

POST-OP ACL Rehabilitation Protocol



Division of Orthopaedic Surgery
QEII Health Sciences Centre
Halifax, Nova Scotia, B3H 3A7

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The following rehabilitation guideline is intended as a guide and does not represent a fully inclusive list of all interventions that can be used in the rehabilitation process. The therapist should use their clinical experience/judgment to help guide their patient through their recovery, consulting with the referring physician should questions arise.



POST-OP ACL

REHABILITATION GUIDELINE

Post-operative rehabilitation is essential in optimizing your function and return to sport after an ACL reconstruction.

The process of returning to physical and athletic activities is not based on time, it is based on the individual's ability to achieve certain milestones or criteria. The time needed to do this will vary from individual to individual. Post-operative rehabilitation begins the day after surgery. There are four phases to the post-operative rehabilitation. Your compliance with this program will have a direct effect on your function and return to sport.

PHASE ONE: The goals of the first phase of the rehabilitation process are to minimize pain and swelling as well as protecting your graft. You will start range of motion exercises and early strength exercises. During the first phase of rehabilitation, the goals are to increase your range of motion and strength, and return to walking without crutches. There is evidence that pain and swelling can hinder or inhibit your ability to generate muscular force in your leg, especially your quadriceps. Thus, it is important to minimize swelling and pain to help restore your strength. Your ability to get stronger is limited if your knee is swollen. It is also limited if you can't straighten your

knee.

PHASE TWO: Phase 2 focuses on restoring your range of motion and you should be able to ambulate without crutches (unless advised otherwise). Phase 2 will also focus on restoring your strength and balance sense (proprioception). There is evidence to show that strength deficits have a direct effect on functional outcomes and return to sport. Proprioception is a sensory modality that provides internal feedback on the status of the body's position, movement and alignment. Various balance exercises will be used to help improve and recover your proprioception. These exercises also help to regain strength. In subsequent phases when jumping, cutting and pivoting are emphasized, it is essential that the body is in correct alignment.

PHASE THREE: One primary goal of Phase 3 is to eliminate strength differences between both legs. You will be doing strenuous strength training exercises three to four times a week. Often times it may be necessary to do more sets and repetitions on the surgical leg than the non-surgical leg to eliminate the difference. You must also be careful not "overuse" your non-surgical leg while doing your strengthening exercises. Other goals of this phase focus on core exercises, running, agility, and jumping drills.

PHASE FOUR: Phase 4 of rehabilitation is termed "athletic enhancement". This is the phase where you will work on sport-specific movement drills. Although you will perform some exercises and movements from earlier phases, you will be working on doing these activities at higher speeds until you progress to game speed. Conditioning drills for muscular endurance and cardiovascular conditioning are included in this phase. Being released to return to sport is a collaborative decision between your surgeon and physiotherapist or athletic trainer.

It is important to understand that patients may progress through the rehabilitation protocol at different paces. In order to progress through each phase of the rehabilitation protocol, you should meet the criteria in that phase before you progress to the next phase of the rehabilitation program.

Commitment to following the ACL rehabilitation program is extremely important to the ultimate success of your ACL surgery. *Do not return to high risk sports/activities before you are ready.*

ACL Injuries

ACL injuries can occur in any age group. The incidence is greater in patients who partake in high risk sporting activities.



The anterior cruciate ligament (ACL) is one of the four strong ligaments connecting the femur (thigh bone) to the tibia (shin bone). Ligaments are strong, dense structures made of connective tissue that stabilize a joint. The function of the ACL is to provide stability to the knee and minimize stress across the knee joint. The ACL limits rotational movements of the knee joint. It also restrains excessive forward

movement of the tibia in relation to the femur. The weight-bearing surface of the knee joint is covered by a layer known as articular cartilage. This articular cartilage allows the joint surfaces to move smoothly. The knee joint also has two shock absorbers known as the medial and lateral meniscus. These structures help reduce the stresses between the tibia and the femur. In general, the incidence of ACL injury is greater in people who participate in high-risk sports such as soccer, basketball, football, rugby

and skiing. However, there are some people who tear their ACLs with seemingly minor mechanisms of injury such a jumping off the back of a truck or stepping into a rut in the ground. An injury to the ACL results from overstretching or tearing of the ligament. Injuries of the ACL range from minor strains to more severe injuries where the ligament is completely torn. Any athletic or non-athletic related activity in which the knee is forced into hyperextension and/or internal rotation may result in

Acute ACL INJURY

“THE GOALS OF SURGICAL TREATMENT ARE TO HAVE A STABLE KNEE JOINT AND TO RESTORE NORMAL STRENGTH AND FUNCTION IN THE KNEE JOINT.”

an ACL tear. A number of patients who tear their ACL may also injure other structures in the knee joint such as meniscus, articular cartilage and/or other ligaments within the knee joint. In addition, many patients have bruises of the bone beneath the cartilage surface. These bone bruises may be seen on an MRI and may indicate injury to the overlying articular cartilage.

The goals of surgical treatment are to have a stable knee joint and to restore normal strength and

function in the knee joint.

The chance of re-tearing your ACL after surgery is 5-15%. There is actually an almost equal chance of tearing your other ACL, the risk being around 10-22%. The reason for the greater risk on the other side is not entirely known. It may be due to your anatomy, compensation for your surgical knee and/or genetic risk factors. Some of these risk factors cannot be modified, but there are measures you can take to reduce the overall risk of another ACL tear. Research has shown

that continuing proprioceptive exercises and continuing to train your landing mechanics and deceleration will reduce your risk of ACL injury. You should continue following the rehabilitation guidelines even after you are discharged from physiotherapy. There are several ACL prevention programs found on the internet. A good resource for soccer players is the **FIFA 11 PLUS WARM UP PROGRAM** that is available on the Fifa 11 Plus website.

PHASE ONE

EARLY POST-OPERATIVE PERIOD

Weeks 0 - 2

G oals:

- Control Pain and Swelling
- Achieve and Maintain Full Passive Extension
- Prevent shutdown of quadriceps muscles
- Gait Training
- Protect Reconstruction

CONTROL PAIN: You will be sent home with a prescription for a strong narcotic medication. You should take this medication for severe pain, as directed on the prescription bottle label. *If you had a femoral nerve block and have not taken any narcotic medication, you may want to take the prescribed medication dose before you go to bed as there is a possibility that you may wake up with significant pain when the nerve block wears off.* Most patients take the narcotic medication fairly regularly for 2 -3 days and then wean off this medication. For the first few days, you may also find it beneficial to take an anti-inflammatory such as Ibuprofen (Advil[®]) 400 mgs every 6 hours (as long as you don't have any contraindications to taking this medicine) **AND** Tylenol (Acetaminophen) Extra Strength 2 pills every 6 hours (as long as you are **not** taking a medicine with Tylenol in it like Tylenol with Codeine or Percocet[®] which also contains Acetaminophen). Taking this combination of medication regularly for the first few days after surgery as well as using ice will help control your pain and you may find that you do not require as much narcotic medication after surgery.

CONTROL SWELLING: Following discharge from the hospital you should go home elevate your leg and regularly apply ice to the knee (5 times per day for 20 minutes at a time). *Do not put ice packs directly on the skin as this may cause damage to the skin.* If you purchased or rented a Cold Therapy Unit, please use this unit as directed by the manufacturer. You may get up as tolerated. As your pain and swelling decrease you can start to move around more and spend more time up on your crutches. Applying ice, gel packs or using the Cold Therapy Unit are very effective ways to reduce pain, swelling, inflammation and narcotic use.

