

**RECOVERY AND REINTEGRATION IN SPORTS OF AN
ATHLETE AFTER SURGERY OF ACHILLES TENDON
RUPTURE**

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Abstract:

Athlete training, both the beginner and the advanced one, has now become a complex science. It refers to elements of pedagogy, biology, chemistry, physics, medicine, mathematics and other sciences; training adapts and integrates all together in the benefit of the human body. In this long journey, full of searching, the body adapts to new conditions, always without danger.

Introduction

The need to prevent athletes injuries is extremely high, especially in the first standard of performance, whereas at this level is expected outstanding results. To achieve this goal, coach must send in sports competition, athletes clinically healthy. Reducing the number of injuries, is therefore extremely important.

The injuries are the result of a complex interaction between multiple risk factors and undertaken sport activities. Studies of sports injuries require a dynamic model that can be adapted to the multifactor etiologic nature, also can watch the entire series of events that eventually lead to its occurrence.

Such a dynamic model described by Meeuwisse (1994).

Meeuwisse developed a theoretical model that includes all factors involved in producing injury, demonstrating that it is based on a complex interaction between internal and external risk factors, and not a single trigger event.

Hypotheses are proposed for demonstration:

- What extent the application of early kinesiology treatments can influence the evolution parameters of mobility, strength, stability;

- If the subject, who followed the kinesiology programs will be able to go back to the formal normal training rhythm;

The facilities at the Kinesiology and Swimming Department are:

- Swimming pool;
- Massage therapy rooms;
- Electrotherapy room
- Sauna and fitness room

During the experiment the following appliances were very helpful:

- Swimming-pool: handrail, stairways, mobile devices (rafts, balls, etc.)
- Massage room: massage bench, ice packs for inflammatory stage;
- Electrotherapy: multifunctional combined electrotherapy: interferential current, ultrasound, laser, EMS, TENS.

Multipurpose hall of physiotherapy and fitness: trellises, gymnastics benches, pulleys, reels correction, sand bags, stationary bicycle, stepper, medicine ball, ankle flexion and extension device, treadmill,

The subject, A.I. , 26 years old, is an athlete of Suceava, University Sports Club, practicing athletic performance semi - fond running, from the age of 10 . Over time, the athlete suffered numerous injuries to the ankle and foot.

Stage III A (after 75 days)

GOALS:

- A. To relief the pain.
- B. To increase joint mobility.
- C. To increase muscular strength and endurance.
- D. To increase coordination and stability.

Means:

- Continue to be applied means of phase-II, increasing the number of assets;
- Hydro- kinesiology with the affected limb loading: walking on tips of the toes and normally;
- Massage for the remaining scar;
- Stretching of the calf muscles, when the retraction appeared;
- Static exercises of traumatized segment with moderate and medium intensity;
- Passive and active mobilization of the ankle;
- Active mobilization and active resisted exercises of the knee and hip;
- Walking with support, but no heel device.

After 90 days, walk on the tips of the toes

Treatments:

- Leg massage technique associated with Cyriax techniques for the affected tendons and ligaments - 10 minutes;
 - Hydro-kinesiology - 15 minutes;
 - Interferential currents - 20 minutes 3 times per week;
 - Static exercises of moderate and high - 10 minutes (10...15 repetitions for each exercise);
 - Stretching - 5 minutes;
 - Kabath method to strength the muscles - 5 minutes;
 - Neuroproprioceptive facilitation ILO, EN, CR, CR) – 15 minutes;
 - Exercises using fitness equipments (devices) - 10 minutes.
- Patient will be instructed how to perform Bürger exercises at home.



Fig.nr.1 Cycling on stationary bicycle

Stage IV (after 90 days)

GOALS:

- A. To increase muscular strength and endurance.
- B. Restoring leg stability.
- C. Restoring sensory - motor segment affected.

