

## **Prevention and Treatment Physiotherapist in the Rupture of the Anterior Cruciate Ligament in Professional Football Players. Systematic Review of the Literature**

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### **Abstract**

Introduction: According to the current professionals of the physical preparation and retraining in football, every day there are a greater number of injuries that can be able to determine the performance of a team in a decisive way and also at the moment s most unexpected and important. 67% of cases of anterior cruciate ligament rupture are caused by indirect mechanisms, so there are six anterior cruciate ligament lesions per 100 football players over a five-year period.

The ruptures of the anterior cruciate ligament condition a prolonged sporty low time: about 6-9 months, regardless of the surgical technique used. In some cases, it may take up to 11 months depending on some facts such as age, sex, stature.

The rupture of the anterior cruciate ligament is an injury that is not so common in the population of athletes, representing 17% of the total knee injuries, within that 17% of the lesions of the cross ligament anxious cover 0.8% of the sports injuries Specifically football, so the anterior cruciate ligament injury is one of the lowest incidence in the sporting world, but in turn is one of the most severe injuries of the player, where 6% of the injured return to relapse in a period less than D Years.

Much progress has been made in the knowledge of risk factors for anterior cruciate ligament injury, where none of these factors have been associated with certainty, make it clear that most of these lesions occur in non-contact situations. Taking into account the above, the role of the sports physiotherapist will be to achieve the rehabilitation of the professional footballer within the average range of rehabilitation, with the certainty that the player will not have recidivism for the ligament injury Previous cross and the maximum re-adaptation to their technical skills, for a return to the group with greater confidence.

Method: A systematic search of articles or Publications was carried out in the main virtual hemerotechs, indexed journals, official internet pages of the government secretariats and databases offered by the Faculty of Medicine of the Autonomous University of the State of Mexico, electron libraries, as well as available reference books, in the period of 2003-2014.

For epidemiological and informational purposes, the pages of the World Health Organization, the Secretariat of Health, Conader were reviewed.

**Keywords:** *Anterior Cruciate Ligament Rupture; Rehabilitation; Physiotherapist Treatment; Prevention*

### **Anatomy of the knee**

The joint complex of the knee is hinged consisting of two joints which are the patellofemoral and the femorotibial which will give the support and stability to the knee. The patellofemoral articulation has the patella which is a sesamoid bone found in the quadriceps tendon, articulated with the furrow femoral being thus a joint trochlear. The femorotibial articulation is a modified biaxial trochlear trosis joint with two interchanged menisci and its time is supported by ligaments and muscles.

The functional stability of the knee is due to the integrity of these structures within which they exert a great importance are the bone structure, muscular and ligament, basically the knee is determined by the integrity of its articulation and mainly the integrity of the ligaments; ligament previous crusader (ACL), ligament posterior cruciate (LCP), ligament collateral medial (LCM) and ligament collateral side (LCL), beings stability anteroposterior will depend of all the ligament rear cross and anterior cross, her stability mediolateral will depend of all the ligament collateral medial and lateral. So, the alteration of any of these structures tends to cause an alteration in the joint stability [1].

### **Anatomy of the anterior cruciate ligament**

The anterior cruciate ligament is an intraarticular and extra synovial structure. Her insertion proximal is situated on La portion more rear of the face internal the condyle femoral external; on address distal-anterior-internal, opening up on fan towards her insertion distal on La region antero-interna in the plateau tibial between the thorns tibial's structurally is compound through fibers in collagen surrounded by in fabric connective LAX and fabric synovial [2].

The ACL is an intraarticular ligament that is inserted, distally, into the pre-spinal area of the upper face of the proximal end of the tibia and ends proximally in the posterior portion of the inner surface of the external femoral condyle and is made up of numerous fibers that absorb the demands of tension during the knee's motion arc. The ACL consists of two functionally different fascicles posterolateral (PL) that arise from the most anterior and superior femoral origin reaching the posterolateral part of the tibial insertion, and the fascicle anteromedial (AM) which is inserted in the anterior and medial part of the tibia, both in turn have an orientation in the form of a spiral, this orientation allows that at any time some portion of the anterior cruciate ligament is tense throughout the knee-mobility arc, when La knee it is found on bending the ligament. it is come back more horizontal of this is way arrives to tense the fascicle anteromedial, given like result that at moment in the extension, hyperextension and rotation internal it is find tense lab and posterolateral [3].

The ACL dimensions are as follows: 25 - 38 mm in length, 7 - 12 mm in width and 4 - 7 mm in thickness. The ligament is narrower in the proximal portion near the femoral origin and widens When it reaches the tibial insertion [4].

The vascularization of the anterior cruciate ligament is very scarce and comes mainly from the arteries genicular a media, genicular an Inferior and lateral genicular A, its innervation depends on the ramifications of the tibial nerve [2].

### **Function**

The ACL is responsible, during flexion, of slipping of the condyle forward while during La extension, the LCP is charge the Sliding the Condyle towards back, preventing both the rotation axial internal like the external, with the knee one extension. The ACL lesion does not produce large variations in joint rotation as the cruciate ligaments offer La Stability fundamentally on Address antero-posterior. The ACL is tense during the movement of flexo-extension of the knee joint and it acts as a structure that limits the hyperextension of the knee and prevents slipping back of the femur over the tibial saucer. In addition, avoid la rotation axial excessive of the tibia over the femur and keeps la stability on valgus-varo [3].

