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**APPROACH TO THE REHABILITATION OF INJURIES OF THE KNEE THROUGH INSTRUMENTAL EVALUATION OF THE RESULTS OBTAINED.**

**Dr. Giancarlo Di Filippo - Italy**

The injury of the re-education of the knee represent a fundamentale chapther in rehabilitation brings together different issues, mainly orthopedic and neurological.

In light of current neurophysiological knowledge, it can be said that the concept of "muscular atrophy ex non-usu" can be considered outdated.

Indeed, it seems essential for the establishment of this framework not only the period of skeletal immobilization, because the role of the articular proprioceptive receptors that, through a feedback mechanism acting directly on muscle and determine the proper tone and trophism.

The sense of position of joints, although recoverable within physiological limits, however, is disrupted in disorders of the knee, and is now known that abnormal afferent system may affect the central nervous system. For this reason, in these disease patterns, it seems appropriate to the use of proprioceptive exercises.

From 2000 to 2006 there are examined 200 cases involving various diseases borne of the knee extensor distributed as follows: 144 cases of reconstruction of anterior cruciate ligament in 32 of meniscectomy, 14 fracture of patella and 10 of other diseases.

It 'was then set up a standard program of recovery prefixing three priority objectives:

- recovery of a correct articular excursion,
- recovery of muscle trophism
- recovery of the key body.

Our experience has mainly involved the rehabilitation of the results of reconstruction of the LCA, constantly adapting to changes rehabilitative surgical techniques that have suffered in recent years.

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Remember that the therapeutic exercises should be started as soon as possible and, in a sequence that takes into account the specificity of the disease.

We also used in recent years, a computerized method for assessment of ballistic motion (Ergopower) who provided us with objective information on muscle function and activity through dynamic surface EMG, with simultaneous assessment of the muscles and the rectum anterior lateral and medial large.

Patients were evaluated before surgery, after 3 months and at the end of treatment, noting strength, power and speed of leg extension with physiological movement speed limit, and maximum resistance against sub-ceiling. The values obtained were then compared with those derived from the same recording on the contralateral.

Through this test were obtained guidelines for functional recovery in the long term treatment, reported the experimental investigation of a restoration of balance in the relationship strength of the extensor muscles of a complete recovery of joint function and muscle activation.

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# EVALUTATION OF SUBCLINICAL FUNCTIONAL ALTERATIONS IN HAMSTRINGS MUSCLES.

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## Introduction

The purpose of this research was to assess possible subclinical functional alterations of hamstrings muscle in professional athletes. For subclinical functional alteration mean a microlesion, usually asymptomatic, out of the muscles to be examined, actual or past, which allows the athlete to perform the athletic performance but with less than its real possibilities.

For the analysis of muscle forces have been invoked **Muscle-lab Bosco System** (KB-Ergotest-Ky-Jyvaskyla, Finland), which provides an assessment isotonic morphological characteristics of functional hamstrings muscle.

## Materials and methods

### Description of Musclelab

The Muscle-lab Bosco System processes the data of mechanical power, strength and speed of a gesture isotonic, is connected to a computer that processes all the information gathered. It is equipped with four channels of surface electromyography (sEMG). The measurement of the mechanical component of the gesture through a wire winding comes in a box (enconder wire), which is set in the search at issue, the lumbar area of the subject, through a belt. This apparatus is used to detect the vertical velocity for athletes at the time of its detachment from the earth. A microprocessor located inside the process to ensure all data collected by the electrode surface. The processing result is a graph showing the activity for each evaluation stage, the different muscles taken into consideration.

### Subjects

The sample examined consists of athletes agonists, selected without any prior investigation and without distinction of age and / or sex. The selection was guaranteed by the policy of diversification, both in the sport that the company belongs. subjects under study are football and volleyball: The muscles investigated were hamstrings muscle femoral upright and bilaterally. Evaluation of extensibility and subclinical functional alteration was performed only on the

hamstrings muscle, more committed. Participated in this study a group of 21 athletes, 8 and 13 volleyball players, including 9 men and 12 women, with an average age of about 21 years.

**Method Followed**

This test allows evalutation the response of hamstrings muscles to sudden stretching. The subject must perform a vertical jump (squat-jump) starting with the legs bent at 90 degrees, keeping the torso erect and hands on hips. The test shall be performed without run and without the help of the upper limbs.

If, during the making of Squat-jump exactly when detachment of feet above the ground, recorded a surge (spike) of myoelectric surface hamstrings muscles, this will be a sign of an altered response of the muscle itself sudden stretching and then an abnormal muscle contraction (subclinical functional impairment).

Before testing any of the authors (GDF) has instructed every athlete on the protocol of the test signed by the athlete himself to an informed consent in respect of privacy, and has collected anamnestetic data (past and / or current conditions of a load 'apparatus osteo-myo-articular, suffered any surgery, drug therapies and physical therapies).

Were subsequently included in the physical computer's needs, such as height, weight, length of lower limbs (measured from large trochanter until external malleolus) beyond the age and sex.

The surface electrodes were placed on the skin projection of the abdomen muscles of the rectum and the femoral hamstrings of both lower limbs. Finally snap the string of the encoder level of the lumbar area.

