

ASPECTS REGARDING THE RECOVERY OF THE ANKLE SPRAIN BY MYOFASCIAL TECHNIQUES

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ABSTRACT. Introduction: A sprained ankle is an injury that occurs when you roll, twist or turn your ankle in an awkward way. This can stretch or tear the tough bands of tissue (ligaments) that help hold your ankle bones together. The incidence of training injuries is almost constant for players between the ages of 13 and 19, with the majority of injuries ranging from 1 to 5 injuries per 1,000 hours of training, while younger players have lower incidences. The incidence of injuries during the match tends to increase with age, in all age groups, with an average incidence of about 15 to 20 injuries per 1,000 hours of play in players over 15 years of age. **Objective:** The aim of this study is to verify the effectiveness of an individualized kinetic program in association with myofascial techniques. **Methods:** The myofascial techniques used are IASTM (Ergon therapy), dry needling, cupping and kinesiotaping. In this study a 18 years old football player was included. The evaluation was performed by the Biodex (for the muscle strength) and lunge test (for the range of motion). **Results:** After a month o treatment, our patient improved his strength and range of motion. **Conclusion:** Studies have shown that these techniques of myofascial release provide a huge effectiveness on the flexibility of the muscles, having even much more efficacy than stretching. Using myofascial techniques, has a much quicker result on the recuperation of the ankle sprain offering a great efficacy on the total recuperation of the patient.

Key words: manual therapy, rehabilitation, ankle sprain.

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REZUMAT. Aspecte privind recuperarea entorsei de gleznă prin tehnici miofasciale. Introducere: O entorsă a gleznei este o leziune care apare atunci când vă rostogoliți, răsuțiți sau întoarceți glezna într-un mod neobișnuit. Acest lucru poate întinde sau rupe benzile dure de țesut (ligamente) care ajută la menținerea oaselor gleznei împreună. Incidența accidentărilor la antrenament este aproape constantă pentru jucătorii cu vârste cuprinse între 13 și 19 ani, majoritatea accidentărilor variind de la 1 la 5 accidentări la 1.000 de ore de antrenament, în timp ce la jucătorii mai tineri incidența este mai scăzută. Incidența accidentărilor în timpul meciului tinde să crească odată cu vârsta, la toate grupele de vârstă, cu o incidență medie de aproximativ 15 până la 20 de accidentări la 1.000 de ore de joc la jucătorii de peste 15 ani. **Obiective:** Scopul acestui studiu este de a verifica eficacitatea unui program kinetic individualizat în asociere cu tehnici miofasciale. **Metode:** Tehnicile miofasciale utilizate sunt IASTM (Ergon therapy), dry needling, cupping și kinesiotaping. În acest studiu a fost inclus un jucător de fotbal în vârstă de 18 ani. Evaluarea a fost efectuată cu Biodex (pentru forța musculară) și testul fandare (pentru amplitudinea de mișcare). **Rezultate:** După o lună de tratament, pacientul și-a îmbunătățit forța și amplitudine de mișcare. **Concluzii:** Studiile au arătat că aceste tehnici de eliberare miofascială oferă o eficiență uriașă asupra flexibilității mușchilor, având chiar mai multă eficacitate decât stretching-ul. Utilizarea tehnicilor miofasciale are un rezultat mult mai rapid la recuperarea entorsei gleznei oferind o mare eficacitate asupra recuperării totale a pacientului.

Cuvinte cheie: terapie manuală, recuperare, entorsă de gleznă.

Introduction

The ankle sprain is one of the most common joint injuries. It represents a traumatic injury caused by the abnormal stress of the capsulo-ligamentary area, a movement that exceeds the limit of normal amplitude, without it losing contact permanently between the articular surfaces. It occurs when a ligament is forced to get stretched beyond its normal limits.

A severe sprain can lead to the rupture of the elastic fibers that make up the ligaments. Ankle sprain appears when the foot twists beyond normal motor limits, walking on an uneven surface, or following a wrong step.

The ankle sprains can be systematized, depending on their severity and of the structures they are involved in: grade 1, grade 2 and grade 3.