BLOOD CLOT PREVENTION: If you have a personal or family history of blood clots, you need to let the surgeon know **before your surgery**. If you are on the birth control pill, are a smoker and/or have an increased BMI, you may want to take one baby Aspirin daily to help thin the blood and possibly reduce the chance of developing a blood clot. You can take this in addition to the Ibuprofen. It is important to perform calf pumps and move around to help reduce the



ELEVATE & ICE

It is very important to elevate your leg and apply ice or use your cryotherapy device on regular basis to help reduce swelling and control pain

“ During this phase, the goal is to control pain and swelling. It is important to keep the leg elevated as much as possible. It is also important during this phase to prevent shutdown of the quadriceps muscles by performing the exercises included in this rehabilitation document.

chance of getting blood clots. ***If you develop calf pain and/or shortness of breath after surgery, you should go to your nearest Emergency Department immediately. A blood clot cannot be diagnosed over the phone.***

STOOL SOFTENER: While on narcotic medication it is wise to take a stool softener such as Colace® (or other stool softener). Take 1 tablet daily with a plenty of water to help ease the risk of constipation after surgery.

CARING FOR YOUR KNEE:
You are allowed to put 30% of

weight on the leg. Make sure that you wear your long leg post op hinged knee brace whenever you are up and moving around. Please **DO NOT** put any pillows directly under your knee as this promotes a bent knee position. You may remove the initial dressing and apply band-aids to the wounds 1 - 2 days after surgery. Please keep your wounds clean and dry. Try to leave the steri strips in place until your first post-operative visit. You have an absorbable suture under these steri-strips but the ends of this suture will be cut during your first

post-op visit. You also have black stitches in the portal sites, which will also be removed. You may shower two days after surgery as long as you keep your wounds clean and dry. Be careful not to slip, twist, or fall. It is a good idea to place a stool or bench in the shower so you can sit on it. This will be more comfortable for you and will help minimize injury to your knee. Do not soak in a bathtub, hot tub, or pool until you are cleared to do so. Once you are done showering pat the wound dry. You may develop a painful swelling, redness +/- or bruising in the **front** of your shin area. If this swelling develops, it can be very uncomfortable. This is typically not an infection; it is the result of blood tracking down your

leg from the surgery. It is known as *periostitis*. If this occurs, make sure that the brace is not too tight, as the swelling will accumulate between the straps of the brace. You may find it more comfortable to open your brace if you are in a protected environment and apply ice to your shin area to reduce the swelling and pain. It is also important to elevate your leg several times a day to help reduce the swelling. Make sure you take Ibuprofen as outlined above in pain control section.

You may also notice an area of skin numbness around your knee or down your leg. Unfortunately, this is one of the risks of having knee surgery. It does not cause any motor weakness or impair the use of your leg. This may or may not improve in the months following surgery.



BRACE:

Your brace will be locked at zero degrees (full extension) when you leave the operating room.

After 24 - 48 hours, you may unlock your brace to whatever setting has prescribed by your surgeon. If you have a brace similar to the one in the picture above, you need to click the red unlock button on both sides of the brace. The brace is generally set from zero degrees to 90 degrees. *The brace may be set at a different setting if you had suturing or your meniscus or a multi-ligament reconstruction of your knee.*

- *If you have had **SUTURING/ANCHORING OF YOUR MENISCUS AND/OR REPAIR OF***

MULTIPLE LIGAMENTS AS WELL AS THE

ACL RECONSTRUCTION: your brace will be set around 0 - 30 degrees to 0 - 45 degrees. Your brace should remain on your knee unless you are showering or undergoing physiotherapy (unless you are advised otherwise).

- *If you have had an **ACL RECONSTRUCTION AND/OR TRIMMING OF YOUR MENISCUS (MENISCECTOMY):** you may unlock your brace 1 - 2 days after surgery.*

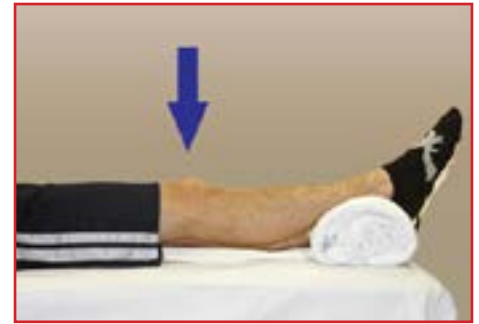
Please follow the specific post-operative settings that have been recommended for you in your post-operative instructions. Please be very careful on uneven ground, slippery surfaces and stairs to minimize falling. You may remove the knee brace while doing exercises or if you are in a safe, protected environment (there may be limitations if you have had a meniscus repair with sutures/anchors). The long leg post op hinged knee brace should be worn while sleeping for the first week. After your first post-op visit, you **may** be able to switch over to your custom fit ACL brace if your swelling allows and you can comfortably fit into the custom fit knee brace. You can bring your custom fit knee brace with you to your first post-operative appointment. The custom fit brace should be worn at all times when you are awake and moving around for approximately 2 months post-op to protect your graft. Generally, it is recommended that you wear the custom fit knee brace for high risk activities for at least 12 months (or more) after your ACL surgery.

FOLLOW-UP: A follow-up visit should be scheduled around 2 weeks following your surgery. If you do not have an appointment, please contact the office.

Dr. Coady: 902-473-2575

Dr. Wong: 902-473-7626

During this visit your sutures will be removed, your wounds and your range of motion will be assessed (especially full extension). Instructions will be provided to you regarding your weight bearing status and progression as well as your brace during this visit.



One of the most important goals of this phase is to ensure that you regain your full extension of your knee joint. Please do not place a pillow directly under your knee joint as this will promote a “bent knee” position in the knee joint. It is also important to walk with a heel to toe gait when ambulating with your crutches.

CRUTCH Walking

1 Please walk with a heel to toe gait using your crutches and your post-operative hinged knee brace. You should aim to put 30% weight on your operative leg unless instructed otherwise. In order to get a sense what 30% of your weight is, place your foot on a scale and place roughly 1/3 of your body weight on your foot. Please aim to walk with a heel-to-toe gait.

ANKLE Pumps

2 The foot and ankle should be actively “pumped” up and down 10-20 times every hour. This will help reduce swelling in your lower leg and may help reduce the risk of blood clots in your leg. It is also helpful in maintaining tone in your lower leg muscles.

KNEE Extension

3 Passive extension of the knee by using a rolled towel under your heel. Note the towel must be high enough to raise the calf and thigh off the table.

- Remove the knee brace from your knee every 2 - 3 hours while awake. Position the heel on a pillow or rolled blanket with the knee unsupported.
- Passively let the knee sag into full extension for starting at 1 minute and increase to 5 minutes. Relax your muscles, and gravity will cause the knee to sag into full extension. Do not **hyperextend** your knee.



ISOMETRIC QUADRICEPS CONTRACTION

This exercise may be performed in a sitting or laying position (1). Start by fully straightening your knee. Tighten the muscles in the front of your thigh (quadriceps) and hold the contraction for 5 - 10 seconds (2). Repeat this six to ten times. Please do these exercises every hour that you are awake. At first, you may have difficulty initiating this isometric contraction but please continue to try to do this exercise and eventually it will become quite easy to perform. This exercise is very important to perform early in your rehab to minimize quadriceps muscle wasting.

MUSCLE STIMULATION

If you have a personal muscle stimulator unit, you may use it as directed by the manufacturer post-operatively. If you do not have one, muscle stimulation will be used during your physiotherapy sessions in addition to other modalities.

PHYSIOTHERAPY: Rehabilitation after anterior cruciate ligament surgery requires careful monitoring by a physiotherapist. This protocol is not meant as a home exercise program. Each patient should have a discussion with their physiotherapist about how to best utilize the physiotherapy visits that they can afford. Patients will generally need physiotherapy care and guidance for 6 - 12 months post-operatively. The patient should be seen by the physical therapist one time per week. If ROM is severely limited, the patient should be seen 2 - 3 times per week and the MD should be notified

“ It is extremely important to start activating your quadriceps muscles as quickly as possible after surgery. You may find it difficult to contract your quadriceps muscles initially, but with steady practice, it will return. This should be your **main** focus during **PHASE ONE** of your rehabilitation.

Palpatate the edge of your patella (kneecap) with your fingers. Then gently glide the patella in four directions; up, down, to the inside (medial) and to the outside(lateral). Try not to tip or tilt the patella, but slide it. Hold for 2 seconds at the end of each glide. This will prevent scar tissue from forming around the patella. This exercise is particularly important if you had an autograft patellar tendon graft to reconstruct your ACL. Glide in each direction for 1 minute, and perform 3-5 times per day.

