between T2 and T3) 17 subjects (28.3%) reported an improvement of pain within their hand(s). In 12 cases, initially two hands were affected and after treatment only one hand was affected. In two cases, even both affected hands improved and in one case, one out of one

hand improved. At T1 and T2, the median of affected fingers was two (IQR 1.0; 3.0). At T3, this had gone down to one finger (IQR 1.0; 1.8). Regarding the joints at T1, the median of affected joints was two (IQR 1.0; 2.25), for T2 it was also two (IQR 1.0; 3.0), whereas for T3 it was only one (IQR 1.0; 2.0). It must be noted that some patients could not define a specific area of pain within a joint. In these cases, the joint above and below the mentioned range was recorded.

Table 3 presents the changes T1-T2 and T2-T3 of the median VAS values. These changes were analyzed regarding statistical relevance.

Table 3: Changes T1-T2 and T2-T3 of the median VAS values and p.

VAS	**Change**		
	T1-T2	**T2-T3**	
	Median (IQR)	**Median (IQR)**	**p**
Restriction of the range of motion during climbing	0,0 (-1,0; 0,0)	-1 (-2,0; 0,0)	.011
Pain intensity during climbing	0,0 (-1,0; 1,0)	-1 (-2,0; -0,5)	.000
Restriction of the range of motion in everyday life	0,0 (0,0; 1,0)	0,0 (-2,0; 0,0)	.001
Pain intensity in everyday life	0,0 (0,0; 1,0)	-1,0 (-2,0; -0,5)	.000
Restriction of quality of life caused by finger pain	0,0 (-0,5; 1,0)	-3,0 (-5,0; -1,0)	.000
Restriction of training volume	0,0 (-0,5; 1,0)	-4,0 (-5,75; -2)	.000
Restriction of training intensity	0,0 (-1;-1)	-5 (-6; -2,25)	.000

Table 3 shows a decrease of the VAS differences of all examined areas except for the restriction in range of motion in everyday life. All changes of the VAS value regarding the characteristics were statistically significant with a value of $p \leq .011$.

27 subjects (43%) reported an immediate onset of finger complaints (group A), 19 subjects (30,6%) a slow onset (Group B), and 15 subjects (24,2%) both together. The point in time when the restriction started was reported as follows: 0-4 weeks by 14 subjects (22,6%), 5-8 weeks by 20 subjects (32,3%), 3-4 months by 6 subjects (9,7%), 6-12 months by 2 subjects (3,2%), more than one year by 11 subjects (17,7%). The VAS values of the two groups A and B were

compared using the Kruskal-Wallis-Test. Change of pain during climbing, restriction of quality of life and restriction of training volume and intensity were considered. Additional groups were formed by selecting acute samples (pain duration less than 8 weeks) and sub-chronic samples (pain duration more than one week). Between these groups, no statistically significant differences could be observed.

DISCUSSION

Finger problems of 61 subjects were treated using the Isele-method in this pilot study. No statistically significant differences were found between different subjects with different onset of pain or regarding their duration of pain. This indicates that the Isele-method could be successfully applied at any stage of climbing-related finger problems. A clear tendency could be observed that all structures (hands, fingers and joints) improved after treatment in terms of experience of pain. The VAS was successfully used to measure subjective characteristics such as pain intensity during climbing. The VAS values of all mentioned characteristics decreased after applying the Isele-method to the subjects. All changes between T1, T2 and T3 were analyzed regarding statistical relevance. All changes of the VAS value regarding the above mentioned characteristics before and after treatment were statistically significant with a value of $p \leq .011$. It should be kept in mind that there was no control group available for this pilot study (e.g. subjects with no treatment or different treatment), which somewhat weakens the significance of these positive results. However, in the “within subjects”-design of this study, the subjects themselves serve in more than one treatment. As there was a waiting time with no treatment between T1 and T2, subjects themselves were considered as the control group. The design of the questionnaires using the VAS did not distinguish between different fingers or hands, when general characteristics were questioned. Only the most painful region was considered when answering the questionnaires throughout the study, even if there was improvement of symptoms in one hand or one finger.

CONCLUSION

The high number of subjects and a throughout positive development of treatment shows the high relevance of conservative finger therapy for climbers. The Isele-method is time effective, requires only minimal equipment and showed clear improvement of all characteristics, such as the notable decline in ‘restriction of training intensity’ from VAS 7 to VAS 2. All these characteristics are strongly connected to a climber’s quality of life, so treatment can be seen as holistic. The Isele-method was reported to be painful, so further investigations should aim

at improving patients' comfort. The results of this study can be seen as a starting point for a new state of the art conservative therapy in the field of climbing-related finger complaints.

DISCLOSURE

The author has no personal financial or institutional interest in any of the drugs, materials, or devices described in this article.

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