Grade 1 ankle sprain is characterized by a stretch of the capsulo-ligamentary area but without the appearance of lesions. This is manifested by moderate pain, apparition of bruising, an edema and difficulty on walking.

On this grade of ankle sprain the joint does not get immobilized. A compressive bandage or an ankle brace is used, of elastic material or an orthosis. The limb is placed in a prone position, cryotherapy is applied and muscle relaxant and analgesic medication is administered. In the case of grade 1 sprain, the compressive bandage is maintained until the disappearance of pain.

Grade 2 ankle sprain it is characterized by the appearance of partial lesions in the capsulo-ligamentary area, in this case the symptomatology is more accentuated, compared to a sprain of grade I.

In the case of this type of ankle sprain, a foot immobilization is required or orthosis, for a period of 7-10 days. If the edema is severe, in the ankle and foot, in the first phase use a splint plastered until the resorption of the local edema (washer skin) and then continued with immobilization, putting a plaster boot with walking heel or an ankle orthosis. In addition to the joint immobilization, the limb is placed in a prone position and the medications that will be administered will be muscle relaxants and painkillers.

Grade 3 ankle sprain is the most serious form, this being characterized by the appearance of a complete ligament injury. The pain felt by the individual is strong, making walking being impossible. In some cases, a paradoxical phenomenon occurs, the pain felt by the patient decreases suddenly on intensity.

In the case of a grade 3 sprain, the ankle is immobilized for a period of 14-21 days, the affected limb is placed in a prone position, cryotherapy is applied topically and medications such as muscle relaxants and painkillers are administered. In the case of high-performance athletes or serious sprains caused by accidents or work, surgery may be needed, which consists of suturing torn ligaments and suturing the joint capsule.

In the case of performance athletes it is very important for the functional recovery treatment to start while the segment is immobilized, to reduce the time required for the recovery and it must have two stages after the removal of the plaster cast: general functional recuperation of the ankle joint and at the same time a specific treatment related to the sport that is being practiced (Doherty, 2014).

Risk factors (Gaber &Knupp, 2022):

- Excessive demand during sports activities – The ankle sprain is the most frequent trauma encountered in the practice of sports that require jumping, changes of directions in a fast mode, running or twisting the foot, in sports such as basketball, volleyball, tennis, football;
- Previous ankle injuries - If the patient has suffered another ankle sprain or other types of ankle injury, the risk of the patient suffering another ankle sprain is high;

- Poor physical condition - low strength or flexibility of the ankles can increase the risk of ankle sprains when practicing sports by the patient;
- Improper footwear – Chosen shoes that are not suitable for physical activity increase the vulnerability of the ankle;
- Obesity;
- Weak muscle tone;
- Accidents that can cause mechanical stress on the ligaments;
- Inactivity (Takumi Kobayashi, 2016).

Etiology

In the case of athletes, ankle sprains are determined by the unequal ratio between the capacity of the capsulo-ligamentary area to manage these demands and the present demands at this level. Mainly, recurrent ankle sprains reappear due to improper treatment. This results on a non fully recovery of the ligaments and the strength being lower than normal. There are mainly three types of traumatic agents that take part on the talo-crural joint and these are:

- Falling;
- Sudden twisting movements;
- Direct hit on the joint level.

The ankle sprain is the most common trauma that the orthopedic doctors are facing at present, having as main causes:

- falls that cause torsion of the joint;
- foot landings after jumping or pivoting;
- walking, running or exercising on uneven surfaces;
- the action of the opponent on the joint in the activity of different sports (Valderrabano, Horisberger, Russell, Dougall, & Hintermann, July 2019).

Myofascial techniques

Manual therapies can treat the fascial distortion and swelling that occurs in ankle sprain. Gemmel H., Hayes B. & Conway M. (2005), highlight that including manual treatment in the classic rehabilitation program of the ankle sprain, contributes to a faster improvement of the range of motion of the dorsiflexion movement. This way, athletes can compete again at a maximum capacity.