PATELLAR MOBILIZATIONS





Wall Slides

Lie on your back and place your operative foot up on the wall. Slowly slide your foot down the wall as far as possible. You may use your other foot to push the involved foot farther down the wall. You will feel some pressure in the front of the knee. Hold for 5-10 seconds. Now slide

foot up until the knee is fully extended. Repeat 15-25 times, and perform 3-5 times per day. *You can incorporate an isometric leg press while in this position. Bend your knee to 90° then push into the wall for 10 seconds. You should feel the muscles in your thigh tightening. Repeat 15 times.*

Heel Slides With Assist

While lying on your back with your brace off, place your good foot in front of your foot on the operative leg and gently bend your knee as far as possible towards your hips. At this point it is normal to feel some pressure in the front of the knee. Hold this for 5-10 seconds. Now

slide the foot back until the knee is fully extended. Repeat 15-25 times, and perform 3-5 times per day.



Hip Adduction



PWhile lying with your knees bent as shown, squeeze a soft ball or a pillow between your knees. You should feel your inner thigh muscles contracting (tightening) when you are doing this exercise. Perform this exercise 5 - 10 times holding each contraction for 5 seconds.

Progress to 30 times holding each contraction for 10 - 15 secs, resting for 5 secs between reps.

SITTING PASSIVE KNEE FLEXION:

Sitting with knees flexed to 90 degrees, place your "good leg" foot in front of your operative leg foot. Gently push backwards to passively flex your knee past 90 degrees. Perform this exercise at least 3 - 4 times per day with 5 - 10 repetitions each time. *Do not perform if you had suturing of your meniscus.*



SITTING PASSIVE KNEE EXTENSION:

Sitting with knees relaxed. Place your good foot under operative leg (1) and slowly bring your knee into full extension (2). Perform this exercise at least 3 - 4 times per day with 5 - 10 repetitions each time.



LYING HIP EXERCISES:

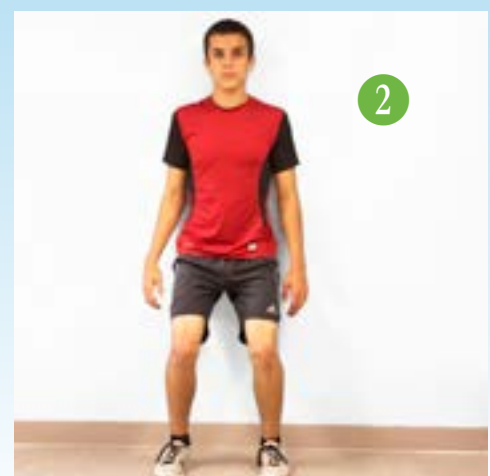
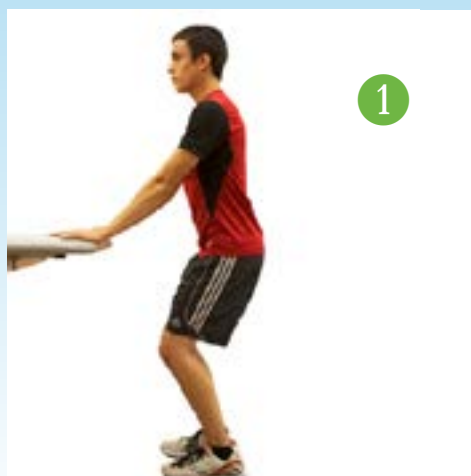
- (1) Lying on your side, lift leg upward and hold for 5 seconds.
- (2) Lying on your stomach, lift leg upwards, tightening your gluteal muscles and hold for 5 seconds.

REPEAT BOTH OF THE EXERCISES 5 - 10 TIMES PER DAY (10 REPS).



STANDING MINI-SQUATS:

(1) Stand upright with hands supported on a table OR (2) Stand upright against a wall. Tighten your core, gluteal and hamstring muscles. Gently squat down 30 - 45 degrees and hold for 5 seconds. Repeat 5 - 10 times. Do not let your knees extend past your toes. *Do not perform if you had suturing of your meniscus.*





Post Op Hinged Knee Brace



EXERCISES

- You may do hip exercises as tolerated.
- You may do straight leg raises with brace **locked** in full extension. You need to be able to contract your quadriceps muscles well before you attempt this exercise. Do not do this exercise at this stage without locking the brace in extension.
- You can also perform resisted ankle exercises using a Theraband® (resistance band).

RETURNING TO SCHOOL/WORK:

1) As far as returning to school, when you are comfortable and you can safely manoeuvre around, you may return to school. You may need to use an elevator at school initially if this is available. Please be careful on uneven and slippery surfaces.

2) In terms of returning to work, please discuss this with your surgeon. If you need to drive to get to work, you will need to have someone drive you until you are safe to drive on your own. This will depend on which leg is operated on, whether you have a standard or automatic vehicle as well as on your progress with the rehab.

CRITERIA TO PROGRESS TO PHASE TWO

- Minimal pain to allow for exercise progression
- Full Knee Extension
- Ability to activate quadriceps muscles
- Able to progress to full weight bearing

PHASE TWO

Initial Strengthening and
Balance Phase

Weeks 3 - 8

G oals:

- Control Pain and Swelling
- Progress to full weightbearing
- Quadriceps muscle strengthening, especially VMO
- Gradual range of motion improvement (0 → 90° by week 6)
- Continue to protect reconstruction

CONTROL PAIN: It would be anticipated that you should wean off any narcotic medication by this stage. If necessary, use an anti-inflammatory medication such as Ibuprofen (Advil[®], Motrin[®]) 400 mgs every 6 hours (as long as you don't have any contraindications to taking this medicine) and/or Tylenol Extra Strength[®] (Acetaminophen) 2 pills every 6 hours (as long as you are **not** taking a medicine with Tylenol in it such as Tylenol with Codeine or Percocet[®] *which also contains Acetaminophen*). Do not take more than the allowed dosages per 24 hours for these medications. The need to take this medication should diminish significantly during this phase.

CONTROL SWELLING: It is still important to apply ice regularly or continue to use your Cold Therapy Unit. If you still have significant swelling in your leg, you should continue to elevate your leg. Applying ice or using the Cold Therapy Unit is a very effective way to not only help with swelling but it is also very helpful with pain control.

CARING FOR YOUR KNEE:

Once you have had your sutures removed, you may shower or bathe in a bathtub and you do not need to cover your wounds. Continue to be very careful not to slip, twist, or fall. If necessary, you may want to continue with a stool or bench placed in the shower so you can sit. Patient who had suturing of their meniscus need to be especially careful.

WEIGHT BEARING:

- **ACL RECONSTRUCTION:** You may progress to full weight bearing with crutches. When you are safe, have a normal walking gait and have good quadriceps control, you may discontinue the use of your crutches.
- **ACL RECONSTRUCTION & MENISCUS REPAIR WITH SUTURES/ANCHORS:** You may progress to 50% weight bearing at this stage and increase to WBAT with crutches over the next 4 weeks as directed by your surgeon.

In order to stop using crutches, you must be able to walk without a limp while using crutches. Continue to use your crutches until you can fully weight bear without pain and have good quadriceps control.

Strength & Balance

This phase emphasizes progressive activation of the quadriceps muscles as well as the other muscles in the lower leg. It also emphasizes core strengthening and balance.



BRACE:

- **ACL RECONSTRUCTION:** You can transition into your *custom fit ACL brace* whenever you can fit into it. You do not need to wear your brace while sleeping.
- **ACL RECONSTRUCTION & MENISCUS REPAIR WITH SUTURES/ANCHORS:** CONTINUE WEARING THE POST-OP HINGED KNEE BRACE DAY AND NIGHT. PLEASE FOLLOW THE FOLLOWING RECOMMENDATIONS UNLESS ADVISED OTHERWISE:
 - ▶ 0-30 degrees for weeks 0 - 2
 - ▶ 0-45 degrees for weeks 2 - 3
 - ▶ 0-60 degrees for weeks 4 - 5
 - ▶ 0-90 degrees for weeks 5 - 6

RANGE OF MOTION:

- **ACL RECONSTRUCTION:** You should aim to achieve at least 90 degrees of knee flexion by 2 weeks post-operatively and 120 degrees of knee flexion by 6 weeks. It is anticipated that you should have near normal range of motion by 6 - 8 weeks post-operatively.
- **ACL RECONSTRUCTION & MENISCUS REPAIR WITH SUTURES/ANCHORS:** Although your brace will be set as outlined above, under the guidance of your physiotherapist, you may remove the brace to gently progress your range of motion as tolerated. You need to be careful of squatting/kneeling.