It should be considered that the thickness of the anterior cruciate ligament is directly proportional to its resistance and Inversely proportional to its possibility of elongation. Also, we consider La structure the ligament already that it does not. All the portions the ligament they have La same resistance is forth is that are given the injuries the ligament [2].

It is important to remember that the structure of the cruciate ligaments is prepared so that at all times the ligament. It is find on true degree in tension [2].

### **Sprains**

Sprains are the lesions of the ligaments that occur when a joint makes a movement more of the normal, thus exerting greater force on the ligaments that offer stability to the joint. Within the sprains we will talk about their classification according to their degree [5].

**Sprain grade I:** It is also called a slight sprain and is due to a slight stretching of the ligament which does not affect the stability of our articulation, but it does not mean that it has not been damaged by what our patient will refer to inflammation and pain when loading their own weight.

**Sprain grade II:** It is classified as the moderate sprain, in this sprain an elongation occurs with more force than the type I sprain which will result in a tearing of the ligament, coursing with an intense inflammatory process, pain and inability to carry your own weight on your articulation so it will have a certain loss of its functionality.

**Sprain grade III:** Is the sprain considered serious because the mechanism of the lesion leaves as a result a tear total or even one break the ligament, this sprain. It is accompanied by pain and even from an inflammation more severe to on the type II so which the patient will lose the capacity in load weight and will suffer one loss in the functionality total of said ligament, being an injury that usually occurs on sports athletes usually require one intervention surgical to get a result in recovery optimal.

**Sprain grade IV:** It is considered the most serious, since the mechanism of injury will leave as a result a dislocation of the joint and total tearing of the ligament; on the service in traumatology it is decided if is necessary the handling surgical, though on the majority of all the cases will be in handling surgical to get results optimal on the athlete [6].

In the ACL break, three stages are differentiated:

- Acute: Less than 3 weeks.
- Sub-Acute: Between 3 - 12 weeks.
- Chronic: More of 12 weeks.

The pathophysiology of the acute stage consists of a local inflammatory response after a series of alterations vascular, biochemistry and cell phones, followed from a phase proliferative and other phase in maturing or repair that, for norma general, would conclude with the repair the ligament injured. On the case of the LCA the breakdowns don't cure [4].

### **Diagnosis**

The diagnosis of this lesion is mainly given by anamnesis and during this questioning, 40% of the patients usually comment have sense a click followed of a large instability on the injury is sure as the player will feel inability to come back to the court of game, questioned to the patient should be in ask how it was the mechanism injury [7].

Experience shows that a rupture of the ACL implies a laxity of the knee, with more or less symptomatology, As well as with a high risk of secondary intraarticular lesions that may even end, with the time, in a gonarthrosis [8].

In addition, it will serve as main support the test of Lachman since the tests are carried out in which we evaluate the stability articulate in addition in evidence in the resonance magnetic [7].

### **Epidemiology**

Within the world population total the rupture of the anterior cruciate ligament represents 50% of the ligamentous lesions of the knee, being 75% of the injuries ligaments produced to the moment in the practice sports, the age more common on the one given the break the ligament previous crusader is on the population of players between 20 and 40years old [7].

The highest incidence of anterior cruciate ligament injuries occurs as a result of indirect trauma to the Knee usually in the practice of the sport in young, the majority of the breaks of the anterior cruciate ligament is given by monofoot support or by sudden braking at the moment of being in the ligament is subjected to an inadequate position in which the ligament does not support the tension to which the ligament is subjected by the hyperextension movement [7].

Rupture of the anterior cruciate ligament is a frequent lesion in sports and recreational activity. Practically two-thirds of the injuries of the LCA they have an origin sports, affecting to a population young man and active with a prevalence High, 3/10,000 inhabitants. This incidence is greater on the ones sports in contact us and on those to demand turns in the knee, like on the football, basketball or skiing [8].

**Causes of injury in footballers**

The usual mechanism of production of these lesions is, in reference to the lateral ligaments internal and cross anterior, an abduction movement, alone or in combination with an external rotation, very frequent in sports such as football, skiing, rugby or skydiving. The external ligament is affected by a less frequent adduction movement. the anterior crusader is exceptional to be injured without associating in its rupture with the internal side or the corresponding to the meniscus, in which case it accompanies the longitudinal breaks or the anterior shaft, either on the accident initial or later, due into the elongation suffered on different crisis of lock articulate, on special if this one is persistent. Of injury, it is only hyperextension, sometimes without great trauma; rarely is affected the posterior crusader [9].

Non-contact sports activities involving high - speed side - cutting maneuvers and jumps or landing cause approximately 70% of all ACL lesions. The majority of lesions of the anterior cruciate ligament in footballers are produced in a mechanism in which there is no contact situation since about 84% of the population of football players with anterior cruciate ligament rupture refer to having been under a situation in the one who does not have contact with any other player but mainly is given by the forces that are they exert at the moment of braking and rotation of the player himself, being able to deduce that the rupture of the anterior cruciate ligament is given by the application of valgus load, on the point of support with light bending in the knee to her once plus into the force that is generated by the contraction the quadriceps, by this mechanism there is a translation anterior of the tibia accompanied from a rotation internal, being this the mechanism more usual of break in ligament previous crusader on the football player [10].

