

THE EFFECTS OF PRE-SURGERY EXERCISES FOR THE LOWER EXTREMITY BEFORE ANTERIOR CRUCIATE LIGAMENT (ACL) SURGERY

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Abstract

This paper may help physical education teacher, coaches to preparing or making ready the ACL injured knee person to surgery for a fast recovery by using the training methodology exercises before surgery and exercises after surgery, let us examine how it has been done with experimental study. In this study, how we can manage during and after the anterior cruciate ligament (ACL) injury, here physical education teacher or coaches have good role such as diagnosing level of injury, rehabilitation etc with help sports medicine specialized knee doctors, sports physiotherapist. If we are not aware of the level of injury we will go for x-ray and do plastering at knee, this will affect the patient knee movement reduction in range of motion in future and the important factor is that ACL ligament injury can be ruled out through MRI, knee brace is better than plastering helps keep movement. The following paragraphs may help to take decision wisely, to help a sports person. ACL is one of the key ligaments that help stabilize knee joint. The ACL connects femur to tibia, patella. Three bones meet to form knee joint. Patella sits in front of the joint to provide some protection. Bones are connected to other bones by ligaments. There are four primary ligaments in your knee. They act like strong ropes to hold the bones together and keep your knee stable. The ACL is a broad, thick cord the size of your index finger with long collagen strands woven together. Collateral Ligaments; these are found on the sides of your knee. The medial collateral ligament is on the inside and the lateral collateral ligament is on the outside. They control the sideways motion of your knee and brace it against unusual movement. Cruciate Ligaments; these are found inside your knee joint. They cross each other to form an "X" with the anterior cruciate ligament in front and the posterior cruciate ligament in back. The cruciate ligaments control the back and forth motion of your knee. The anterior cruciate ligament runs diagonally in the middle of the knee. It prevents the tibia from sliding out in front of the femur, as well as provides rotational stability to the knee.

Anterior Cruciate Ligament (ACL) Injuries and Common Causes: The anterior cruciate ligament can be injured in several ways; several studies have shown that higher incidence of ACL injury in sports. It has been proposed that this is due to differences in physical conditioning, muscular strength, and neuromuscular control. People often tear the ACL by twist your knee, changing direction rapidly, Stopping suddenly, slowing down while running, Landing from a jump incorrectly, Direct contact or collision, such as a football tackle, landing from a jump such as basketball, soccer, tennis and volleyball .The ACL is the most commonly injured ligament in the knee. Once the ACL is torn, the knee usually becomes unstable. One of the most common knee injuries is an anterior cruciate ligament sprain or tear. If you have injured your anterior cruciate ligament, you may require surgery to regain full function of your knee. This will depend on several factors, such as the severity of your injury and your activity level. About half of all injuries to the anterior cruciate ligament occur along with damage to other structures in the knee, such as articular cartilage, meniscus, or other ligaments. Injured ligaments are considered "sprains" and are graded on a severity scale. Grade 1 Sprains. The ligament is mildly damaged in a Grade 1 Sprain. It has been slightly stretched, but is still able to help keep the knee joint stable. Grade 2 Sprains. Grade 2

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Sprain stretches the ligament to the point where it becomes loose. This is often referred to as a partial tear of the ligament. Grade 3 Sprains. This type of sprain is most commonly referred to as a complete tear of the ligament. The ligament has been split into two pieces, and the knee joint is unstable. Partial tears of the anterior cruciate ligament are rare; most ACL injuries are complete or near complete tears.

Objectives

- To analysis speedy recovery after surgery
- To find out the Effect of Exercises on pre and post stage of ACL surgery

Definitions

ACL: Anterior cruciate ligament is one of the key ligaments that help stabilize knee joint. The ACL connects femur to tibia, patella. Three bones meet to form knee joint.

Muscular Strength: Strength is the ability to overcome resistance. strength should not be considered a product of muscular contractions

Endurance: Endurance is the ability to do sports movements, with the desired quality and speed under the conditions of fatigue. (Harre1986, Singh, 1991)

We can divide to four stages of injury management

1. Role of physical education teacher,2. Role of specialised doctor, 3. Role of sports physiotherapist after surgery and before surgery,
4. Role of physical education teacher after surgery and during the return to ground.

