
EFFECT OF ERGON IASTM TECHNIQUE ON RANGE OF MOTION IN PATIENTS WITH BIMALEOLAR FRACTURE

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Abstract. Ankle fractures are common injury occurring due to low energy trauma. The purpose of the operative intervention is anatomical restoration of the function and anatomy of the talocrural joint. Ankle fractures are of great social significance due to the fact that they most often affect the young age of the population. Rehabilitation after ankle fracture can begin soon after the fracture has been treated by the use of different types of immobilisation which allow early commencement of weight-bearing or exercise. Alternatively, rehabilitation may start following the period of immobilisation, with physical or manual therapies. The ERGON® technique is an innovative therapeutic approach, combining static and dynamic manipulations of the soft tissues of the body with tools for the treatment of neuromuscular and skeletal pathologies. Instrument assisted soft tissue mobilization (IASTM) is a popular treatment for myofascial restriction. **Purpose:** The purpose of this pilot study is to monitor the efficacy of Ergon IASTM (Instrument Assisted Soft Tissue Mobilization) Technique applied to patients after surgical treatment of a bimaleolar ankle fracture in subacute postoperative period on the restoration of the ankle range of motion. **Research methodology:** 17 patients with bimaleolar fracture in subacute postoperative period were studied, distributed as follows: control group - 8 patients and experimental group - 9. The **study methodology** includes functional studies: range of motion of the ankle joint before and after one month application of kinesitherapy. Routine kinesitherapy was applied to control group, and in experimental group, kinesitherapy and Ergon IASTM twice a week were administered. The Ergon technique is applied to each procedure with techniques: rub, wave, excav, ciryax, sculpt, sep, switch, split. **Results:** The empirical material is processed with the statistical package Prism 3.0. The mean values ($\bar{X} \pm SD$) of the range of motion of the ankle joint before and after one month of kinesitherapy were as follows: dorsal flexion in control group was $4.39^\circ \pm 2.62^\circ$ and $7^\circ \pm 3.22^\circ$ in experimental group. After one month of treatment, the results are as follows: dorsal flexion in control group is $11^\circ \pm 3.02^\circ$ and $18.22^\circ \pm 1.32^\circ$ in experimental group. Plantar flexion before the application of kinesitherapy in control group is $23.5^\circ \pm 3.07^\circ$ and $29.22^\circ \pm 3.35^\circ$ in experimental group. After one month of treatment, the results are as follows: plantar flexion in control group is $30.4^\circ \pm 2.88^\circ$ and $41.11^\circ \pm 2.2^\circ$ in experimental group. The differences in the values of the results of the indicated tests in the two measurement periods were statistically significant ($p < 0.05$). The presented data prove the better effect and impact of Ergon IASTM techniques applied in the experimental group compared to convection kinesitherapy in the control group, in patients with bimaleolar fracture in the subacute postoperative period. **Conclusion:** In the pilot study we found that there are statistically significant differences in both groups. Despite the better initial results of the patients in the experimental group, we found that IASTM had a better effect in restoring the ankle range of motion of patients with bimaleolar fracture of the ankle joint, compared with convection kinesitherapy administered in the control group.

Keywords: Ergon Technique, IASTM, Ankle fractures, kinesitherapy

1. INTRODUCTION

The ankle joint is the most loaded articular joint and one of the joints with the most common injuries. Hippocrates was the first to diagnose and repair an ankle fracture in the 5th century BC. Ankle fractures are common injury occurring due to low energy trauma. Unstable ankle fractures are usually treated with operative management (Dhoju, 2019). The most common mechanism that cuts this ligament is foot eversion or external rotation force. Conversely, in the inversion mechanism, the primary ligament injured is the anterior talofibular ligament, and hyper-dorsiflexion trauma might cause syndesmotomic ligament tears or sprains. According to the Lauge-Hansen and the Weber classifications, this fracture is unstable, and it classifies as Supination-External Rotation Injuries III, V (Weber Type B) that requires operative intervention (Koujan, 2020).