It is noted that the average incidence of injuries in professional football is 6 ACL breaks per 100 players in a period of 5 years and, being independent of the position to be occupied in the playing field, except in the goalkeeper where a significant incidence is observed lower (Table 1) [11].

Function in the field	Players (n°)	%	ACL lesions (n°)	Incidence by function in the field
Goalkeeper	50	10	1	2%
Defender	178	35	10	6%
Midfielder	165	33	11	7%
Front	11	22	8	7%
Total	504	100	30	6%

**Table 1:** *Players divided according to La function to they play on the field and the incidence in injury of the LCA on function in the same [11].*

In reference to whether the percentage of injury is higher in competition or during the results show that there is a greater risk of injury during the competition (80%) that during a training session practicing the same number of hours in both activities.

Already in the physical activity of the subject as is football, highlights the main gestures sporting as detonators to provoke an injury.

Address changes combined with deceleration. Maneuvers in cut combined with slow down.

Landing a jump on or near the full extension.

Turn with the knee near the full extension and a foot resting on the ground. Swept that involves hyperextension in the knee and the hyperflexion [12].

An early examination, if possible within the first few hours, is necessary in this type of injury before the further presentation of symptoms masking the clinical picture. Accurate make emphasis on the great importance than a diagnostics, if more adjusted possible, it is set how much before, already that of he will determine La guideline Therapeutic. Therefore, in the first hours it is possible to appreciate, according to O'Donoghue the degree of instability lateral; the location of the injury by pain; the existence of the sign of the drawer; the limitation of the extension, which is safe sign of meniscal injury.

Usually the traumatized go to the consultation past many hours. Then La scan is more hard, by be presented with frequency one reaction synovial more or less than intense. Does not necessarily indicate that we find ourselves.

In the presence of an intraarticular lesion, as it usually occurs in about half of the cases and without times have relations hip her intensity with the importance in the same when you there is [9].

### **Physical exploration**

Physical examination will be one of our main tools for determining cross-ligament rupture previous, for this we must begin evaluating the healthy knee to perform the comparative between the injured and the intact, this examination will begin with the observation of the arc of movement between both knees without the examiner's intervention. Within this exploration we will find a hyperextension in the traumatized knee which makes us infertile are front to a break in ligament anterior crusader and if in addition we found a lock into the extension we can determine to there is one injury meniscal associated. In addition, in the hyperextension the examiner should be palpation the journey in each one of all the ligament remaining to check that is not find injured [9].

To have a more accurate result we will use the lachman test as it is the best test to check the integrity the ligament previous crusader, being La test the cajon previous made with the knee at 20° - 30° bending. It produces less pain to the patient. The positive result is determined by the absence of endpoint for tibial translation or subluxation. The difficulty of this test is due, to the therapist in some cases, it cannot encompass the lower limb with hands [13].

**Classic Lachman:** The patient is in supine decubitus and his thigh is placed on the thigh of the clinician, with what is achieved, in each exploration, a constant flexion with the same features. With one hand, the specialist performs a movement of the tibia in the ventral direction, while with the other fixed the subject 's thigh in the ventral face of his leg.

**Anterior drawer test:** The patient is in supine decubitus with the knee between 60° and 90° of flexion. The foot resting on the stretcher, fixed by the buttock of the clinician, sitting upon the back the same. Both hands "hug" the calf and they place the thumbs on both sides of the tibial tuberosity. The physiotherapist takes the tibia to the anterior. The positive result is determined by the anterior tibial translation according to the classification of the degrees of displacement [14].

Although the Lachman test is the best clinical test to evaluate the integrity of the LCA, the difference between one and the other side in some individuals can be very subtle and make the best clinician wrong. Currently it is using the KT-1000 for measure La translation anterior tibial [9].

The rupture of the ACL may produce indirect and non-specific signs in the single Rx, such as an increase in joint fluid by hemarthrosis, seen IN 70% of the acute ruptures of the LCA. However, we can also find very specific signs of rupture of the ACL in the single Rx; among others, there are two radiological signs that are the most important and frequent to diagnose rupture ACL with simple Rx: the sign of the deep groove consists of a osteochondral fracture by impaction on the middle third of the surface in cargo the condyle femoral external, which is present on approximately 5% of the X-rays in patients to presented injury of the LCA, on La X-Ray side of Knee is possible

distinguish soft concavities or grooves normal on both condyles femoral. The simple x-ray can show us subtle but very specific signs of breakage of LCA, which we should look for inpatients with radiological evaluation of the knee trauma, especially when we see increased joint fluid in no apparent fracture [15].

### **Surgical treatment**

The conservative treatment method resolves acute lesions by applying the PRICE method. The patient usually needs crutches and NSAIDs reduce edema and pain. If you cannot clarify a definitive diagnosis during the acute phase, the doctor should return to examine the patient after 5 or 7 days. On the football almost all the breakdowns of LCA are treated by arthroscopy in repair and only rare exceptions, such as partial breaks without instability, are treated conservatively [16].

The decision on surgical or conservative treatment will depend on a number of factors such as the degree in instability, and limitation functional in the knee on this case the factor that give higher importance is the speed in recovery already as the player in football will have La purpose in come back to the courts what more quick possible, said factor is the one that we takes to take La decision of being perform one repair surgical the ligament previous crusader already that the intervention surgical for the injuries ligament is the most success [9].

There are two reconstruction surgeries used INLCA repair, with H-T-H and ST-RI. On a studio prospective of 2011 is noted that it does not had differences proprioceptive significant at 3, 6 and 12 months between the two types in surgery used.