Symptoms: When you injure your anterior cruciate ligament, you might hear a "popping" noise and you may feel your knee give out from under you. Other typical symptoms include: Pain with swelling. Within 24 hours, your knee will swell. If ignored, the swelling and pain may resolve on its own. However, if you attempt to return to sports, your knee will probably be unstable and you risk causing further damage to the cushioning cartilage (meniscus) of your knee, Loss of full range of motion, Tenderness along the joint line, Discomfort while walking

Physical Examination and Patient History: Physical education teacher have to take the patient to specialized doctors based on his experience he can discuss with doctor about symptoms and medical history and check all the structures of injured knee, and compare them to your non-injured knee. Most ligament injuries can be diagnosed with a thorough physical examination of the knee by doctor, even sports teacher can also identify it and better to do MRI. X rays will not show any injury to your anterior cruciate ligament, x-rays can show whether the injury is associated with a broken bone. MRI , creates better images of soft

tissues like the anterior cruciate treatment. Treatment for an ACL tear will vary depending upon the patient's individual needs.

Nonsurgical Treatment: A torn ACL will not heal without surgery. But nonsurgical treatment may be effective for patients who are elderly or have a very low activity level may be able to return to a quieter lifestyle without surgery. If the overall stability of the knee is intact, your doctor may recommend simple, nonsurgical options. Bracing, Doctor may recommend a brace to protect knee from instability. To further protect knee, may be given crutches to keep from putting weight on your leg. Physical therapy, as the swelling goes down, a careful rehabilitation program is started. Specific exercises will restore function to your knee and strengthen the leg muscles that support it.

Surgical Treatment: The young athlete involved in agility sports will most likely require surgery to safely return to sports rebuilding the ligament. Most ACL tears cannot be sutured (stitched) back together. To surgically repair the ACL and restore knee stability, the ligament must be reconstructed. Your doctor will replace torn ligament with a tissue graft. This graft acts as scaffolding for a new ligament to grow on. Grafts can be obtained from several sources. Often they are taken from the patellar tendon, which runs between the kneecap and the shinbone. Hamstring tendons at the back of the thigh are a common source of grafts. Sometimes a quadriceps tendon, which runs from the kneecap into the thigh, is used. Finally, cadaver graft (allograft) can be used. There are advantages and disadvantages to all graft sources. You should discuss graft choices with your own orthopaedic surgeon to help determine which is best for you. Because re growth takes time, it may be six months or more before an athlete can return to sports after surgery. Surgery to rebuild an anterior cruciate ligament is done with an arthroscopy using small incisions. Arthroscopic surgery is less invasive. The benefits of less invasive techniques include less pain from surgery, less time spent in the hospital, and quicker recovery times.

Methodology

The purpose of the study was to find out the effect of giving *rehabilitation exercises management for knee, before and after anterior cruciate ligament (ACL) surgery for speedy recovery* on ACL ligament injured persons between the age of 35 plus male to know the changes speedy recovery period by both the groups. In-order to conduct the study 20 sedentary was selected from different clinic. The importance of the study was explained to the subjects before getting their consent for the study. They were divided into two groups of 10 male each. Group "A" "underwent Training before and after surgery and Group" B "acted as Control Group exercise only after surgery.

Rehabilitation: Whether treatment involves surgery or not, rehabilitation plays a vital role in getting you back to your daily activities. A physical therapy program will help you regain knee strength and motion. If you have surgery, physical therapy first focuses on returning motion to the joint and surrounding muscles. This is followed by a strengthening program designed to protect the new ligament. This strengthening gradually increases the stress across the ligament. The final phase of rehabilitation is aimed at a functional return tailored for the athlete's sport. Decrease harmful peak landing forces, the rehabilitation stage considers Decrease medial/lateral torques at the knee (wobbly knee), Increase hamstrings power and strength, increase hamstrings-to-quadriceps peak torque ratios, Increase vertical jump height etc. Here is the Rehabilitation exercise under the supervision of sports physiotherapist and physical education teacher.

ACL injured person, if his muscles are weak related to knee area i.e. quadriceps, hamstring, calf etc and then he can go for pre surgery strength training up to two weeks. After surgery the muscles will go weaker. The rehabilitation exercises with start for both groups (pre exercised and control) with zero level. On the process of rehabilitation, based on the performance of strength the weight will be added eventually for strength. Normally in the both groups will be ready for jogging in the fourth month, but considering muscular strength fitness, recovery speed for the pre exercised group showed significant improvement in this study.