Means:

- To continue kinesiology programs to increase muscles strength and improve endurance;
- Active mobilization active resistive exercises of the ankle;
- It must be recovered full dorsal flexion of the foot. It insists on toning the calf muscles(gastrocs, soleus)



Fig. No. 2 Exercise to stepper

To develop muscle strength, the following resistive exercises program:

- Set I - exercises 40% of maximum muscle strength (10 RM - repetition maximum);
- Set II - exercises 30% of maximum force, more intensive repetitions - 20 repetitions;
- Set III - same resistance with exercises to fatigue;
- Set IV - isometric exercises - 10 repetitions.

To restore sensory - motor lower limb stability and ability were executed:

- Proprioceptive stimulation exercises: walking on varied terrain, walking on sand, grass, running, exercises with imbalance. Walking on the tips of the toes and jumping shown to be achieved in the final stage.

Maintenance program will be recommended depending on individual moral characteristics - patients volitional.

A treatment session:

- Hydro kinesiology: therapeutic swimming(crawl, backstroke and breaststroke) 15 ... 30 minutes;
- Stimulating massage to improve muscle tone - 10 minutes;
- Neuroproprioceptive facilitation (ILO, EN, IA, Iza) - 10 minutes;
- Active exercises, active resisted - 10 minutes (20 repetitions for each exercise);
- Stability exercises, 10 minutes;
- Proprioceptive stimulation exercises (walking on varied terrain, walking on the sand, walking on the heels) - 5 minutes;

Stage v-(after 6 months):

GOALS:

- A. Social-professional reintegration.
- B. Maintenance exercises -program.

Means:

- Proprioceptive stimulation exercises (walking on varied terrain, walking on the sand, walking on the heels, etc.)
- Specific exercises for a specific sport.

The therapist in the coach set a maintenance program for the athlete to avoid any post surgery complications.

Based on collected subjective and objective data, we examined the patient in various stages of development. Thus we assessed patient pain based on pain scale (from 0 to10), from the first day of treatment until it disappears as follows:

RATING	INITIAL	Phase I	Phase II	Phase III
Calcaneus	7	5	3	0
Ankle	6	5	2	0
Leg	8	7	5	1

D. Functional test

Measurements

Following inspection and palpation, it was observed the presence of a high enough atrophy in the calf and thigh, which required the thigh and calf circumference measurement to show its extent and evolution. Measurement was made using metric device comparing the healthy member and the affected member at the beginning of each stage of treatment.

Evaluation	Stage I		Stage II		Stage III		Stage IV		Stage V	
	R	L	R	L	R	L	R	L	R	L
Leg	35	41	35	41	36	41	38	41	40	41
Thigh	45	50	47	50	48	50	49	50	50	50

Joint balance

Somatoscopic examination revealed an attitude of right foot plantar flexion and a light knee flexion. The joint assessment with goniometry, there was a lack of mobility in the ankle plantar and dorsal flexion both legs as the knee flexion and extension. Deficit at the knee level is not caused by complication, but due to ankle immobilization and knee inactivity.

Evaluation	Stage I	Stage II	Stage III	Stage IV	Stage V
Plantar flexion	35 °	35 °	42 °	47 °	50 °
Dorsal flexion	-15 °	0 °	5 °	12 °	15 °
Flexion knee	50 °	90 °	130 °	135 °	135 °
Extension knee	20 °	7 °	2 °	0 °	0 °

Muscles assessment

To assess the status of the calf muscle and foot muscle is necessary to take 0 - 5 scale testing muscle strength. They tested the main muscles that move the leg as follows:

Evaluation	Stage I	Stage II	Stage III	Stage IV	Stage V
Gastrocs and soleus muscles	F1	F2	F3 +	F4	F5
Tibialis anterior muscle	F2	F3	F4	F4 +	F5
Peroneus longus muscle	F3	F3 +	F4	F4 +	F5
Tibialis posterior muscle	F3	F3 +	F4 +	F4 +	F5

Statics and dynamics

Examination of statics and dynamics: statics and gait assessment is mandatory not only for full and correct evaluation of functional deficits, but also to set up the program and recovery methodology.