However, in another prospective study at the end of 2011, it has been shown that arthroscopy with hamstring tendon, ST-RI, It gives better results in satisfaction, symptoms, activity level, function and Stability [17].

The procedure consists of using an autograft that is the most common or a synthetic graft, being an autograft will use a graft from the patellar tendon as this ligament has one force tensile equal to the ligament previous crusader, to some plasty the ligament previous crusader some people medical use one portion in the cintilla iliotalibial or tend on the semi tendon, but it has been shown than the higher resistance will be the ligament patellar reason by which this it's the chosen for the substitution in ligament [2].

Brückner, in 1966, introduced the use of a part of the ligament patellar that Ericsson, in 1976, on an idea of Brostrom, it improved substantially. However, it was Jones, in 1963, which popularized the use of the middle third of the patellar ligament, starting from an original idea of Campbell who, in 1936, proposed the use of intern alignment strips patellar [18].

### **Prevention**

It is of paramount importance to mention that pre-and post-surgical therapy also increases the economic impact of ACL rupture. By placing La scary figure of 17,000 dollars (€13,344.10) by reconstruction and rehabilitation of the LCA on the ones athletes, it's for this thing that the break the ligament previous crusader means the end of the career sports the player professional on some people cases [19].

The main risk factor to be evaluated for the prevention of anterior cruciate ligament injuries is the evaluation of the risk factors and mechanisms of injury of the anterior cruciate ligament.

Recommendations on the prevention of knee injuries have been previously published, although few are the studies that have managed to effectively evaluate prevention programs, by such motive were developed studies in sports such as basketball, football and handball, so that in 1990 was created the first program of injuries of the anterior cruciate ligament , study that was conducted in two leagues of America's first division, the program was developed over eight years old, where influenced changes on question in on La generation in techniques in players individual where it is assessed La force exercised in the bending in the knee on the attack to earth, by La acceleration, changes in address and slow down coming to stop changing the foot of support or alternating. it is in this evaluation that the results were excellent with a reduction of 89% in the incidence of lesions of the anterior cruciate ligament [20].

The first football work came in the year of 1996 in Italy, where a program was created training and balance to through in exercise in proprioception using a group of 600 players in football, this studio consisted on a program in training of 20 minutes away to be divided on 5 stages with a degree growing in difficulty, where it is concluded to there were one decrease in the injuries the ligament previous crusader on a 87% on comparison with other groups don't trained [20].

Strategies to prevent ACL injuries are applied almost exclusively to those that occur without contact us. Conditions that originate from direct contact cannot be prevented and will be determined by the correct practice of the sport in question. A few simple measures preventive measures to it is can apply on La majority in sports are:

- Heat entry, to increase body temperature, muscle elongation and joint mobility.
- Proper progression of workouts, avoiding the sharp increase in workload.
- Use of protective equipment such as shin, anklets, knee pads...etc.
- Practice fair play, comply with the rules of the game and punish offenders harshly.
- Conducting Medical examinations [16].

There is currently scientific evidence that sustains that it can reduce the risk of injury from anterior cruciate ligament without direct contact in sport and more specifically in football. Current research suggests that the protective effect of preventive treatments may be the result of peripheral adaptations (Strengthening of the muscles), Central adaptations (reprogramming Motor), or both [21].

Programs to prevent anterior cruciate ligament injuries are based on neuromuscular training that include:

1. Neuromuscular training with proprioception and equilibrium, awareness of the biomechanical mechanisms involved in the lesion and sports gesture education.
2. Stretching.
3. Control exercises of the trunk.
4. Strength, plyometrics and aerobic conditioning [22].

The plyometrics exercises, largely encompass the proprioceptive training of the joint complex, the training in technique and awareness of biomechanical mechanisms involved in the prevention of injuries. The plyometrics will be in charge of improving agility, strength and power, and the balance due proprioceptive training is associated with a lower risk of cross ligament injury previous. The highest rate of lesions of the anterior cruciate ligament is directly associated with the absence of this training regime and, no doubt, has sensitized the physical trainers, coaches and parents of athletes about the benefits of ligament injury prevention exercises previous crusader. Experts of high profile on La medicine sports they are increasing La consciousness recommend La assessment early and the application in tools simple to avoid La injury of the LCA [23].

Plyometric exercise is another fundamental piece in preventing anterior cruciate ligament injury already which is a program to does emphasis on La improvement in the techniques in jump including fields soft, flash backs sudden and position correct with jumps up and down without movements inside to side and with falls over the ante pie on once in over all the plant actions to they achieve decrease the injuries the ligament previous crusader.

The use of plyometric exercise is essential as it is defined as that exercise that trains a muscle to reach one force maximum on a period in time more short possible developing mainly power already to this type in exercise is a mechanism on the which there is a mechanism where it is sends and get information constantly comings for the muscles to apply La tension necessary for the maintenance in the posture and the initiation or arrest the movement, being this factor the which will act on La prevention in the injury [24].

The proprioception is worked by training the balance, either on the floor or board for 20 minutes each day during the pre-season and three days a week during competition week has been found that these proprioception training programs may reduce the incidence of anterior cruciate ligament injuries in football [25].