EXERCISES:

During this phase it will be important that you work on strengthening of your quadriceps, hamstrings and your gluteal muscles. You will also be working on exercises that will help you regain your core strength as well as your proprioception/balance. Please follow the following exercises. *Of note, patients who have had a meniscus repair with sutures/anchors will progress at a slower rate due to the recovery process involved in having a meniscus repair. They should not perform exercises with squatting until after 6 weeks post op.*



The exercise bike is one of the safest and most effective ways of building up the muscles in your leg as well as improving your endurance. A recumbent bike might be easier to use initially if you have access to one. Set the seat height so that when you are sitting on the bicycle seat, your knee is almost fully extended with your heel resting on the pedal. You may be only able to partially pedal the bike initially. Keep working on it until you are able to pedal freely. Start with 5 - 10 minutes on the bike with little resistance. As your mobility and strength in your leg improve, you may start increasing the resistance on the exercise bike as well as the amount of time you spend on the bike.

An elliptical machine is also a great way to build muscle strength and endurance. It is a low impact activity that has the added benefit of working your upper and lower body.

PRONE HANGS:



PRONE HANGS:

If you are having difficulty regaining full extension in your knee, please do this exercise. Lie on your stomach with your brace off and your knees and lower legs hanging off the bed or table. Try to keep your hips down on the table. You may place a small weight on your ankle or use the other foot to apply some downward pressure onto the heel to increase the stretch. You should feel some stretching and mild discomfort in the back of the knee. Hold this for 30 to 60 seconds, rest for 30-60 seconds, repeat 3-5 times consecutively, and perform 3-5 sessions per day.

GLUTEAL SQUEEZES:

Lying on your back with your arms rested by your side. Squeeze your buttocks (gluteal muscles) and lift them upward off the bed. Use your gluteal muscles to do the work. Support the weight on your shoulders, do not strain your neck. Hold for 5 to 10 seconds and then lower. Start with one set of 10 and gradually increase to two sets of 15 repetitions.



GLUTEAL SQUEEZES:

A photograph of a man and a woman exercising on elliptical machines in a gym. The man is in the foreground, wearing a white t-shirt and dark shorts, smiling as he works out. The woman is behind him, also smiling. The gym has a high ceiling with white beams and large windows.

PHASE TWO

STRENGTH & BALANCE

Elliptical

“ During phase two, the focus is on regaining your range of motion in your knee as well as working on regaining your lower leg strength and balance.

Remember to allow pain and swelling to be your guide on how you progress through the rehabilitation process. The rehabilitation phases serve as guidelines for you and you may take longer to achieve the proposed guidelines. It is important to understand that each patient may

progress at a different rate. Patients who have had a meniscus repair with sutures/anchors and patients who have had multiple ligaments repaired will progress through the rehabilitation program slower initially than patients who do not.

Hip Abduction

Continue working on your hip and gluteal exercises as outlined in phase I. Lie on your side on a flat surface. Holding your leg straight, lift off of the bed / flat surface. Hold and squeeze your gluteal muscles for 2 - 4 seconds then lower back to the resting position. Contract your abdominal muscles and keep your core engaged. Repeat 5 - 10 times.



Start by standing on a flat surface. Stand tall with your abdominal muscles tightened. Rest your hand(s) on a sturdy object for balance. Raise your heels a few inches off the ground. Hold the position for 3 - 5 seconds, lower and repeat 10 - 15 times. As you get stronger, you may perform this exercise on the edge of a stair or using a platform.

Calf Raises

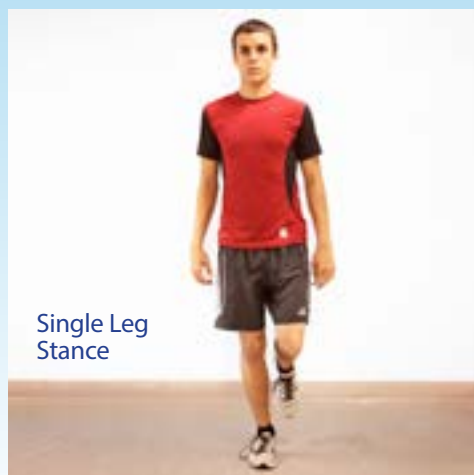


Stand with you back flat against a sturdy wall and place a lightweight ball between your thighs (just above your knees). With straight legs, walk your feet forward until they are roughly 12 inches in front of the wall. Keep your back flat against the wall and squeeze against the medicine ball with your inner thighs as you bend your knees to squat down. Make sure that your knees don't extend past your toes. Hold this squat for 20 seconds, *Avoid until 4 - 6 weeks post op if you had suturing of your meniscus.*



Wall Squats With Ball Squeeze

Single Leg Stance



Weight Shifting: *START with this balance exercise first.* Stand with both feet on the ground. Slowly shift your weight from your non-operative leg to your operative leg. Slowly increase the amount of weight supported through your operative leg.

Single Leg Stance: Once you are comfortable with weight shifting to your operated leg, you can progress to balancing on one leg. Stand on your operative leg for 5 seconds and slowly increase the amount of time you can balance to 20 seconds. Repeat 5 times.

