



- fashion physical activity under different types, and to convince them of their beneficial outcomes.

### References

- Bogdan, C., 1992, Elements of geriatric practice, Medical Publishing House, Bucharest;
- Cristea, E., 1990, Movement therapy in elderly, Medical Publishing House, Bucharest;
- Cristea, c., lozincă, I., 1999, Principles of Rehabilitation Kinesitherapy in elderly, University of Oradea Publishing House;
- Dan M., Lozincăli., 2007, Kinesitherapy in geriatric pathology, University of Oradea Publishing House;
- Dumitru, M., 1984, Active aging, Medical Publishing House, Bucharest;
- Dumitru, Ghe., 1997, Health through sport meaning each, Romanian Federation of Sport for All, Bucharest;
- Dumitru, M., 1982, Geriatrics, Medical Publishing House, Bucharest;
- Niculescu m., georgescu I., marinescu A., 2006, Fitness and state of health, University of Craiova Publishing House;
- Sbenghe, T., 1999, Theoretical and practical aspects of kinesitherapy, Medical Publishing House, Bucharest.

Science, Movement and Health, Vol. XIII, ISSUE 2 supplement, 2013  
September 2013, 13 (2), 679-684

## STRATEGIES FOR KINESITHERAPEUTIC INTERVENTION TO THE RECOVERY FROM ACHILLES TENDON INJURY

RABOLU ELENA<sup>1</sup>

### Abstract

The Achilles tendon rupture is one of the most frequent traumas in professional footballers and it requires an increased attention and a relatively large period for recovery.

*Purpose-* to optimize the recovery from Achilles tendon rupture by kinesic means.

*Treatment methods:* massage and medical gymnastics.

*Results:* improvement of pain, articular mobility and regaining muscle strength.

*Conclusions:* By applying correctly the kinesic means, rapid return to professional sport of the athletes under study was ensured (training and competition).

*Key word:* tendon rupture, physical therapy, pain.

### Introduction

Football causes between 29 – 36% of the total sports traumas. Most specialized services in the country, but also abroad, group this specific pathology of the football game on three categories, namely (Drăgan, 1994):

- Macrotraumatic injuries
- Microtraumatic injuries
- Hyperfunctional injuries.

The methodical errors are among the favouring factors, materialized by unequal training of certain agonist groups, to the prejudice of the antagonist groups. Thus, the large number of muscle injuries in football, occurring particularly to the posterior musculature of the thigh, is due precisely to a large difference in tonus and strength of these groups, resulted from the negligence in training them, although the agonist muscle (quadriceps crural) is by far the most demanded in football (Dragan, 1994).

Nutritional deficiencies, hard weather conditions, inappropriate sports equipment, reduced biological potential due to abuses and non-sportive life are among the favouring causes, as well as errors in the recovery process. Triggering causes of muscle injury or tear can be the direct contusion caused by an opponent, but more frequently the internal opposing forces (muscle contraction or movement's sudden stop) or external (pushing the player by an opponent).

From 1970, the introduction of ultrasound methods and their impetuous development over the following years in clinical medicine made it possible, upon Wagner's effort and collab. Zuinen and collab. that, as of 1980 to find an objective method as well – ecomiography- by which the existence of muscle injury can be found as well (Drăgan, 1994).

*Prophylactic treatment.* The prevention of injuries and of ruptures of this kind is made by a very active lifestyle, dynamic, proper nutrition, removal of

<sup>1</sup>Department Of Healthcare And Physical Therapy, By University Of Pitesti, ROMANIA  
E-mail: nicolelena2001@yahoo.com

toxins from the body.

#### Treatment for Achilles tendon rupture

Functional disability caused by the surgical procedure at **Achilles tendon level**, along with the immobilisation period may result in sequelae: equinovarus deformity, joint block, inability to sustain the body and to perform gait, except heeled.

**The modern opinion in posttraumatic recovery and especially in recovery from Achilles tendon injury** no longer starts from the idea that subjacent, superjacent joints have to be mobilised at all costs, but from the need to regain normal muscle tone and strength; this is a mandatory condition for static and for walking.