In considering the statics and dynamics of the lower stage I noted:

- Maintaining bipedal position is maintained for a limited time because of pain;
- Walking was performed with 2 axillary crutches with knee slightly bent to protect Achilles tendon;
- Climbing stairs and going down is made with difficulty;
- After removal of pain, muscle strength development has helped increase joint stability and movement's ability of the affected limb.

The main objectives during the kinetic treatment applied were:

-Fighting edema.

- Pain relief.
- Increasing mobility of the traumatized segment
- Increasing muscular strength and endurance.
- Increasing coordination and stability
- Sensory - motor restoration of the affected segment
- Socio-professional reintegration (sports).

Relaxing massage and manual lymphatic drainage, joint mobilizations and exercises Burgers type, along with other adjuvant therapies have led to relief pain and trophic changes that were presented from the beginning.

Starting from the initial test values, using an appropriate methodology to the situation, insisting on better joint training, massage, hydro kinesiology, mobilization, passive stretching, active mobilization, it was gradually reduced joint deficit in the third stage. He recorded an apparent increase mobility and final stage, mobility deficit is removed.

To increase muscle strength isometric contractions started and continuing with concentric exercise, eccentric exercises with resistance. Those exercises did not interfere with the surgery place. Thus in stage-IV the strength of the muscles realizing the main movements of the leg was almost normal.

Static and dynamic body balance was compromised at the patient entry into treatment. Walking is done with axillary crutches. Bipodal and unipodal balance were not possible, triceps sural showing a low elasticity. Switching to a static equilibrium and a good free walk was performed by loading the affected limb gradually, with increasing muscle strength.

To restore sensory - motor function of the affected leg the techniques of rhythmic stability and of alternating isometrics were very useful in addition to proprioceptive exercises with various devices.

Using movements in open and closed kinematics chain have helped to restore motile control and ability affected limb.

Reintegration of patient in the socio-professional activity was easily as functional deficit was eliminated. To achieve it, there were used exercises taken from the practiced. At the end of treatment the patient was instructed on the maintenance program and to prevent relapses and complications.

To highlight better the efficiency of the kinetic program established at the end of treatment, before of the sports reintegration, a rapid global test leg was done, to help form a final conclusion. The following tests were carried out giving values of each execution (3 = good 2 = average 1 = insufficient)

1. Subject is asked to stand on the tips bipodal and unipodal balance; (Plantar flexors: triceps sural(gastrocs and soleus), posterior tibialis, peroneus, toes flexors);
2. Subject is required to maintain balance in standing on heel (dorsal flexors of the foot);
3. Subject is asked to go on the lateral edge of the foot (inversion – anterior tibialis);
4. It requires the subject to walk then on the internal edge of the foot (eversion – longus peroneus and minimus peroneus);
5. It requires the subject to walk normally on a given distance.

TEST	Value obtained	NORMAL VALUE
Bipodal plantar flexion	2	3
Unipodal plantar flexion	2	3
Bipodal dorsal flexion	3	3
Inversion	3	3
Eversion	3	3
Walking	3	3

As a conclusion of this study, analyzing the obtained results during the experiment can be stated:

All hypotheses were tested:

- Early application of physical therapies treatments improve parameters influencing the evolution of mobility, strength, stability positively;
- Physical therapies programs in the application subject resumes normal training pace before of the injury.
- Processes included in the recovery methods that have been listed as a value in the results were:
 - Cryotherapy, applied after mobilization and during the day for analgesics and anti-inflammatory effects;
 - Electrotherapy to combat swelling and pain;
 - hydro - kinesiology for its calming effects and ease of movement in water can be achieved;

- Tendon-muscular joint mobilization with extended scope that led quickly to increase soft tissue elasticity and joint amplitude;
 - Return to the socio-professional activity of patients who have ruptures of Achilles tendon needs to be made when there is an amplitude of joint movement and muscle strength by 85-100%;
- Conclusions reached from making investigation and confirmation of the hypothesis from which it began is an example showing that kinesiology as a part of physical therapies is the means of physical treatment that can not be replaced by other rehabilitation mean. Kinesiology occupies a central place in functional recovery.