### **Neuromuscular training, proprioception**

The proprioception is a modality of sensitivity, which allows to know the location and the speed of the movement part of the body in relation to each other, deduce the weight of the objects, specify the muscular work necessary to carry out a task, as well as recognizing La position and the movement from a segment corporal, keeping the body on balance, without need in use La Vision. The proprioceptive system integrates postural control and balance [26].

The proprioceptive work is understood as a sensory-perceptive motor education, which tries to put in march to level in the bark cerebral, the concepts in feeling, perception and response motor, for what which, uses into the information afferent that you provide the ones receivers sensitive. The mechanical deformation of the sensory receptors is transformed into electrical impulses, which provide to level of the CNS the position relative and the parameters in movement [27].

The neuromuscular control system is a complex interaction of the nervous and muscular system. Performs their tasks influenced for two mechanisms in operation:

- 1. Feedback:** Known as feedback, in its definition alludes to the phase during the execution of a movement, where the CNS receives information on the change of status of the receivers [28]. This response allows the CNS to control movements, continue them and if necessary induce its modification, correction and conclusion. It is the most used, receivers send stimulus information to be compared with pre-stored reference values. A simple example occurs when we step wrong and the mechanism of injury of the LLE is triggered ankle, the musculature is quickly activated to return the neutral position of the foot. On the sport, the speed the movement increases considerably and on occasions it is exceeds the mechanism in response, originating La injury [16].
- 2. Feedforward:** The CNS knows the State of the body musculature at all times, this information provides to the CNS the values in game to start one modification in posture and of movement, this thing means that by the posture corporal and the movement of a patient can deduce the state of activity of his CNS [28].

These are mechanisms of anticipatory control. It is of vital importance in the prevention of injuries because the more specific and in turn varied be the ones training sessions, greater information in movements it is will be storing, allowing on a future get one better capacity adaptive to stimulus harmful [16].

The main objective is the training of the body afferences which implies an improvement of the feeling of Joint movement, to encourage the recruitment of the maximum number of receivers located in muscles and joints, to get a faster neuromuscular response and effective before aggression external. Search for La stabilization muscular reflects to offer a greater protection articulate. Get new capabilities in response before situations to involve the movement harmful [29].

### **Plyometrics exercises**

Plyometrics exercises are defined as those who train a muscle to reach a strength maximum in a shortest possible time period. This is capacity in speed-strength is known like power.

The term plyometric was first coined in 1975 by Fred Wilt, one of the athletic Coaches in States United, the root Latina we interpreted plyometrics like the "increase measurable", beings the exercise plyometric it was popularized and will came back essential on the ones athletes to they jumped, they ran, they were lifting or they threw.

The plyometric exercise makes use mainly of two types of contractions, the eccentric one that is known as elongation and concentric shortening, where it makes use of the first for quickly change to the second.

Plyometric training takes many forms, which include jumping or multi-hop training, jumps, plinths and drops jumps. The jump or multi-jump is done at a distance of 30 meters from which to derive jumps on the same site, jump with feet together, the jump is an exercise performed in a distance of less than 30 meters, the drops jumps they employ the weight of the athlete 's body and gravity to make out

against the ground, running on a higher surface can be a box to drop and jump again at the top of the box, the exercises with plinths can be of low or high intensity, depending in the height in the boxes employees and combines multi-hop with drops jumps, the height of all the drawers it is graduate of 15 cm each level starting with height individualized depending in the height the athlete to going from the 15 to 60 cm. On the football it is will develop exercise main to strengthening of all the which will exist variants to depend on the athlete and her physiotherapist.

Bottom and vertical jump is the first of the exercises in which the footballer will separate a lot of feet, one towards go ahead and the other towards back, and flexing La leg in advance forming an angle of 90 degrees with the hip and other angle of 90 degrees with the knee, you will ask to the football player jump towards up, using the ones arms for the elevation keeping the legs on La same position to fall in this is same form and repeat immediately the jump.

Side jump over an obstacle, this exercise will be done with a cone as part of the equipment that is will use, it is will start being standing next to the cone, you will indicate to the football player jump towards up, but it with a thrust in her body towards aside and lifting up the knees to jump through over of the barrier, indicating to land in the same way that home page so that come back immediately the thrust towards the side opposite.

Alternative ascent to bench, will be made with a bench or wooden crate of a height from 15 to 30 cm, the football player starts with one foot on the floor and the other on the drawer with the heel next to the nearest edge. The player will be instructed to give momentum with the foot that is above the crate raising all it possible to make an exchange of feet and fall with interspersed feet, in the same manner he was you will be asked to run a swing with your arms to obtain greater height and balance.

Jumps on cones with a turn of 180 degrees, a line of 4 to 6 cones will be used separate between yes at 70 cm, it will start standing facing towards the front parallel to the line of cones, it will ask the footballer to jump and being in the air rotate 180 degrees, so that you land looking to the opposite side, you will continue to jump and spin along all La line in cones [24].

Currently, plyometrics is part of almost all injury prevention programs and is, together with the training neuromuscular that implies the treatment proprioceptive, the two techniques preventive measures of greater efficacy [25-31].

It has been demonstrated in several studies, that skill training, compared to that of force for situations landing after a jump, was superior; keeping the skills learned up to six months later, which would confirm motor learning at the central level [21,32].

### **Physiotherapist treatment in professional football players**

After the surgical treatment is very important to start with the rehabilitation plan and that will be the most efficient tool to get the player to reintegrate as soon to the sporting activity as the fact of having a limited athlete of the activity it's going to have a direct impact on your muscle tone , your cardiovascular performance, which will cause a great loss on the performance the player at the time of to rejoin to play football, which it is will see reflected on less than opportunities in play what it take to a possible retirement early the football.