*The objectives of recovery:*

- Treating and eliminating oedema;
- Toning the muscles, triceps surae muscles, especially to obtain the desired function;
- Toning the muscle groups that have been damaged by immobilisation, both in the uninjured lower limb and in the one in plaster bandage;
- Re-mobilising subjacent, superjacent joints (fingers, ankle, knees, hip);
- Stretching to relax the muscle groups in contracture or that tend to result in musculotendinous retraction (long stretch) (Pasztai Zoltan, 2001).
- Preventing defective compensating habits with the two well-established phases;

1) *Post-operative phase with gradual recovery on stages, which last for a few weeks or even months,*

2) *The phase of preserving the compensation level gained, which lasts for the entire life. To assess the post-operative outcomes, Județ and Benssay suggested the following criteria:*

- Oedema ;
- Pain (rated 0,1);
- Tibiotarsal mobility and stability (TT);
- Triceps' strength: toe and heel walk;

#### Recovery principles

The re-education, after the immobilisation is over, should be made very carefully, as there is the risk to unsettle the scar;

Recovery movements shall be solely active or active-assisted (not-passive!!!) – performed in neutral water, 37-38°C, until the elasticity, muscle and joint mobility is gained;

Voluntary contraction is the basic agent of mobilization. It has the following advantages:

- Helps to recover muscle elasticity;
- Is the most active element which determines blood's venous return from the periphery to the center;
- Fights against oedema;

- Favours the slips of different anatomical frames;
- Fights against venous stasis;

#### Recommendations concerning the Achilles tendon rupture

1. *Immediate actions-* these are the actions that need to be taken immediately after trauma, being related to the first-aid measures. Cold, moist gauzes are to be applied, at a temperature of 20 - 25°C and the patient is carried by other people, in order to prevent complications by bipodal posture. The leg is placed in a mild plantar flexion, 10 - 15° so as not to stress the injured tendon (it is recommended that the leg stays in the position in which it remained after the trauma suffered). All these actions are taken so as not to cause possible total rupture (from a partial one).

2. *Urgent actions-* these are the actions that are taken in 24-48 hours after the trauma's occurrence, and is the appanage of the surgeon.

3. *Actions in the immobilization period-* these are actions differentiated depending on the patient's status (kinesitherapy at the bed, hospital or at home). These actions differ also depending on the retention: femoral and podal, short or ice-type plaster bandage. In this phase of recovery, movements with the help of devices can be made: walking frame, axillary or Canadian crutches, and canes, without support on the injured lower limb in order to maintain the correct walking engram.

**Purpose-** to optimize the recovery from Achilles tendon rupture by kinesic means.

In athletes, especially after a period of interruption, the period needed for body's gradual return to maximum effort capacity is considered. Recovery from effort should be made on all levels – physical, metabolic, psychical, in terms of diet – and kinesic treatment of microtraumas should become a rule. (Pasztai, Z., 2001).

The research was made for 6 months on 2 professional footballers with Achilles tendon rupture, aged 24, respectively 27 years old.

The kinetic program was carried out 4 times per week, with duration of about 40 – 50 minutes, gradually increasing the repetitions number or their difficulty, depending on the stage, gravity and evolution of each subject's diagnosis. The existent organisational framework, as well as active and conscious participation of subjects facilitated the carry out of the research under good conditions.

#### Sports- medical anamnesis

Name: T. B.

Gender: male

Date of birth: year: 1985, month: July; day: 5

Address – Locality- Pitești

Position: student

Sports classification: professional footballer

LIVING CONDITIONS:



Dwelling: At home

Diet: - hour – set depending on the training program

- excess - YES
- alcohol consumption – NO
- smoking - yes

TRAINING CONDITIONS:

- Gym, materials and equipment's hygiene:  
GOOD

Training schedule – set depending on the competition phase

- HEREDO - COLLATERAL CLINICAL RECORD (AHC)
- Pathological - NO

PERSONAL HISTORY:

- physiological: normal growth and physical development
- sport-related: he started playing football at age 6

FEATURES OF SUPERIOR NERVOUS ACTIVITY

- Workload: average
- Balance of psychical processes: good
- Mobility of psychical processes : good

ATHELETE'S CURRENT STATUS –trauma at ankle level.

Diagnosis: **Achilles tendon rupture.**

Along with anamnesis and after making the initial diagnosis, we shall draw-up the individualized recovery program.