Before you run the real test was necessary to carry out the calibration for each muscle taken into account (right femoral, hamstrings muscle left and right, left), obtained through an isometric contraction sustained for a period of about five seconds. This allowed the study of myoelectric activity of agonist and antagonist muscle.

Run what the athlete is taught the proper execution of the test (Squat Jump) by repeating ten o'clock jump through in order to select those considered best.

Subsequently, the data emerging from the test were analyzed, also using anamnestetic data collected above, for the detection of possible subclinical alterations in muscle loading hamstrings.

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**Discussion**

Of the twenty evaluated athletes, seven, just five women and two men, presented a sub-physiological loading of the muscles hamstrings .

If no subclinical functional impairment, it is noted that at the peak of the speed (0.2 sec.) Moment when you have the posting of feet above the ground with consequent stretching of the muscles hamstrings, not recorded sudden peak of they hamstrings muscles.

This allows us to say that the person concerned has no subclinical functional alterations.

More over by comparing the values of the average power of the muscle groups that is observed in this subject without subclinical alteration, the ratio between the average of the left hamstrings and the corresponding right femoral artery is less than one (and similarly for those of right ) as during the conduct of the Squat Jump are the muscles of the front of the thigh than in the rear part as agonists to the movement and then to have a power greater than that of the hamstrings muscles.

If the athlete is suffering from subclinical functional impairment, at the peak of maximum speed (0.3 sec), a sudden increase (spike) hamstrings muscles, a sign of a pain in the muscles themselves, which means the presence of a probable subclinical functional alteration. In this case the comparison on the power recorded during the Squat Jump evidence of a relationship between increased muscle hamstrings left and the right femoral correspondent that allows us to hypothesize that a loading of the muscles hamstrings is the probable subclinical functional alteration . Similarly on the right.

**Conclusions**

**The study revealed functional alterations in subclinical 33.3% of cases, with an incidence of 71.5% from the female and 28.5% male. The Squat Jump allows in any case the evaluation of the electromyographic response to detect a change (spike) as a likely indicator of subclinical functional alteration. In conclusion, the test can be considered an excellent technique for detecting early muscle pathologies difficult to find.**

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# ERGOPOWER AND ISOKINESI IN EVALUATION OF MOVEMENT: A COMPARISON OF TWO METHODS.

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**Instrumental investigations are at present a valuable and increasingly important to support the action of a doctor and are increasingly the key points in the diagnosis as for developing therapeutic.**

This scenary is not and should not be less rehabilitative medicine, in which the appearance and diagnostic treatment are closely linked in terms of best possible recovery, both in social and physical profile.

The tools that technology makes available to health professionals need to be finalized, taking full advantage of the support they are able to give, and to do what is necessary on the one hand a complete understanding of our "working tool" , of the lack of prejudice against other methods of investigation, perhaps more modern and less known, which can complement if not improve the information already obtained from the first.

**In this work we study the data provided by two methods are very important even if not equally utilized and notes, known mostly in the field Physiatric medical and sports: the isokinetic evaluation and assessment of the ballistic motion through** Ergopower**.**

Purpose of this work is to illustrate the characteristics of the methods on their own or in equipment, concepts that can easily be acquired by hand, but to put compares the information they provided.

We have evaluated three healthy subjects aged between 25 and 35 years, who performed before the instrumental assessments, clinical testing and a load of the muscle extensor and capsule-ligament structures of the lower limbs, and X-ray of the knees at 45 ° to establish any unknown diseases.

**The subjects then performed a test of isokinetic flexion-extension of the bilateral leg speed of 90 and 180 degrees per second and for each speed were performed six repetitions. After 48 hours has been carried out with evaluation ergopower and also in this case were performed six repetitions at the maximum possible speed for each load, with progressively increasing loads.**

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It was therefore taken as a reference one with the best values (the Protocol does not use disease in people because the information would be obtained in the training).

The data obtained were then compared. Both methods give us information about power and total work-concentric and eccentric, but in different dynamic conditions: the work is shown in total and in the single repeat by the isokinetic while ergopower integrates these data with the magnitude of the change load and information on strength and speed.

This way you can know the real capabilities and potential of optimizing subject and training, both in the choice of the load (or ceiling sub-ceiling by the values of strength and power and delivering the results that you want to achieve) that speed and number of repetitions.

The contribution of ergopower in training is to promote a rehabilitative care treatment using a visual biofeedback on the basis of data obtained from previous evaluations, offsetting the more quantitative and qualitative of isokinesi.

They were of healthy subjects evaluated the data for the most part overlapping, leaving one or other method of immediacy will determine information (eg. work, power, ratio flexor / extensor isokinesi and with speed, strength, power , moving with the ergopower).
From EMG finally, using dynamic of the ergopower in a case could be observed the difference in muscle activation (were compared femoral rectum, broad and extensive medial side) at different stages of contractions with differences not only between subjects, but between two limbs of the same subject, indicating an alteration of the normal balance is not symptomatic and not otherwise detected, and in pathological conditions becomes point of reference for an appropriate rehabilitation treatment.

Have been studied healthy subjects in order to simplify the interpretation of data obtained by different methods for making the most obvious possible their partial overlap and complementary both in diagnostic and therapeutic.

We are finally working on a work project for the evaluation of patients with knee pathologies in order to obtain useful results from the comparison and integration of the two methods we designed for the formulation of treatment protocols.

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