According to the World Confederation for Physical therapy (WCTP) it defines that physiotherapy in sport is the set of methods, techniques and actions that by the use and application of physical agents that prevent, recover and they readapt to people with dysfunction the appliance locomotive, produced in the practice the sport or exercise physicist on their different levels [33].

It is for this reason that it has worked exhaustively to create a rehabilitation protocol aimed at the football players and high performance athletes in which rehabilitation should be accelerated to rejoin sports activity, said protocol will consist on phases being the two intermediates those that will consist with two subphases extras for a clear knowledge in these phases [34].

Recovery of anterior cruciate ligament rupture							
Mandatory and all and yes n Ligament o plastic	Phase I	Phase II		Phase III		Phase IV	
	Treatment the physician	Rehabilitation + retraining		Rehabilitation		Return to the group	
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	
	Physiotherapy						The same as petitions
		Force Isometrics	Force Isometric + concentric + eccentric				
			Proprioception				
			Flexibility Extensors + flexors				
		Aquatic environment Mov. Articular + Displacement					
				Career technique of career	Career changes in rhythm	Movements tactical and collective technique	
				Gesture deportivo skill + driving	Gesture deportivo Golpes		
				Squat			
	Pelvic balance						

Table 2: Recovery in the break in ligament previous crusader [34].

**Phase 1 post-surgery and medical treatment**

It will be the immediate stage or also called early recovery phase and reaches from the first to the eighth week after La intervention surgical [7].

It will have as fundamental objectives to eliminate the sensation of pain and inflammation, to complete the extension, to avoid decreased muscle tone and regain muscle control. The control of these objectives will be essential to reinstate the patient to his most stressful activities, managing to act on the reconstructed ligament to improve his function. The control of inflammation and pain will promote to control and activate the muscular groups in charge of the mobility articulate mainly to the muscle quadriceps, manager in the extension in the knee to mainly we will help into the wandering [34].

To achieve inflammatory and painful control It is common to have a medical treatment that will consist of non- steroidal oral and anti-inflammatory analgesics (NSAIDs), being this fundamental treatment to carry to cabo the plan physiotherapist and that the patient tolerate the pain during the La realization of all the exercise mainly the muscle quadriceps, muscle that at step of 7 days without have activity will lose near of 30% of her force muscular though the job muscular will be moderate to mild by the time so short past in the surgery. Other as an alternative to medical treatment in later days the therapist will be able to ‘s hand agents physical for the control inflammatory and painful mainly by La cryotherapy, already be by simple compresses cold, bags in ice or by systems in flow cold [7].

The recovery of the mobility arc is the main focus of this phase, which is why we will use to the early mobilization of the articulation, time considered to a week as the appropriate. Already that the loss the arc in mobility so much bending like on La extension is a made on La majority of all the cases in this is surgery, the target in the therapy will be reset La extension and bending complete of 90 °on la first week in this is phase. For this increase of the mobility arc it will be of paramount importance the application of progressive passive exercises to reach the point where the patient actively achieves it, closed kinetic chain exercises [35].

**Phase 2 rehabilitation and retraining**

During this proper recovery phase, rehabilitation will be carried out by a team in which the work will be coordinated by the doctor to coordinate the evolution of the of the patient, the physiotherapist in charge of the rehabilitation and the physical preparer of the team that will be in charge of the retraining, this phase of the rehabilitation it will take place from 9 to 18 week of LCA plasty it is important to remember that the time in each phase it is will establish to starting in the evolution the patient [7].

Throughout this phase and within its two levels will make use of hydrotherapy as a tool of great utility in the patient with anterior cruciate ligament plasty which will be of great help in the rehabilitation and physiotherapy treatment, for hydrotherapy- related research was qualified the medium as positive for mobility and patient recovery.

In hydrotherapy there is less intensity after treatment and greater analgesia after each session of rehabilitation, occurs, due to hot water that produces a muscle relaxation, reducing its edema, pain and sensitivity.

Thus, in the rehabilitation of a lesion of the anterior cruciate ligament, it will be necessary to work in a swimming pool or tank deeper. Given the above will provide the patient with a better reduction of the edema, improve the quality of his progress in the absence of gravitational actions and pain relief will also reduce the impact on the way out. It was shown that the best results were given in those patients who underwent aquatic kinesitherapy, this significant difference can be associated with water turbulence that generates an environment of instability, which causes in the patient to have higher gains with regard to its proprioceptive system after the loss suffered after the break of the anterior cruciate ligament. Also found numerous benefits like gain on the range in movement in the articulation, maintenance in trophism muscle, increased relationship in resistance the balance of all the muscles agonists with the antagonists and the tone muscular [36].

The hydro kinesitherapies protocol will be addressed as a start at the beginning of level 2 of phase 2 and conclude in the final week of level 3 of the same phase [37].