References:

1. Baciu C., "Musculoskeletal apparatus" Medical Publishing, Bucharest, 1981
2. Carligelu V. Duma E., Simu Z., "Physical care and herbal therapy" Ed UTCM Cluj - Napoca, 1997;
3. Cataniciu V., "Physical therapy and a healing art of movement" Ed Todescu, Cluj - Napoca, 2001;
4. Avramescu Floor, Rusu L, Ciupeanu - Calugaru D., 2005, Human Anatomy Ed Universitaria Craiova
5. Clark BL, Derby Ac Power Gr: "Injures of the lateral ligament of the ankle": Conservative vs. operative repair, J Can Surge, 1995;
6. Cordun Mariana "Medical Kinesiology", Ed axis, Bucharest, 1999;
7. Dragan I, "Applied Sports Medicine, Ed Editis, Bucharest, 1994;
8. Dumitru D., " Physiotherapy guide", Sports Tourism Bucharest Ed 1981;
9. Gorun N., A. Voinea, Vessei A. and TiroiC., L. C., "Orthopedics and Traumatology" Scientific and Encyclopaedic Publishing House, Bucharest, 1987;
10. Pop L. "Course balneophysiotherapy and rehabilitation;
11. Sbenghe T., "Kinesiology as prophylaxics therapy and rehabilitation", Medical Publishing House, Bucharest 1987;
12. Sbenghe T., "Medical recovery of traumatic limbs", Medical Publishing House, Bucharest, 1981;
13. Stroescu I. Negoiescu M., "Functional Recovery in rheumatologic practice. Progress in functional diagnosis. Medical-surgical methods and techniques, "Medical Publishing, 1979;

14. V. Poenaru, Petrescu P Buse I Raibulet T, "Trauma and functional recovery in athletes", Ed Facla, Timisoara, 1985;
15. Radovic I, San-Marín Helen "Recovery traumatized athletes" Stadium Ed, 1973;
16. Mark V., "Massage and physical therapy, Ed Sports Desk, Bucharest, 1983;
17. Mark V., Child Carmen, "Massage and complementary techniques", Oradea, 1995;
18. PÁSZTOR Z., PÁSZTOR E., "Using the methods in joint gymnastics gymnastics, Ed. Bucharest Review of Education - Physical and Sport;
19. Robanescu L. Mertoiu M., "Some reflections on sural triceps function, Romanian Physical Therapy Journal, 1996;
21. Rinderu ET, Kinetoprofilaxie, Lecture Notes, Universitaria Publishing House, Craiova, 2008.

Titlu: Recuperarea și reintegrare în activitatea sportivă a unui atlet după o operație de ruptură de tendon Ahilian.

Cuvinte cheie: recuperare, reintegrare, atlet, tendonul lui Ahile.

Rezumat: Pregătirea atleților, atât începători cât și avansați, a devenit o știință complexă. Aceasta se referă la elemente de pedagogie, biologie, chimie, fizică, medicină, matematică și alte științe; procesul de antrenament le adaptează și integrează pe toate împreună în beneficiul organismului uman. În acest drum lung, plin de cautare, organismul se adaptează la noile condiții, întotdeauna fără pericol.

Titre: D'rétablissement et réintégration dans sport d'un athlète après chirurgie de rupture du tendon Achille.

Mots-clés: relèvement, de réinsertion, des athlètes, du tendon d'Achille.

Résumé: L'entraînement des athlètes, à la fois le débutant et celui de pointe, est devenue une science complexe. Elle se réfère à des éléments de la pédagogie, biologie, chimie, physique, médecine, mathématiques et autres sciences; adapte la formation et intègre tous ensemble dans l'intérêt du corps humain. Dans ce long voyage, plein de recherche, le corps s'adapte aux nouvelles conditions, toujours sans danger.