The kinetic program was carried out at three weeks after surgery.

**Objectives:**

- Regaining articular mobility;
- Regaining strength and muscle tone;
- Controlling the inflammatory process and fighting against pain;
- Reducing to the minimum the effects induced by kinetic activity's interruption;
- Restoring muscle coordination typical to the motor activities specific to the sport played;
- Improving effort capacity;
- Return to sport (training and competitions) by setting fitness and warm-up programs.

**Specific methods for assessment**

- Assessment of articular movement's total range of motion;
- Iordănescu Baciu assessment scale
- Pain assessment scale 0-5

**Means:** physical exercise

**I. Exercises program to recover from the Achilles**

**tendon rupture**

**DAYS 1-5**

1. From a dorsal decubitus position, a flexion and a plantar extension are made (alternately 2 x 10 repetitions with the injured limb);
2. From a dorsal decubitus position, the pedal is pushed with counter –resistance (alternately 2 x 10 repetitions with the injured limb);
3. Walking with support between two parallel bars (2 x 3) ;
4. From a sitting position, deep inspiration, moving the upper limbs sideways and upon expiration, taking them close to the body (2 x 10).

**DAYS 6-11**

1. From a bipodal position, feet slightly spread, torso pushed in front, with support on hands at one bar, toe-lift is done, and from this position, shifts from one leg to the other are done (alternately 2 x 10 repetitions with the injured limb, then with the uninjured one);
2. from a dorsal decubitus position, lower limb is slightly lifted at 15-20° and held for 5 seconds and flexion- extension of the leg is made (alternately 2 x 10 repetitions with the injured limb, and then with the uninjured one);
3. legs on the ground, at an arm's length from the wall, body is slightly bent forward, keeping it straight in the front; from this position is made the return to vertical position by contracting the triceps surae muscle 2 x 10 repetitions with the injured limb, and then with the uninjured one;
4. heel walking on the post-external side, foot in dorsal flexion and in supined posture (alternately 2 x 10 meters with the injured limb and then with the uninjured one);
5. from dorsal decubitus position, ankle abduction exercises are made, without and with opposing resistance (for the lateral short peroneal muscle), simultaneously (2 x 10);
6. walking with support between two parallel bars (2 x3);
7. normal walk on two lines traced on the carpet (2 x 3);
8. from sitting position, deep inspiration, moving the upper limbs sideways and expiration upon taking them close to the body (2 x 10).

**DAYS 12-17**

1. from dorsal decubitus position, doing leg flexions and extensions with 1,5 kg

- sandbags tied to the ankles (alternately 2 x 10 repetitions with the injured limb);
- 2. from standing position, face against the wall at an arm's length, arms are flexed, coming closer to the wall, heels do not detach from the ground, lift, holding the leg for 5 seconds (alternately 2 x 10 repetitions with the injured limb);
- 3. Position on the knees with posterior on the lower legs, feet on the ground with dorsal-external side;
- 4. from an upright posture, toe-lift is done (2 x 10);
- 5. normal walking on the lines traced on the carpet (2 x 3);
- 6. from standing position, deep inspiration, moving the upper limbs sideways and expiration upon taking them close to the body (2 x 10).

**DAYS 18-25**

- 1. great toe extension with a belt, band, etc (alternately 2 x 10 repetitions with the injured limb, then with the uninjured one);
- 2. from dorsal decubitus position, with two dumbbells weighing 2,5 kg tied to the ankle, lower limb is slightly lifted at 15-20° and held in that position for 5 seconds with leg flexion – extension (alternately 10 repetitions with the injured limb and