The greatest contribution to the study of the mechanism of ankle trauma was made by the author (Lauge-hansen, 1950), who grouped in his work "Fractures of the ankle" bone and ligament injuries in five main types:

1. Supination-adductor type fractures are 10-20% of all ankle injuries.
2. Supination-eversion type fractures are 40-70% of all ankle fractures.
3. Pronation-abduction type are 5-21% of all fractures of the ankle joint.
4. Pronation-eversion type are 7-19% of the fractures in the ankle complex.
5. Pronation-dorsiflexion type is most often caused as a result of altitude injuries and traffic accidents.

The purpose of the operative intervention is anatomical restoration of the function and anatomy of the talocrural joint, anatomical reduction of fractures of the lateral and medial malleoli and to address ligamentous instability when achieving exercise stability (Ochman, 2021). Indications for surgical treatment are luxated and unstable fractures, unsuccessful conservative treatment, open fractures, posterior maleolar fragments larger than 1/3 of the joint surface.

Ankle fractures are of great social significance due to the fact that they most often affect the young age of the population. According to the University Multidisciplinary Hospital for Active Treatment and Emergency Medicine "N.I. Pirogov", fractures in the ankle joint are 17% of all fractures of the musculoskeletal system. According to data from Prof. Ganchev from 1997, fractures of the lower leg bones account for 13% to 25% of all fractures of the musculoskeletal system.

Rehabilitation after ankle fracture can begin soon after the fracture has been treated by the use of different types of immobilisation which allow early commencement of weight-bearing or exercise. Alternatively, rehabilitation may start following the period of immobilisation, with physical or manual therapies. Where it was possible to avoid ankle range of motion after surgical fixation, the use of no immobilisation compared to cast immobilisation also improved ankle range of motion. After the immobilisation period, manual therapy was beneficial in increasing ankle range of motion (Lin, 2008).

Numerous scientific studies are made by kinesi therapists (physical therapists), new innovative tools and methods, as well as the effect of their application, in order to faster and longer recovery of patients with various pathologies.

The ERGON® technique is an innovative therapeutic approach, combining static and dynamic manipulations of the soft tissues of the body with tools for the treatment of neuromuscular and skeletal pathologies. The name of the technique comes from the ancient Greek word "ergon", which means "product of human labor, be it manual or mental, scientific or artistic activity".

Instrument assisted soft tissue mobilization (IASTM) is a popular treatment for myofascial restriction. IASTM uses specially designed instruments to provide a mobilizing effect to scar tissue and myofascial adhesions (Cheatham et al., 2016).

The ERGON IASTM Technique includes specific therapeutic techniques for the diagnosis and treatment of disorders of the musculoskeletal system, which the physiotherapist performs with the help of specially designed stainless steel instruments. All three ERGON instruments are multifunctional and can serve as 10 separate clinical instruments. Each tool has several work surfaces. They feature an ergonomic design that facilitates innovative grips and therapeutic applications.

ERGON® Technique is based on the theory of myofascial meridians, first described by (Myers, 2013).

The impact of ERGON® IASTM Technique (Tasheva, 2019) is aimed at achieving short-term and long-term therapeutic adaptations such as:

- ✓ "Release" of cross-links between connective tissues;
- ✓ Stimulation of anabolic processes in connective tissues;
- ✓ Restoration of the elasticity of the connective and muscular tissue;
- ✓ Facilitation of reflex changes in chronic pathological patterns of muscle activation;
- ✓ Improving the myotatic reflex and neuromuscular control;
- ✓ Stimulation of the healing processes by improving the blood circulation and blood supply;
- ✓ Increased cellular activity, including fibroblasts and mast cells;
- ✓ Reduction of pain and muscle spasm through neurophysiological adaptations;
- ✓ Restoration of the biomechanical function of the joints by releasing fascial constraints and adhesions;
- ✓ Duration of applications - the treatment of an anatomical area is between 10 and 15 minutes.

2. MATERIALS AND METHODS

Purpose. The purpose of this pilot study is to monitor the efficacy of Ergon IASTM (Instrument Assisted Soft Tissue Mobilization) Technique applied to patients after surgical treatment of a bimalleolar ankle fracture in subacute postoperative period on the restoration of the ankle range of motion.