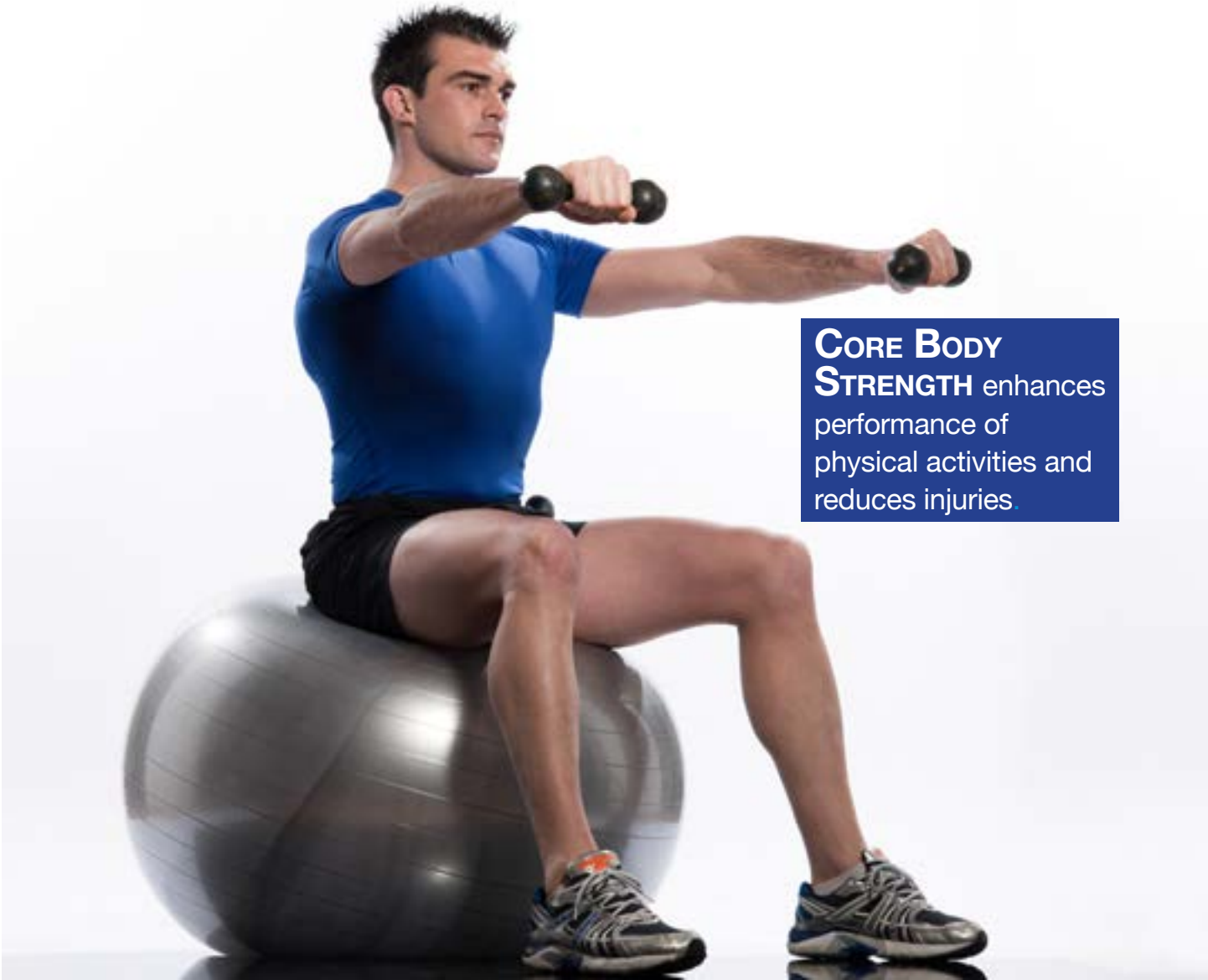


POOL PROGRAM: A pool program is an excellent way to recover from your ACL surgery. You may do the flutter kick, easy jogging in waist deep water and/or running in deep water with an aqua-belt. Avoid doing the whip kick and flip turns in the pool initially while you are recovering from your surgery.

PHASE II EXERCISES



STRENGTH
&
BALANCE



CORE BODY STRENGTH enhances performance of physical activities and reduces injuries.

CORE BODY Training

Maintaining good core body strength enhances performance of physical activities and reduction of injuries. Your abdominal muscles, low back muscles and pelvic stabilizing muscles are considered your core. The trunk and torso transfer and stabilize all forces generated by the upper and the lower body musculature. Building a strong core is an integral step toward making maximal gains in strength, power and performing any kind of skilled athletic movement.

Strong abdominals are important in every motion. During this phase you may start doing some basic core exercises such as abdominal crunches, gluteal exercises and lower back strengthening exercises.

Abdominal Crunches



VARIATIONS:

1. Bring your knees in at the same time you lift your upper body off the floor (full body crunch)

2. To make it more difficult, you can do your abdominal crunches while you balance on an exercise ball.

1. Lie down on the floor on your back and bend your knees, placing your hands behind your head or across your chest.
2. Pull your belly button towards your spine, and flatten your lower back against the floor to prevent straining your back.
3. Slowly contract your abdominals, bringing your shoulder blades about one or two inches off the floor.
4. Exhale as you come up and keep your neck straight, chin up.
5. Hold at the top of the movement for a couple of seconds
6. Inhale as you slowly lower back down

Many people do not use good form when doing abdominal crunches. This may cause back and/ or neck problems and it will make your workout less effective.

Use proper technique.

ADDITIONAL PHASE 2 EXERCISES

- Calf Raises
- Adductors/abductor with resistance tubing
- Clam shells
- Isometric exercises for quadriceps, hamstrings, hip flexors and hip extensors
- Patellar mobilizations
- Abdominal and core strengthening

CRITERIA TO PROGRESS TO PHASE THREE

- Minimal inflammation and pain
- ROM: 0 degrees to near full flexion
- Strong quadriceps contraction
- Straight leg raise with no quadriceps lag
- Good core strength

PHASE THREE

Strength and Control

Weeks 9 - 17

G oals:

- Normalize gait
- Regain full range of motion
- Improve lower leg, hip and core strength
- Aerobic activity
- Proprioceptive and neuromuscular control

BRACE: You should wear your ACL brace for all high risk activities such as pivoting, twisting, slippery or uneven ground activities.



WEIGHT BEARING: You should be full weight bearing without walking aids (crutches/canes) at this phase of your rehabilitation.

RANGE OF MOTION: You should have full, painless range of motion of your knee by the end of this phase. You should continue with patellar mobilization exercises in all planes to minimize scar tissue forming in your patellofemoral joint.

SWELLING/INFLAMMATION: Continue use of ice, compression, and elevation, as needed.

EXERCISES: Continue muscle stimulation to quadriceps (if needed). Quadriceps and hamstrings isometrics can be done anytime. You may want to start incorporating a pool therapy program to help you with your rehabilitation. You can initially start a walking program in the shallow end of the pool. You can then progress to easy jogging in waist deep water. You may also use the pool for running in cardio exercises (running with a weight belt) to help with your aerobic endurance. You can then start doing straight kicks with a flutter board and progress to using your arms as your

Strength & Control



“ In phase 3 it is important to work on improving your lower leg , hip and overall core strength. It is also important to continue working on improving your balance sense in your lower extremity (proprioception)

strength and endurance improves. Avoid whip kick and flip turns until phase 4. Continue with the bike and/or elliptical machine as they help with range of motion, muscular strength and aerobic fitness as well. It is important to continue to work on core strengthening exercises as well. You will start more advanced balance exercises during this phase. Flexibility exercises for your lower extremities are also an important component of this phase. You may want to join a gym at this phase of your rehabilitation. Please

ensure that you use proper form and technique with all exercises. You should continue to be under the supervision of a physiotherapist or a certified kinesiologist / trainer.

Wobble Board



Standing on a wobble board is one of the exercises you can do to help regain your balance sense.



RUNNING PROGRAM

“Running should begin on a treadmill or a flat surface at slow, comfortable speeds for short durations and distances.”

If you enjoy running or partake in a sport that involves running, you may start running at this stage of your rehab. Before you attempt running, you should be very comfortable jumping on one leg with your brace on. Begin by

jogging on a treadmill or on flat ground. Start by doing a good warm-up. You may want to walk at a moderate speed and then try to run at a slow, comfortable speed for short duration and short distances. You may progress in speed, time and distance as long as there is not an onset of new signs/symptoms of inflammation, pain, or increased swelling. When you can tolerate 2 miles (3.2 Km) of treadmill running, you may begin

track and/or road running. You should only run straight ahead (no curves on the track) and avoid hills, inclement weather, and uneven surfaces initially. If

AEROBIC CONDITIONING

During this phase you may start a jogging or running program. There are other forms of aerobic exercises that can be done during this phase as well including biking (indoor/outdoor) and skipping.

Aerobic Conditioning

Aerobic conditioning is usually achieved through cardiovascular exercise such as running, swimming, skipping, cycling, etc. This type of training targets the large muscle groups in the body so that as the intensity of physical activity is increased, overall fitness is improved



you have a functional knee brace, wear it initially. When you feel stable, you can remove the brace while running straight ahead. You should not attempt hurdles or do any jumping sports in track until you are cleared to do so.

JUMPING ROPE

Jumping rope is a great aerobic conditioning exercise as it improves your cardiovascular fitness while toning your muscles and working on your balance at the same time. This is a great exercise to start at this phase of your rehabilitation.

BASIC REQUIREMENTS:

You will need a four-by-six foot area and about 10 inches of space above your head. There are a selection of skipping ropes available. Find one that works for your level of comfort and fitness. Adjust the rope by holding the handles and stepping on the rope. Shorten the rope so the handles reach your armpits. Make sure that you wear properly fitted athletic shoes, preferably cross-training shoes. The exercise surface

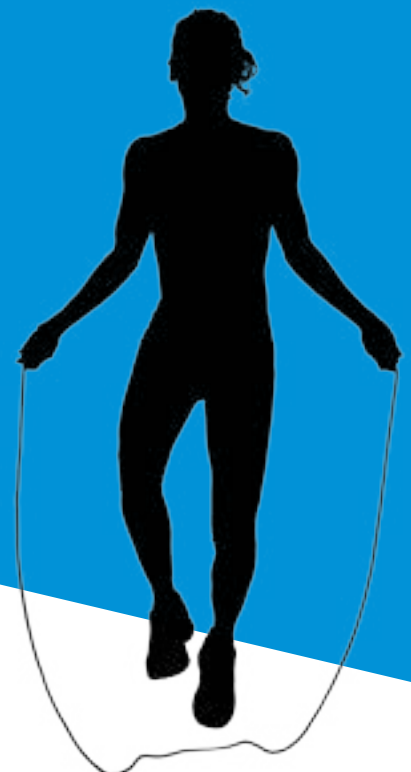
is very important. Try to find a softer surface such as a wood floor or an impact mat. While skipping, stay on your forefoot. When done properly, jumping rope is lower impact than jogging or running. It is very versatile, and portable.