According to Kamari N., Poojari S. & Prabu R. (2021), myofascial techniques are effective for chronic ankle sprains too, not just for the acute ones. Compressive myofascial release produces immediate changes in the dorsiflexion movement of the ankle (Stanek J., Sullivan T., & Davis S., 2018).

IASTM (Instrument Assisted Soft Tissue Mobilization) is a manual therapy that consists on the assisted mobilization of soft tissues with the help of a specialized tool.

ERGON represents an innovative therapy for static and dynamic mobilization of soft tissues with the help of a medical instrument (Park et al., 2016).

Studies show that ERGON treats the body's biomechanical deficiencies by improving musculoskeletal endurance and imbalances of the entire kinematic chain. It has immediate effects, being an effective, non-invasive procedure. A meeting lasts between 5-10 minutes depending on the area and the condition being treated. It is recommended to avoid sensitive structures, bone protrusions, rich areas vascularized and superficially innervated regions (Park et al., 2016).

Dry Needling is a modern treatment performed with dry needles and was designed to relieve muscle pain. Its popularity is growing. During the dry needle, a practitioner inserts several threaded needles into the skin. Threaded needles are fine, short, stainless steel needles, which do not inject fluid into the body. That is why the term "dry" is used.

Practitioners place needles in "trigger points", in muscle or tissue. The dry needle is sometimes called an intramuscular stimulation.

Practitioners with dry needles say that the needle helps on releasing the knot and improves any muscle pain or spasms. The needles will remain in the skin for a short time. The time duration depends from practitioner to practitioner. Some health professionals, such as physiotherapists and massage therapists get some training on the dry needle as far as that goes (López-González, et al., 2021).

Kinesio taping

A form of therapy which consists applying elastic bandages in key areas of the body, muscle, joint and/or ligament injuries. It directly stimulates the peripheral and lymphatic circulatory systems, and indirectly, the muscular and neurological system (Byeong-Jo Kim, 2015).

Cupping

Cupping is a form of therapy that is applied with the help of devices in the form of a cup and was a method used to treat skin lesions. It is assumed that this method removes toxins from the body. The application of suction cups over the years has evolved since the use of the animal horns, then to the bamboo cup and then to the glass cup, as it is used today. Cupping can also be made of clay and silicone materials that can withstand exposure to high temperatures during the heating process (Cao H, 2012).

Massage

The massage is a very important component in recovery. It can be performed in several ways, depending on the intended purpose. Its main benefits are: stimulation of blood circulation and automatically a richer flow of high levels of nutrients, muscle relaxation, general relaxation, lowering the pain threshold, etc (Cordun M., 2005).

Objective

The aim of this study is to verify the effectiveness of an individualized kinetic program in association with myofascial techniques.

Materials and methods

We included a subject – male, 18 years old, football player, with ankle sprain grade 2. The treatment was applied for 4 weeks. The evaluation was performed with biodex and lunge test

The kinetic program consists of the following exercises:

1. The patient in supine position performs active flexion and extension at the ankle level (isometrics) 12 repetition/2 series (figure 1).



Figure 1. Exercise 1

2. The patient in supine position or seated, performs active abduction at the toe level – 12 repetitions/2 series.

3. The patient, seated, performs extensions at the level of the knee of the affected limb – 12 repetitions/ 2 series.

4. The patient, standing, will perform movements in all planes at the level of the hip, corresponding to the affected limb. 10 repetitions/2 series.

5. The patient in the supine position will perform abdominal breathing – 30 seconds/3 series.

6. The patient in supine position – flexion and extension of the fingers with a resistive band (this exercise can be performed with the lower affected limb positioned on a stand) – 10 repetitions/3 series (fig. 2).



Figure 2. Exercise 6

7. The patient, in a seated position, performs the extension of the knee corresponding to the affected limb, in resistive mode – 10 repetitions/2 series.

8. The patient, in prone position, flexes the knees in resistive mode – 10 repetitions/2 series.

9. The patient, standing, seated or quadruped position, performs mobilizations of the affected limb in resistive mode – 10 repetitions/2 series.