Post- traumatic/post-surgical knee hydrokinesitherapy Protocol			
Phases			
	1: weeks 1 - 4 after Medical leave of my support Affected.	2: weeks 4-8 after Cargo Permit	3: week 9 - 12 after Cargo Permit
Execution	Deep water immersion, partially discharging the affected MI, subject to a parallel Bar	Autonomous immersion in water at waist height, without bar support, can carry a cork if there is imbalance	Autonomous immersion in shallow water, without bar support, increase execution speed progressively, enter rhythm changes
Exercises	Teaching of normal gait, with knee flexoextension movements. Walk with bar Support, forward/backward/lateral, 10 min. With delayed feet and unloading of body weight in MMSS in bar, tiptoe and heels. Place cuffs at ankle height, and with WALL- supported body, pedaling movements assisted through flotation, 5 min. With long Cork under the foot, let it by flotation, passively flex the knee; after, Extend actively up to Play the Floor, 5 min with Depth Growing according to Tolerance.	Walk without help, forward/backward/lateral, 5 min. Walk with heels and tips, with hand to bar 5 min. In bar, with separate legs, Lower body weight, in closed Kinetic chain, up to 90 ° With long Cork under the foot, in water by the waist, let it by floating, passively flex the Knee; after, Extend actively up to Play the Floor, 5 min with Depth Growing according to Tolerance Ditto actively extend inward and outward until touching the ground. (Vast internal/vast outer). With my affected extended to 90 ° Respect to the trunk, place long Cork under ankle and push down, 25 reps With table under the foot, in water by the waist, to push towards the soil actively; Leave to Flex passively through flotation, trying to in retain La Table without it escaping, 5 min with Depth Growing according to Tolerance.	Walk with heels and tips, no props, 5 min Subject to bar, with separate legs, Lower body weight, in closed Kinetic chain, up to Bending, repetitions according to tolerate. Face to Wall, place my affected in 90 ° flexion, place long Cork under the ankle; Leave to passively Flex La Knee through flotation, with Depth Growing according to Tolerance Face to Wall, throw and COLLECT ball with monofoot support of my affected Back 1a The wall, with ball fastened with 2 hands, and extended Arms, touching The wall at the sides of the trunk, with support monopruning of the affected side. In step, up and down, in the direction of the March, backward, and lateral, 10 '. Walk in zigzags and in circles, 5 min. Light Trot and Stride, 5 min. Walk with Eyes closed, on everyone the ones Senses in the March, 5 min. Swimming, crawl kick and back kick.

**Table 3:** Post-traumatic/postsurgical knee hydrokinesitherapy protocol [37].

A treatment performed twenty-two athletes with ligament injury grade I or II ankles and knees, which they were distributed randomly on media in treatment water sports and terrestrial showed as the exercise aquatic can provide advantages over La therapy terrestrial, for a quick return to activities athletics. On consequence in this is, the exercise aquatic can be recommended to La phase initial of a rehabilitation program. Hydrotherapy was proven to be a major rehabilitation tool for posterior ligament reconstruction previous crusader because they allows rehabilitation with the cargo less than aggressive, then increase tolerance participant on the program in rehabilitation, increase in the force, the increase in the proprioception and experiencing a return, before her function [36].

## **Level 2**

The patient within this level will have to complete their mobility arcs both in flexion and in hyperextension, in addition to strengthening the affected musculature, improve the proprioception and recover the marching pattern. Immediate postoperative treatment is the main stage of treatment where there is greater concern [38].

Within the level two of this phase we will be able to take the hand of isometric exercises of greater intensity and duration to maintain muscle tone and be able to maintain its strength despite not subduing your body to a training rigorous to the which I was accustomed, like second resource within this level we can make use of all the media water sports (hydrotherapy) with which we'll like target favor in to the activation muscular and articulate by exercise proprioceptive including the job in balance pelvic for a job later on exterior, this job pelvic it is will continue developing until the end of the treatment [34]. Beginning in order with these objectives The main thing will be to recover the march pattern normal already to this it is found related directly with the mobility and strengthening the muscle quadriceps, the way correct how will perform the patient this job will be walk front to a mirror performing all the phases in the march, this method is essential for the recovery from a pattern normal of march. So same it is will perform conditioning muscular by exercise isometrics mainly of all the muscles quadriceps hamstring [36].

At this level it will be of sudden importance to the player to maintain a good muscular tone and in be possible increase it already to the patient athlete good muscle tone will be essential to retain the same level of individual technique, as well as it will serve to maintain its physical condition on the systems of energetic intake aerobics is at this level where also begins to use the pelvic balance as a load complementary to the training [7].

## **Level 3**

Since muscle weakness will be a fact inmost chronic lesions, it will be required in this level a specific work of muscular strengthening, which will be proportional to the deterioration functional and will also be linked to the degrees of joint mobility recovered, i.e. with this training we will try in recover the ones levels in force previous into the injury the patient, by such reason will be a change in level on the which we will pass of all the exercise isometrics to yield the step for the exercise centric and concentric at the same job in proprioception within the same level 3 [7].

The therapeutic work based on isometrics will include exercises of the flexor musculature and extension of the joint in the knee, the which will consist on achieve one contraction muscular on La which La length muscular is keep constant while it is develops tension and force maximum against a resistance motion less. The benefits of isometric contraction will be the contribution of stabilization force which will be critical to keep one arthrokinematics normal, other benefit in this type in exercise is that will be capable in increase La force muscular. So, we determine that the isometric exercises will be of great importance at this stage of the rehabilitation to avoid the loss of strength reason why they are used from the latest sessions in the phase 1 and a her once to increase La force reason in the which it is works with the ma round in the phase 2 to the level 3 of retraining [38].