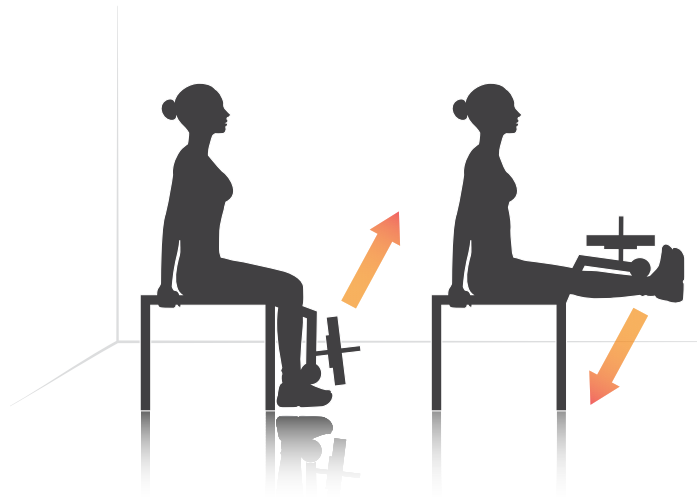
If you have an custom fit ACL brace, wear it initially as you learn to skip. Start by skipping on both legs. As your fitness level and your ability improves, you can start skipping forwards and backwards as well as side to side on both legs. You may then may transition to skipping on alternate legs and even try running while skipping. There are several very good videos on skipping techniques on You Tube. You can perform interval training while skipping. You can do as many jumps as you like and as many sets as you like, resting for a couple of minutes or two between sets.

A good indicator for when you are ready to start a running program is when you can skip equally well on both legs.

JUMPING ROPE

IN ADDITION TO LOWER BODY TONING, SKIPPING WITH A JUMP ROPE BURNS CALORIES, ENGAGES THE HIP FLEXOR MUSCLES AND ABDOMINALS TO STABILIZE YOUR BODY, IMPROVES HEART HEALTH AS WELL AS WORKING ON YOUR BALANCE AND COORDINATION

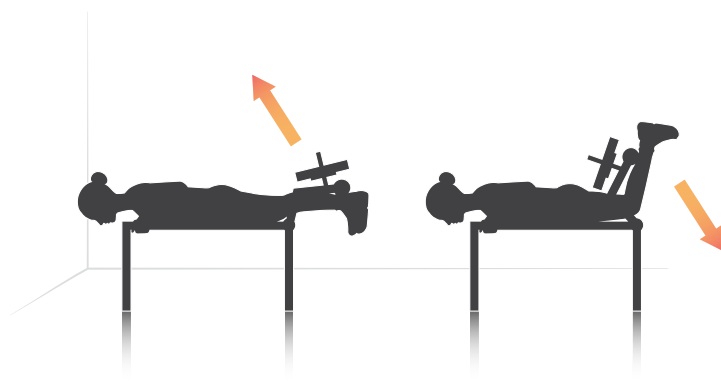




Leg Extensions

This exercise should be done under the guidance of a physiotherapist

or trainer until you become familiar with this exercise. Leg extensions help strengthen your quadriceps muscles (the muscles in the front of your thighs). Sit on the padded seat of the machine. Select a light weight initially to ensure that you can do the exercise properly. Hook your feet under bar of the machine. Adjust the bar so that it rests comfortably at the lower end of the leg. Slowly extend your legs straight. You should feel your quadriceps muscles exercising however it should not strain your muscles. Perform 2 - 3 sets of 8 to 10 repetitions. Ensure that you use proper form and technique while doing this exercise to minimize the chance of injury.



Leg Curls

This exercise should be done under the guidance of a physiotherapist or trainer until you become familiar with this exercise. Leg curls help

strengthen your hamstrings muscles (back of the legs). Adjust the machine to fit your height. Start with a light weight initially. Lie face down on the leg curl machine. The pad of the lever should be placed just a few inches under your calf muscles. Keep your torso flat on the bench, do not arch your back and hold onto the handles of the machine or the side of the bench. Exhale as you curl your legs upward and hold the contraction for a second. Inhale as you slowly bring the legs back to the initial position. You should feel your hamstrings working, but you should not strain your muscles. Perform 2 sets of 8 to 10 repetitions.

CAUTION:

Do not use too much weight while doing leg curls as this may cause you to start using bad form. It is very easy to injure your hamstrings and/or to cause a lower back strain. Ensure that you have proper form and technique.

THERE ARE A FEW VARIATIONS FOR THIS EXERCISE INCLUDING: LYING HAMSTRINGS CURLS WITH AN EXERCISE BALL, SEATED LEG CURLS, STANDING LEG CURLS AND CABLE LEG CURLS.



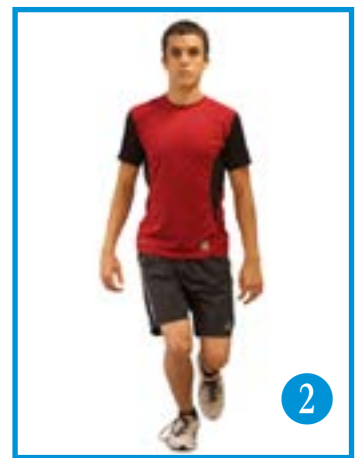
PRONE HAMSTRING CURL:

Lying on your stomach, Place a resistance band around your ankle as shown and anchor the other end to the bed. Slowly bend your knee against the resistance of the band by pulling your foot towards your buttock. Do not arch your back when you are doing this exercise. Start with one set or 10 reps and increase to 3 sets of 15 reps.



STEP UPS

Stand in front of a stair or low rise platform and place one foot on the step in front of you ①. Rise up to the step by shifting all of your weight onto this leg and tighten your quadriceps muscles ②. Start with one set of 10 repetitions and increase to 20 repetitions.



SINGLE LEG SQUATS

Initially, use something for support such as a chair or a railing. Standing on one leg, ① slowly squat bending your knee from 0 degrees to 45 and increase 70 degrees when able ②. Make sure that your knee does not go in front of your foot. Hold each squat for 5 seconds. Start with one set of 10 and increase the number of repetitions as your strength improves.

FLEXIBILITY EXERCISES

Flexibility exercises are an important component of the rehabilitation after an ACL reconstruction. After your warm-up, all muscle groups in your leg should be stretched. A physiotherapist or trainer can ensure that you have proper stretching form.

SEATED HAMSTRINGS STRETCH





ore training exercises are an important way of building strength and stability.

Building a strong core is the first step toward making maximal gains in strength and power and performing any kind of skilled athletic movement., as well as the risk for lower-back injury. Though commonly used to refer

to the abs and lower-back muscles, the term “core” actually applies to several muscles throughout the upper and lower body. The transverse abdominis, rectus abdominis, internal obliques, multifidus, spinal erectors, latissimus dorsi, gluteals, and trapezius are all considered to be important core muscles. A strong core will enable good posture, allow stronger positions

to be maintained and will facilitate more powerful movements. The basic plank exercise is a great starting place if you want to improve your core strength and stability. Abdominal exercises are also a great way to build on core strength. You can progress your abdominal exercises at this stage to more challenging variations such as leg raises, flutter kicks, medicine ball twists, etc.