10. The patient, seated, standing supported on a chair or in supine position, stretches the thigh – 1 minute/2 series.

11. The patient, standing on a balance ball, maintains the position on each lower limb – 30 seconds/3 series (figure 3).



Figure 3. Exercise 11

12. The patients, standing, lifts on the toes – 15 repetitions/3 series (figure 4).



Figure 4. Exercise 12

13. Easy runs with change of direction – 2 min/4 series.

14. Standing on one leg on the balance board – 30 seconds/3 series each leg (figure 5).



Figure 5. Exercise 14

The myofascial techniques applied are:

- ✓ Ergon therapy – performed 15 minutes 3 times a week, treated muscles: hamstrings, gastrocnemius, tibialis anterior and ankle flexor
- ✓ Massage – 15 minutes, 3 times a week, on the front and back of the foot
- ✓ Kinesio tape – in the first 2 weeks we applied kinesio tape for posture, after that we used tape to stabilize the ankle
- ✓ Cupping – twice a week for 5 minutes in combination with tissue massage or ergon therapy
- ✓ Dry needling – 2 minutes on each muscle separately, treating in a different way the tibialis anterior, peroneis, ankle extensors.

Results

At the lunge test we can observe an increasing of the value obtained from the final assessment by 14° at the level of the sprained ankle, from 28° at the initial evaluation to 42° at the final evaluation (table 1).

Table 1. Results of the lunge test

Ankle Assessment	Initial assessment	Final assessment
Sprained ankle	28°	42°
Healthy ankle	41°	42°

At the level of the sprained ankle, the patient improved the strength for the extension movement by 40 Joules, from 20.9 J to 66.9 J, and for the flexion movement by 149.7 J, from 121 J to 270.7 J. At the level of the healthy ankle, we can also observe an improvement of the strength: for the extension movement the strength increased by 5 J and for the flexion movement by 30 J.

Table 2. Biodex results

Ankle Assessment	Initial assessment		Final assessment	
	Extension (J)	Flexion (J)	Extension (J)	Flexion (J)
Sprained ankle	20.9	121	66.9	270.7
Healthy ankle	60.3	238.2	65.3	268.2

Discussions

Currently, ankle sprains are the most common trauma to the osteo-articular system. In the case of athletes, they are more common during training or playing and are caused by abnormal joint stress. (Fong, 2007)

Injuries to the lateral collateral ligaments are present in a proportion of 85% of total cases. Following a meta-analysis conducted in 2016, it was concluded that football presents the highest risk of ankle sprains, with an incidence of 7 per 1000 individuals. In the United States, in 2010 the incidence was 2.15 per 1,000 people per year.

Age 10- 19 years old were associated with higher rates of ankle sprain. Men between the ages of 15 and 24 have a higher incidence than women, while women over 30 have a higher incidence than men. Most ankle sprains are produced during sport activities. Ankle sprains take part, particularly to active people, especially adults and adolescents, after work, traffic or sports accidents. (Doherty, 2014)

Conclusions

The ankle sprain has recently become a very serious problem in sports and non-sports life. Researchers have tried to find new therapies to treat this type of pathology. Several studies have shown that myofascial therapies are effective in treating the ankle sprain.

Also, after using the IASTM technique and dry needling, I observed a significant improvement of the patients who received this specific protocol of recuperation than those who did not.

After some years of me being non-sporting, I tried to use myofascial therapies to treat this type of trauma. Being a physiotherapist at one of the oldest Romanian football teams, I tried to introduce myofascial therapies to treat ankle sprains and after some successes that I had, I am confident that ankle sprains can be treated in optimal time through myofascial therapies.

Using the myofascial techniques in association with a kinetic program, the range of motion and muscles strength improved, which highlights the effectiveness of the therapeutic protocol.

In conclusion, a protocol that is based on the myofascial techniques as said previously, help the patients by providing towards them a quicker recovery after an ankle sprain.

Authors contribution

All authors have equally contributed to this study.