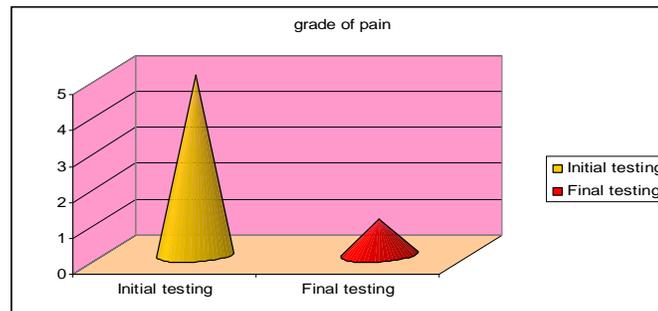
- then with the uninjured one);
- 3. toe-lift with a barbell on the back with variable weight (alternately 2 x 10 repetitions with the injured limb, then with the uninjured one);
- 4. dorsal and plantar flexion, inversion and eversion, abduction and adduction, leg circumduction, as well a flexion done with more difficult repetitions (alternately 2 x 10 repetitions with the injured limb, then with the uninjured one);
- 5. from standing position faced against the espalier, forefoot on a sandbag, heel on the ground, the healthy leg is lifted as high as possible on a bar of the espalier (2 x 10);
- 6. normal walking on two lines traced on the carpet, having 2,5 kg sandbags tied to the ankles (2 x 3);
- 7. stepper exercises (3 x 5 min);
- 8. running on a track with a 10° incline (3 x 10min);
- 9. stationary bike pedalling by gradually increasing pedalling difficulty, 2 x 10 minutes;
- 10. from standing position, deep inspiration, moving the upper limbs sideways and expiration by taking them close to the body (2 x 10 rep.).

**Results**

**1. Assessment of pain scale**

|               | Initial testing | Final testing |
|---------------|-----------------|---------------|
| grade of pain | 5               | 1             |

**Table no. 1 assessment of pain scale**



**Graphic no. 1 assessment of pain scale**

In terms of pain scale, a reduction in pain is seen toward the end of the recovery period, fact

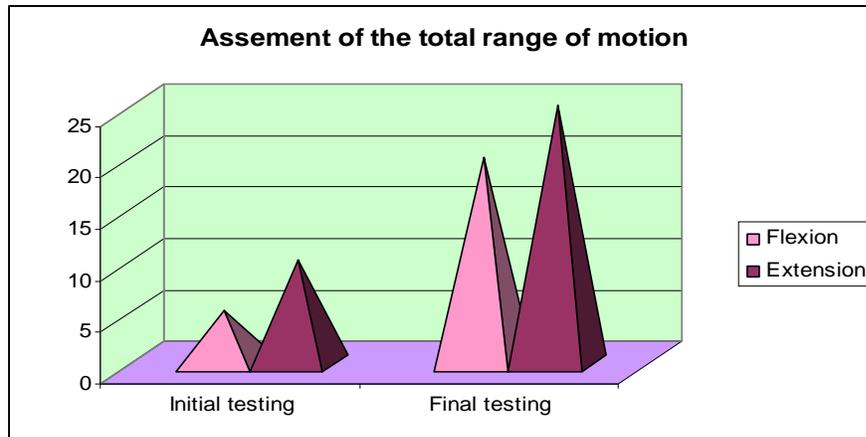
resulting from the kinetic program's effectiveness, combined with medication therapy.

**2. Assessment of the**

| articular movement | Initial testing | Final testing |
|--------------------|-----------------|---------------|
| Flexion            | 5               | 20            |
| Extension          | 10              | 25            |

**total range of motion**

**Table no. 2 Assessment of the total range of motion**



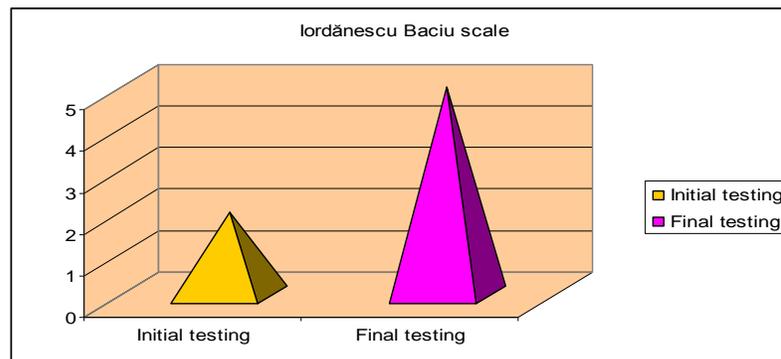
**Graphic no. 2 Assessment of the total range of motion**

Articular movement registers an increase by 15° on flexion and 15° on extension, the athlete being able to return to training at a low intensity after 6

months of recovery, as compared with an unusual training.