	Exercises	Total no of repetitions	Recovery
1	Stretching with pad in long sitting position,	10	30sec
2	Thigh contraction	20	30sec
Following exercises should start without weight and after attaining basic strength add weights (starts from half kg) and increase gradually for full recovery.			
3	Raising the leg from long sitting position hold for 5 sec with appropriate repetitions, effect on quadriceps	20	30sec
4	Lying on floor and raising knee straight leg outside and inside for 5 sec, effect on gluteus, hamstring, vastus, adductors	20	30sec
5	Prone lying and raise leg to 90 degree and return, effect on hamstring	20	30sec

6	Keep leg straight on prone lying and arise the leg without bending knee, effect back muscles	20	30sec
7	Cycling 5min to increase gradually	5 min	30sec
8	Balance on half dome	1min	30sec
9	Balancing on rubberized plate with one leg	1min	30sec
10	Heel rising for calf muscle	20	15sec
11	Half squat	20	30sec
12	Stepping,	20	30sec
After 45 days added with above			
13	Ladder coordination work		
14	Hurdle jump, ten hurdles	5 times both direction	
15	Slow walking	2 rounds for 3days	
16	Slow jogging/2 rounds walking and one round jogging and modification	3 rounds	
17	Striding straight /30x 2		
18	Striding straight /50x 2		
19	Striding straight /100x 2		
20	Stretching		

After completion of rehabilitation exercise, he can enter into sports gradually he can reach to earlier fitness level.

Analysis of Data, Results and Discussions

The data of these variables were collected through 50 m dash test and weight lifting by weight on injured leg. Paired sample T-test statistical techniques used. In all these statistical tests, level of significance was fixed 0.05 levels. All statistical analysis was carried out with the help of statistical package SPSS for WINDOW.

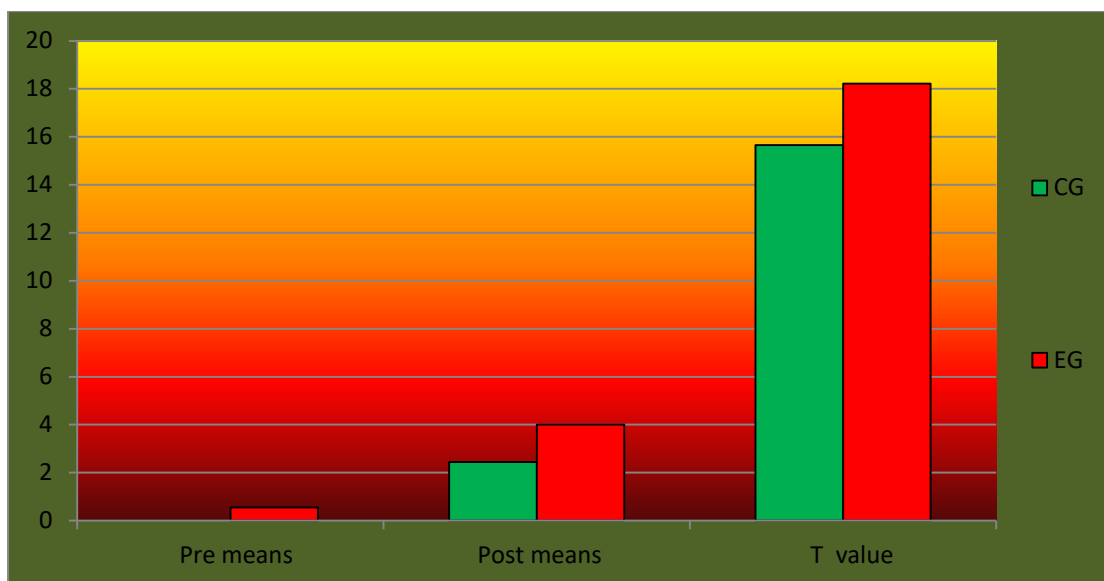
Statistical analysis on strength

Paired T-test on control and experimental group on strength

Paired T- test was used to examine whether there is any statistically significance in pre test to post test mean difference of strength scores in control experimental and experimental group. The results are shown in table.

Table and graph -Paired t-test of pre to post test of 3 months progression

Groups	Pre means	Post means	T value
CG	.7	2.4	15.5
EG	.65	4	18.1



After three months, the subjects were under gone improvement test. There is a significant improvement in both groups but less than experimental group. In pre-test and post-test of CG are 7& 2.5 T value is 15.65 and for EG is .5&4 and calculated T value is 18.2 in third month. Since T is greater than the tabulated value, So there is a statistically significant pre to post test mean difference score in experimental group.

Conclusions

On the basis of the results of the study the following conclusions were drawn that, the effects of ACL rehabilitation exercises management for knee, before and after anterior cruciate ligament (ACL) surgery shown significant improvement for speedy recovery

Recommendations

On the basis of the study results and conclusions drawn the following recommendations are made.

1. It is recommended to sports person who have undergone ACL surgery, the pre exercises may enhance the development of strength and speedy recovery,

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