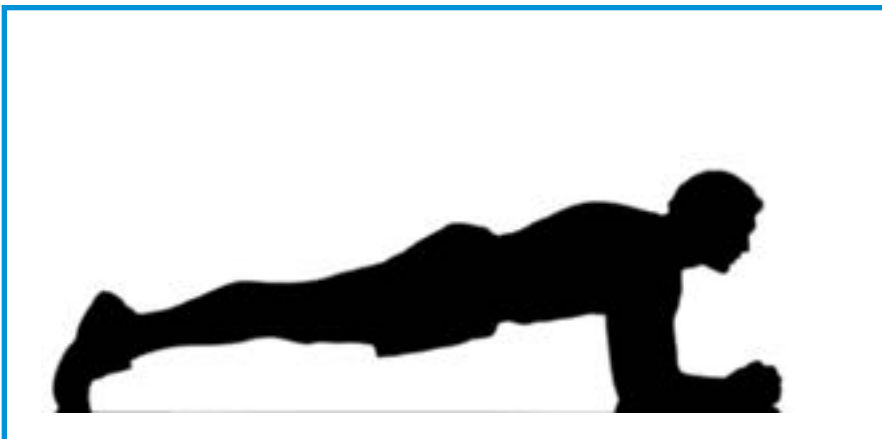
ABDOMINAL EXERCISES

VARIATIONS TO TRY:

1. *Bicycle crunch*
2. *Reverse crunch*
3. *Leg raises*
4. *Flutter kicks*
5. *Medicine ball twists*

Plank Exercises

Plank exercises are an excellent way to build a solid core. There are many variations of plank exercises. Start by doing a basic plank. Begin in the plank position with your forearms and toes on the floor. Keep your torso straight and rigid and your body in a straight line from



ears to toes with no sagging or bending. Your head is relaxed and you should be looking at the floor. Your body should form a straight line. Hold this position for 20 seconds to start. Over time work up to 30, 45, 60 seconds and if possible up to 2 minutes. If this is too difficult, you can start with a modified plank where your knees are supported on the floor instead of your toes.

As you get stronger, you can then progress to more advanced plank exercises as side planks, cross body planks, stability ball plank and raised leg planks.

PLANKS

One of the most basic, easy and effective methods to test your core strength is by performing the plank.

ADDITIONAL PHASE 3 EXERCISES

- Hip abduction, adduction, extension (open chain) in standing; progress to resistance with tubing or weights
- Open kinetic chain weight-training exercises
- Flexibility exercises
- Proprioception drills
- Walking, hiking, jogging, cycling as tolerated

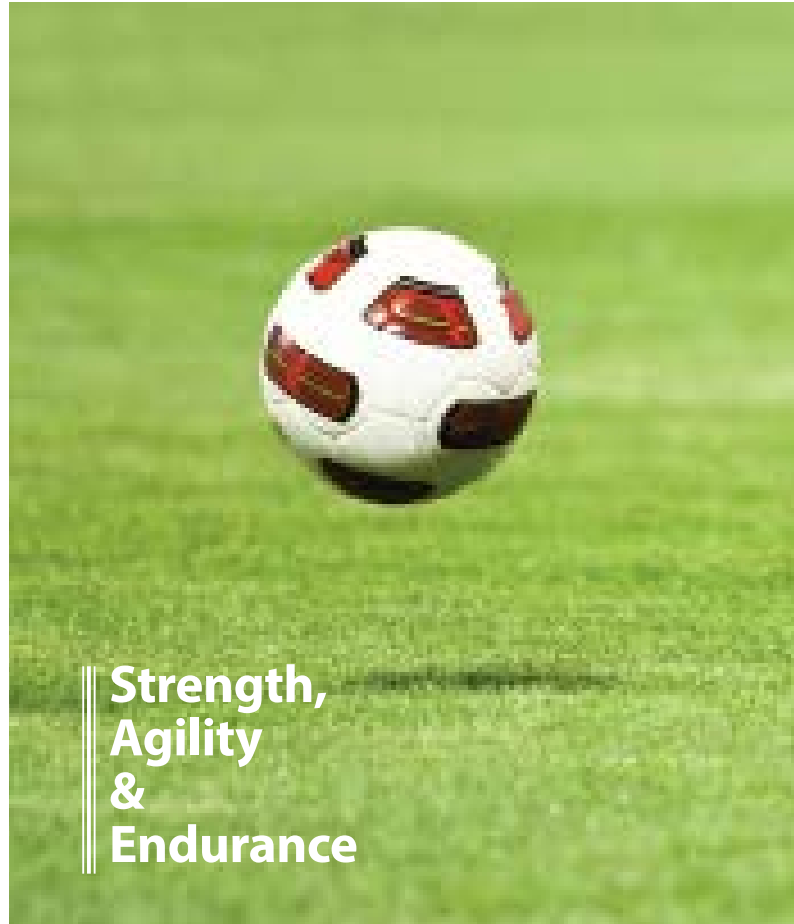
CRITERIA TO PROGRESS TO PHASE FOUR

- Full Non-Painful ROM
- Good strength, endurance and balance control
- Knee extension strength 80% of opposite (contralateral) knee.
- Good core control

PHASE FOUR

Maximizing strength and endurance

Weeks 18 - 52+



Strength,
Agility
&
Endurance

G oals:

- Maximize muscle strength and endurance
- Improve balance & neuromuscular control (proprioception)
- Improve aerobic endurance
- Plyometric drills
- Sport specific drill training

Phase 4 generally starts around week 18 and may last up to 12 months depending of the progress through the rehabilitation program. This phase focuses on improving agility and strength through plyometric exercises, and return to functional activities including sports.

BRACE: You should wear your custom fit ACL brace for all high risk activities until advised otherwise by your physician.

SWELLING/INFLAMMATION: Continue use of ice, compression, and elevation, as needed.

EXERCISES: During this phase you want to continue working on your strength. You should continue doing open kinetic chain weight training exercises such as leg press, leg extension, leg curls and 4 way hip exercises. You should also continue with your abdominal and core strengthening exercises. Cardio conditioning is important especially if you want to return to



“Phase four focuses on improving strength and agility through plyometric exercises and sport specific retraining exercises and drills. Continued balance and core exercises are highly recommended.

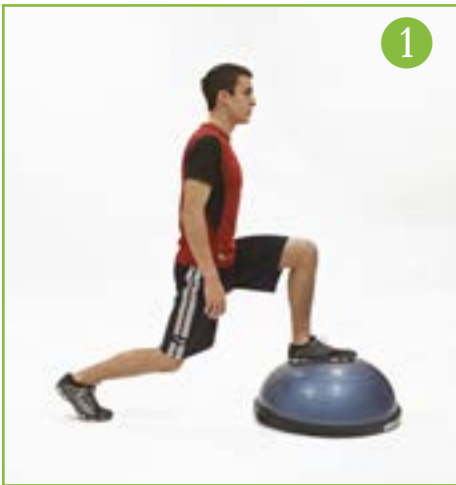
sport at involves aerobic or anaerobic activities. You may partake in a running program. Agility exercises will be incorporated during this phase. Balance exercises remain a key component in the rehabilitation program. Your ability to know where your joint is in space is known as proprioception.

PROPRIOCEPTION: Proprioceptive ability can be trained. Learning any new motor skill involves training our proprioceptive (balance) sense.

Anything that involves moving our arms or legs in a precise way without looking at them invokes it such as jumping rope, basketball, walking on uneven ground, or even painting. Proprioception involves the sense of where one's body is in space, and is closely related to another important but often overlooked sense, one's sense of balance. Proprioception affects the ability to balance. Balance sense is also maintained from your eyesight (visual

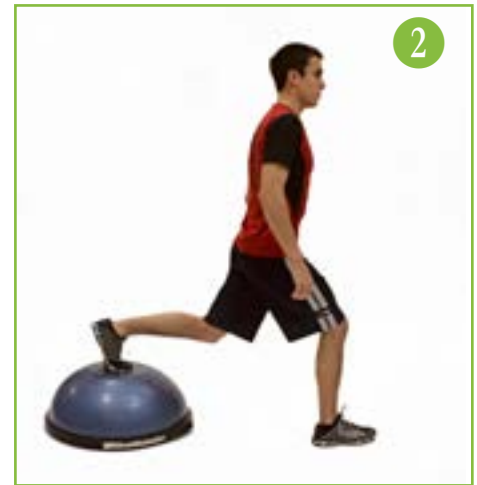
information), skin pressure (such as walking on sand), and information from your inner ear. For example, if you have inflammation in your inner ear nerve, you will have difficulty balancing. Proprioceptive exercises are extremely important to work on during this phase of the rehabilitation program.