**3. Assessment of muscle strength**

|                        | Initial testing | Final testing |
|------------------------|-----------------|---------------|
| Iordănescu Baciu scale | 2               | 5             |



**Graphic no. 3 Iordănescu Baciu scale**

As far as muscle strength is concerned, it increased, as seen on the scheme, from 2 to 4 on Iordănescu Baciu's scale, the resulted movement being of normal range and strength; they maintain at optimal parameters, as long as there is activity occurring.

- The foot has a great static and dynamic role, being the key factor for locomotion. It represents, along with the ankle, an anatomo-functional complex meant to support the entire weight of the body and to ensure walking under any circumstance. This is why

**Discussions**



ankle's joint trauma sequelae, which comprises all the anatomical elements (tegument, ligaments, muscles, tendons, vessels and nerves) are very important and problematic in terms of recovery.

- Data gathered in the first consult help establish treatment and recovery program, which should be early, complete and uninterrupted.
- The means used have to stop the inflammatory process, fight against pain, to help in relaxation, posture and medical gymnastics.
- Sports activity will always lay accent both on patient's return to sport as soon as possible, without neglecting the three recovery stages, and on preventing recurrences. Athletes will be thus recommended to:
  - do warm-up and stretching exercises: before any intense sports or physical activity, warm-up exercises should be done for 5 to 10 minutes, as well as walk on the bicycle, stretching the lower legs that will prepare
  - Achilles tendon and muscles for subsequent activity;
  - stretches working on different muscle groups can also be done;
  - avoid any sports or physical activity that the body couldn't face;
  - wear shoes protecting the heel, comfortable and adapted for physical activity;
  - wear orthopedic devices that reduce overstraining the Achilles tendon.
- Leontescu (2011) thinks that kinetic recovery is an important part of this injury's treatment by passive and active exercises to remobilize ankle's joint, and not just that of the injured limb, but of the uninjured one as well.
- Sbenghe (1987) supports the idea according to which recovery from a tendon rupture depends upon the correctness of the kinetic treatment applied, on the observance of kinetic objectives, and on the careful selection of recovery methods and techniques.

### Conclusions

- By applying correctly the recovery methods, rapid recovery of the athletes under research (case studies) to professional sport (training and competition) was ensured.

- Ensuring kinesitherapeutic treatment was made considering the requirements of ensuring continuity, rhythmicity and consistency within kinesitherapy sessions.
- By carrying out the kinetic treatment proposed, apart from the correct recovery of injuries, reduction in the frequency of muscle pain's occurrence, increase of articular mobility and muscle strength were obtained.
- Upon finalizing research and analysis of the results obtained, we can strongly state that the use of means specific to kinesitherapy successfully contribute to the optimization of return to professional sport of athletes having physical traumas.
- The base for medical recovery is patient's assessment. Special accent should be laid on pointing out dysfunctions and their assessment. Recuperating assessment should be thorough, the aim of recovery being to develop fully physical, mental social and professional abilities of the patient.
- Muscle toning is simple, monotonous and long-lasting. This is why one of the conditions to get an effective therapy is to gain the patient's collaboration and to persuade them on the necessity of perseverance and continuing treatment on a period of time. The patient's recovery is pursued up to "restitutio ad integrum".

### References

- Baciu, CL., 1981, Pre – and postoperative kinesitherapy, Sport-Tourism Publishing House, Bucharest;
- Cordun, M., 1999, Medical Kinetology, Axa Publishing House, Bucharest;
- Drăgan, I., 1994, Applied Sports Medicine, Editis Publishing House, Bucharest;
- Drăgan, I., 1996, The practice of sports medicine, Medical Publishing House, Bucharest;
- Drăgan, I., 2002, Sports Medicine, Medical Publishing House, Bucharest;
- Ionescu, A., 1994, Medical gymnastics, Big All, Publishing House, Bucharest;
- Sbenghe, T., 1999, Theoretical and practical aspects of kinesitherapy, Medical Publishing House, Bucharest;
- Sbenghe, T., 1987, Kinetology prophylactic, therapeutic and recovery, Medical Publishing House, Bucharest;
- Pasztai, Z., 2001, Kinesitherapy in functional recovery of the musculoskeletal system, University of Oradea Publishing House.