The eccentric and concentric exercises in closed kinetic chain and open kinetic chain in the patient will be applied in the same way in the flexing and extender chains of the member inferior lesion, with which the patient may develop eccentric and concentric force which allows selective recruitment of fast motor drives, which has great relevance for effective performance in gaming actions in football association in addition to serve us to recover the lost tone for the period of forced rest after surgery.

The proprioception can be defined as a feedback mechanism which will allow awareness of the position in the body space of the footballer or part of this in this case the knee either statically or dynamically and in a conscious manner, it is for this reason that the proprioceptive work will be of great importance in the readaptation. The exercises used should be carried out from less to greater complexity and instability. The proprioception protocol may last between 15 and 20 minutes with a duration of 30 seconds per Leg [39].

As mentioned above the joint program of strength, flexibility and proprioception, in addition to the factor of pelvic balance will be the basis of the physiotherapist's work to readapt and prepare the player of football for their return to sports activity.

### **Phase 3 retraining**

This phase lasts from Week 17 to week 22 depending on the evolution of the patient. It is in this phase that we will seek to work exclusively on the restoration of the functions and skills lost, said the above is will look for La retraining physiological in the area affected into the systematic the training, fundamentally for the mechanisms specific and skilled in her practice sports. On this plan the work of the physiotherapist will be La realization from a planning progressive in the loads in job to power gradually integrate to the player into the dynamic of all the training sessions [7].

### **Level 4**

At level 4 we can also call it functional training phase as the physical training it will be a denominator for the readjustment of any injury.

It is the next phase of the return of the physical activities previously performed on the lesion.

Within this level of retraining we will have as objectives to achieve permanence or stability in a single foot, to recover the race through gradual progress in relation to distance, time and weekly frequency leaving the intensity/speed increase for a later stage, carrying a training aimed at the sporting gesture played by the player as the physical qualities they are necessary when it comes to sporting practice [34].

The retraining of sports skills should be understood as a practice area in which a teaching-learning process will be given which will restore and improve the physical patterns-engines of an athlete, facilitating in the shortest possible time, a state of welfare optimal for the effort and performance to the full reincorporation to her activity usual sports.

It will be extremely important for the therapist to report on the characteristics of the sport practiced by the athlete, already to everything this thing i will take to meet the ones gestures technicians sports usual to power play a right training and in addition power value if it is should be use or not exercise in skill static and dynamic for the introduction to the sport. Given the above, the therapist will be able to use all possible contact surfaces on the side healthy like the side faint, with the purpose in reactivate the ones levels in dexterity motor.

As a sporty and readjusted gesture, focus on ball driving exercises and skill, on the which the football player manage both legs without import her dominance, you will ask that at moment in the driving perform turns of 360 degrees and changes in address simulating La action from a dodge, in addition in include the game real 1:1 on where submit her job muscular and proprioceptive to a competition. It is in the retraining where we begin to integrate the pull of force, flexibility and proprioception in the player as this is part of the physical activity basic the player in football association professional [7].

### **Level 5**

To end with phase 3 precisely level 5 will be the transition from patient recovery to reintegrate into physical exercise fully sporting in this case football association professional for the which her process in retraining should be to be completed for what which the therapist on whole of the preparer physicist the team shall in integrate everything I lived by the player on the stages priors of rehabilitation [34].

Physical Training mainly in the race should undergo an Evolution of the simple trot and Race of resistance to the changes of pace where the footballer will start with a simple trot to culminate with rhythmic changes of acceleration and deceleration in turn with changes

simulating a clipping or dribbling with the appropriate speed that would be performed Action as well as possible variants of the race as the side - to - sidesteps with address and speed or just La career towards back.

In the work of their sporting gestures the therapist will coordinate that the player can make ball with both legs, where the patten should be to be firm, with force painless I which will allow to the football player perfecting this gesture sports essential on her practice sports [7].

It is at this level that the squat method is used which consists of exercises using squats which have the benefit of strengthening the muscles that hold this joint, as well as also exercises the injured ligament. It is of paramount importance to know when to apply these exercises according to the progression for a correct realization in them, from this is way we will be of greater utility already to also will strengthen the ones muscles in the hip what you we will serve to stabilize La knee.

At this stage will begin the plyometrics exercises which will be used in the initial phase in the contraction concentric, followed through other phase in contraction eccentric [40-42].

#### **Phase 4 back to the group**

This phase will cover the week 23 to the 29<sup>th</sup> after the surgery, is the last stage of recovery in the which the physiotherapist work will remain constant. Being football a sport of medium impact the progress of recovering this injury 5.8 months with a range between 4 to 9 months of recovery possibility, showing some authors that the player 's return to the courts can occur before the 6 months without a problem.

This phase is characteristic by the re- incorporation of the footballer to the group, until the player manages to reach the level of physical condition of the group or the one he possessed previously, in order to return to compete and achieve a good individual performance. The objective of this phase is to place the player at the level of a possible competition but the therapist must have the assurance that the player will have a correct technical execution, and integration into the Tactical application, which will generate confidence in its total recovery for the next competitions and a correct integration to the team [7].

It is logical that in processes of a period as long as that of the rupture of the anterior cruciate ligament the athlete must be coherent and patient to meet the level sports the previous and the current injury, this level will be recovered gradually to allow come back to show it on a party. The type of exercises that the player should perform during this stage will be analytical and general exercises so that they are later global and can be useful for improve the skillful technical gesture [34].

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