REFERENCES

- Byeong-Jo Kim, Jung-Hoon Lee, Chang-Tae Kim, Sun-Min Lee. (2015). Effects of ankle balance taping with kinesiology tape for a patient with chronic ankle instability. *Journal of physical therapy science*, volume 27, issue 7, pages 2405-2406 <https://doi.org/10.1589/jpts.27.2405>.
- Cao H, Li X, Liu J. (2012). An updated review of the efficacy of cupping therapy. *PLoS ONE*. Pub Med.
- Cordun, M. (2005). *Kinetotologie*. Medicală. București: Editura Axxa.
- Doherty, C., Delahunt, E., Caulfield, B. et al. (2014). The Incidence and Prevalence of Ankle Sprain Injury: A Systematic Review and Meta-Analysis of Prospective Epidemiological Studies. *Sports Med*, **44**, 123–140, <https://doi.org/10.1007/s40279-013-0102-5>.
- Fong, D.T.P., Hong, Y., Chan, L.K. et al. (2007). A Systematic Review on Ankle Injury and Ankle Sprain in Sports. *Sports Med.*, **37**, pages 73–94, <https://doi.org/10.2165/00007256-200737010-00006>.
- Gaber, S., & Knupp, M. (2022). Diagnostics and Therapy of Ankle Instability. *Therapeutische Umschau. Revue Therapeutique*, **79**(7), 333-337. <https://doi.org/10.1016/j.gaitpost.2022.09.009>
- Gemmell, H., Hayes, B., & Conway, M. (2005). A theoretical model for treatment of soft tissue injuries: treatment of an ankle sprain in a college tennis player. *Journal of manipulative and physiological therapeutics*, **28**(4), 285–288. <https://doi.org/10.1016/j.jmpt.2005.03.004>
- Kamani, N.C., Poojari, S., & Prabu, R. G. (2021). The influence of fascial manipulation on function, ankle dorsiflexion range of motion and postural sway in individuals with chronic ankle instability. *Journal of bodywork and movement therapies*, **27**, 216–221. <https://doi.org/10.1016/j.jbmt.2021.03.024>
- López-González, L., Falla, D., Lázaro-Navas, I., Lorenzo-Sánchez-Aguilera, C., Rodríguez-Costa, I., Pecos-Martín, D., Gallego-Izquierdo, T. (2021). Effects of Dry Needling on Neuromuscular Control of Ankle Stabilizer Muscles and Center of Pressure Displacement in Basketball Players with Chronic Ankle Instability: A Single-Blinded Randomized Controlled Trial. *Int. J. Environ. Res. Public Health*, **18**, 2092. <https://doi.org/10.3390/ijerph18042092>
- Park, J.H., Shim, J.W., Cho, W.Y., Kim, J.I., Jeon, J.Y., Kim, H.S., ... & Cho, J.H. (2016). Literature review of tool-based manipulation for musculoskeletal diseases-with focus on guasha and IASTM. *Journal of Korean Medicine Rehabilitation*, **26**(4), 57-65.
- Salom-Moreno, J., Ayuso-Casado, B., Tamaral-Costa, B., Sánchez-Milá, Z., Fernández-de-Las-Peñas, C., & Alburquerque-Sendín, F. (2015). Trigger point dry needling and proprioceptive exercises for the management of chronic ankle instability: a randomized clinical trial. *Evidence-Based Complementary and Alternative Medicine*, 2015.
- Stanek, J., Sullivan, T., & Davis, S. (2018). Comparison of Compressive Myofascial Release and the Graston Technique for Improving Ankle-Dorsiflexion Range of Motion. *Journal of athletic training*, **53**(2), 160–167. <https://doi.org/10.4085/1062-6050-386-16>

- Takumi, Kobayashi, Masashi, Tanaka, Masahiro, Shida (2016). Intrinsic Risk Factors of Lateral Ankle Sprain: A Systematic Review and Meta-analysis. *Sports Health*. pages 190-3, doi: 10.1177/1941738115623775
- Valderrabano, Victor, MD., Horisberger, Monika, MD., Russell, Iain, Dougall, Hugh, Hintermann, Beat (2009). Etiology of Ankle Osteoarthritis. *Clinical Orthopaedics and Related Research*, 467 (7), 1800-1806, doi: 10.1007/s11999-008-0543-6