Research methodology: The research is conducted in the Multi-profile Hospital for Active Treatment-Blagoevgrad, Department of Orthopedics and Traumatology. 17 patients with bimalleolar fracture in subacute postoperative period were studied, distributed as follows: control group (CG) - 8 patients and experimental group (EG) - 9. The study methodology includes functional studies: goniometry of the ankle joint before and after one month application of kinesitherapy. Routine, convection kinesitherapy was applied to CG, and in EG, kinesitherapy and Ergon IASTM twice a week were administered.

The following means have been applied in the experimental methodology of kinesitherapy:

- ✓ Joint mobilization techniques;
- ✓ Ergon technique processing – IASTM;
- ✓ Techniques from PNF;
- ✓ Massage;
- ✓ Exercises with equipment;
- ✓ Kinesio Taping.

The **Ergon technique** is applied twice a week, and in the initial procedure the treatment of the scar is done with the help of fingers, due to the increased sensitivity of the area. The Ergon technique is applied to each procedure with techniques: *rub*, *wave*, *excav*, *ciryax*, *sculpt*, *sep*, *switch*, *split*.



We start with the "*rub*" technique with which we prepare the entire lower leg region for work and cause slight hyperemia. It is processed at a 30-40° angle with light pressure.



With the "*wave*" technique we move the fascia in the area of the lower leg in the cranio-caudal direction, the pressure is more significant compared to the first technique, thus we help the sliding of the superficial to the deep fascia. An angle below 30-40° is observed.



With the "*sep*" technique we separate the fascia between the medial and lateral head of *m.gastrocnemius*, the instrument is compressed so that its edge is in contact with the septum, with a small amplitude in the medio-lateral and latero-medial direction below 90° the tissues are processed.



With the "*Cyriax*" technique we process trigger points in the area of the lower leg.



With the "*switch*" technique we process deeply localized adhesions between the heads of m.gastrocnemius.



With the "*sculpt*" technique we mobilize the fascia around the spotted bone and the insertion of the Achilles tendon.



With the help of tools to mobilize postoperative scars, thus used in a short time to improve the application of soft tissues in the clouds of the malleolus.



With the "*excave*" technique we treat the region in the area of the Achilles tendon and minimize adhesions in this area.

3. RESULTS

The empirical material is processed with the statistical package Prism 3.0. The mean values ($\bar{X} \pm SD$) of the range of motion of the ankle joint before and after one month of kinesitherapy were as follows: dorsal flexion in control group was $4.39^\circ \pm 2.62^\circ$ and $7^\circ \pm 3.22^\circ$ in experimental group. After one month of treatment, the results are as follows: dorsal flexion in control group is $11^\circ \pm 3.02^\circ$ and $18.22^\circ \pm 1.32^\circ$ in experimental group. Plantar flexion before the application of kinesitherapy in control group is $23.5^\circ \pm 3.07^\circ$ and $29.22^\circ \pm 3.35^\circ$ in experimental group. After one month of treatment, the results are as follows: plantar flexion in control group is $30.4^\circ \pm 2.88^\circ$ and $41.11^\circ \pm 2.2^\circ$ in experimental group. The differences in the values of the results of the indicated tests in the two measurement periods were statistically significant ($p < 0.05$). The presented data prove the better effect and impact of Ergon IASTM techniques applied in the experimental group compared to convection kinesitherapy in the control group, in patients with bimalleolar fracture in the subacute postoperative period. Increased range of motion during one month of treatment improves the quality of life in patients with this disease.

4. DISCUSSION

The positive effects of IASTM techniques on ROM have been reported by two systematic reviews (Lambert, Hitchcock, Lavallee, et al., 2017), (Cheatham, Lee, Cain, et al., 2016), which found that IASTM can improve functionality and significantly increase ROM immediately after application (Maniatakis, et al., 2020).

5. CONCLUSION

In the pilot study we found that there are statistically significant differences in both groups. Despite the better initial results of the patients in the experimental group, we found that IASTM had a better effect in restoring the ankle range of motion of patients with bimalleolar fracture of the ankle joint, compared with convection kinesitherapy administered in the control group.

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