PERTUBATION: Perturbation is defined as an unconscious reaction to a sudden unexpected outside force of movement. These are reflex activities that occur within seconds. Training an athlete in restoring or improving reaction times is referred to as perturbation training.



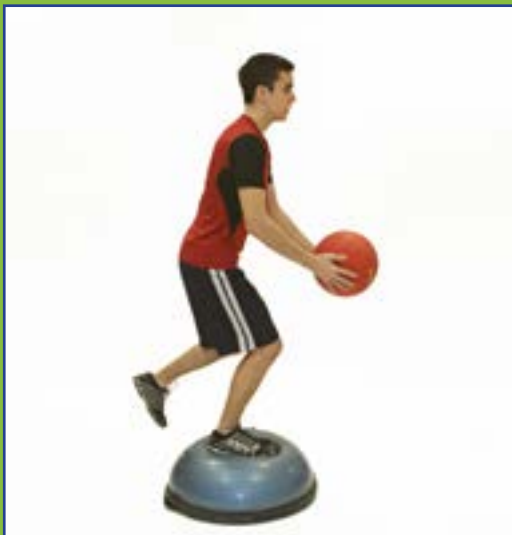
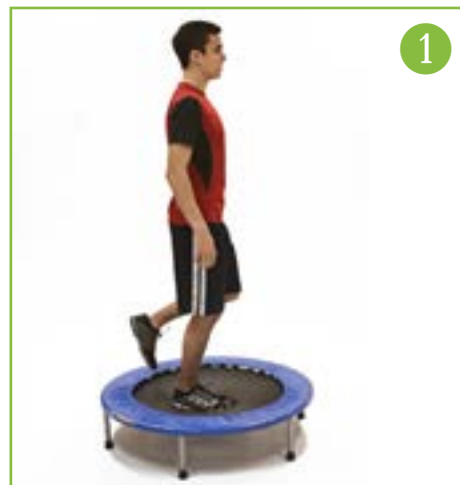
Lunges on a Bosu

Standing with feet together lunge forward and backward with one leg at a time as shown. Control your movement to ensure that your knee does not move beyond your toes. Start with one set of 10 lunges holding for 5 seconds with each lunge. Increase the number of reps on each leg as tolerated to two sets of 10 lunges as your strength increases.



Single Leg Squat

Standing on one leg on a mini-trampoline, slowly squat down bending your knee making sure that your knee does not extend past your toes. Start with one set of 10 and hold each squat 5 seconds. Increase to 2 - 3 sets of 10. Perform this exercise on both legs.



Single leg stance with ball toss

Steady yourself and stand on a BOSU ball. Initially use both legs to do this exercise.

When you are more adept with the exercise, progress to standing on one leg at a time. Slightly bend your knee(s). Initially, you can throw and catch a light ball against a wall. Once you

are stronger and your balance sense improves, you try throwing and catch the ball to a partner. Start with 1 set of 10 throws and increase to 2 sets of 15 throws.



Squat Jumps

Plyometrics

Plyometric drills (also known as jump training) are a type of training technique designed to increase muscular power and explosiveness. Plyometric training conditions the body with dynamic resistance exercises that rapidly stretch a muscle (eccentric) and then rapidly shorten it (concentric). Hopping and jumping exercises can strengthen the quadriceps

muscles, increase vertical jump and reduce the force of impact on the joints.

Caution: Plyometric training is associated with a risk of injury if you do not have adequate strength. You **must** be able to perform a controlled single leg squat and have very good quadriceps muscle and core strength before attempting these drills.

Agility Jumping

Start with straight-line jumping, backward/forward/side to side jumping using both legs. Progress to diagonals and combined patterns when able. Once speed and agility are good with jumping, progress through the same drills with single leg hopping.



Side To Side Jump Steps

Perform quick steps in both directions over BOSU ball. Start with 1 set of 10 steps in both directions and progress to 3 sets of 15 steps in both directions as your strength increases.

Sport Specific Drills



BASKETBALL: lay-up drills, lateral shuttle runs while throwing/catching ball off wall, run-pivot-vertical jump, dodging drills, defence drills (running/jumping backwards)

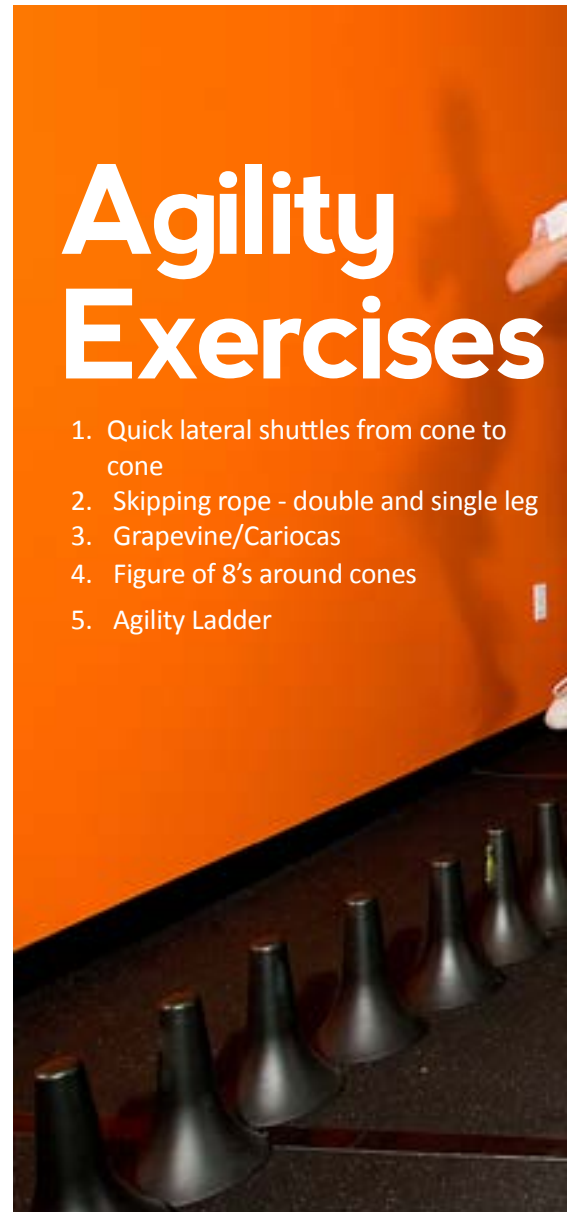
SOCCER: dribble around cones, shooting drills, defence drills, lateral shuttle runs while kicking ball off wall, tackling drills

FOOTBALL/RUGBY: dodging/deking drills, running and throwing drills (all directions), defence tackling drills

HOCKEY: skating figures, stick handling drills, shooting drills, deking drills

Agility Exercises

1. Quick lateral shuttles from cone to cone
2. Skipping rope - double and single leg
3. Grapevine/Cariocas
4. Figure of 8's around cones
5. Agility Ladder



ADDITIONAL PHASE 4 EXERCISES

- Wobble-board balance activities +/- perturbation (throwing/catching ball, raising arms)
- Box hops (up/down starting with 6" block)
- Rocker board lunges (forwards/backwards)



R

eturn to sport is based on progression to sport specific activities and depends on quadriceps and hip strength and control. Most patients take 8 - 12 months to rehabilitate well enough to return to sport although some patients **may** return slightly earlier with dedication to their rehabilita-

tion program. You should have full painless range of motion and your strength should be close to 90% compared to the non-operative leg. Your proprioceptive ability should also be very good before you return to full sporting activities. Do not return to cutting or pivoting sports until you are fully rehabilitated. If you return to sport too early, you may risk re-injury.

