JOSHI HOSPITAL MULTI SUPER SPECIALITY & TRAUMA CENTER

SPORTS INJURY CENTRE

(Arthroscopy & Joint Disorder)

PATIENT INFORMATION BOOKLET

On

Anterior Cruciate Ligament Injury & Reconstruction

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FREQUENTLY ASKED QUESTIONS ABOUT ANTERIOR CRUCIATE LIGAMENT INJURY & ITS TREATMENT

What is the ACL and what does it do?

 The anterior cruciate ligament (ACL) connects the femur (thigh) bone to the tibia (leg) bone in the center of the knee joint.

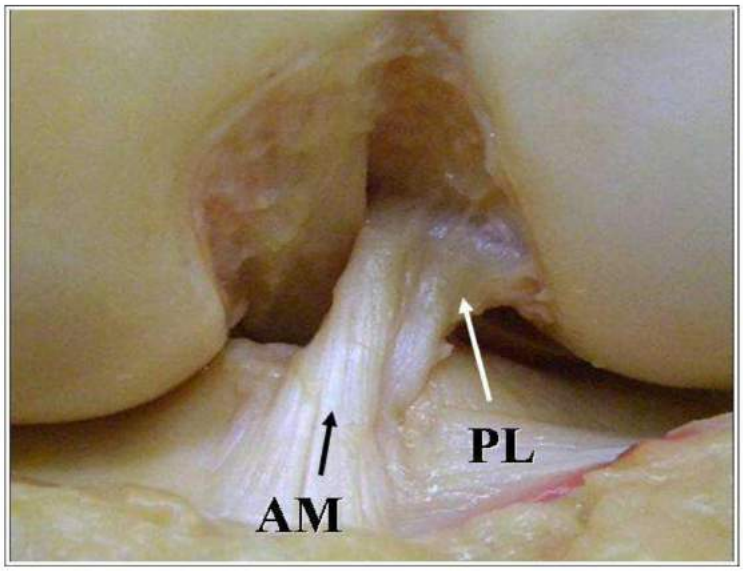
 The ACL is important during daily activities but absolutely critical to the stability of the knee during sports and athletics.

2 **What is the native anatomy of the ACL?**

 The ACL is made up of two functional bundles of tissue, the anteromedial (AM, front) and posterolateral (PL, back) bundles.

 The AM bundle of the ACL primarily controls anterior (forward) movement of the tibia underneath the femur, and the PL bundle controls rotational stability of the knee, such as in turning, pivoting, twisting, running, and jumping.

 Here is a closer look at the attachment sites – we can see the ACL attachment site on femur (upper) and AM and PL bundles and their attachment on the tibia (down).



How is an ACL tear diagnosed?

 Tear of the ACL can be diagnosed by a history of trauma to the knee (contact or non-contact) and physical examination. MRI scan can confirm the diagnosis, but it is not absolutely necessary:

 At the time of arthroscopic surgery, severe stretching or complete tearing of the AM and PL bundles of the ACL may be observed.

6 **Is surgery necessary for ACL tear?**

Yes, an intact ACL is needed for a stable knee for performing activities of daily living like running, jumping, stair climbing and more so in sporting activities.

 There is a risk for damage to the menisci (cushion like structures) and articular cartilage coating inside the knee joint with each subluxation event. This damage can lead to degenerative arthritis.

 There is a risk of injury to other ligaments of knee also.

Can the ACL be repaired or does it have to be reconstructed?

In general, the fibers of the ACL can not be sewn back together again (or repaired 'primarily'). This is due to irreversible stretching and damage to the ligament sustained at the time of injury. Therefore, damaged ligaments are removed and replaced with new ones.

I just tore my ACL—when will I be ready for surgery?

 In general, there are three criteria that must be met before the ACL can be surgically reconstructed:

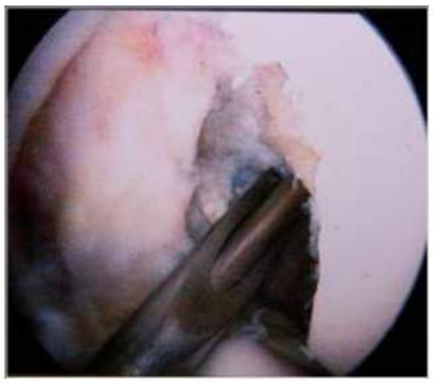
1) Swelling in the knee must go down.

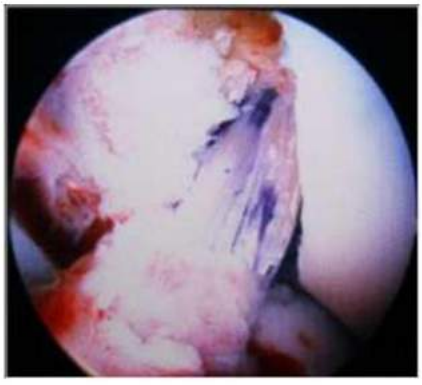
2) Range-of-motion (flexion and extension) of the injured knee must be nearly equal to the uninjured knee

3) Good Quadriceps muscle control must be present (ability to do straighten the knee)

What surgical techniques are used for ACL reconstruction?

 A standard technique of ACL surgery during a "single bundle" reconstruction involves removing the remnant of torn ACL. A drill guide is then used to drill a single tunnel on both the tibia and femur. A single ACL graft is then passed through the tunnels and fixed on either side.





Do we perform anatomic single bundle ACL reconstruction?

- There are a few scenarios where we prefer to perform single bundle surgery:
  - Patient has a very small native ACL insertion site. This typically can only be determined at the time of surgery
  - Patient is still growing and his or her growth plate is not closed
  - Patient has severe arthritis
  - Patient with multiple knee ligament injuries or knee dislocation
  - In females generally, because of smaller knees

Why is Anatomic Double-Bundle ACL reconstruction performed instead of Single-Bundle?

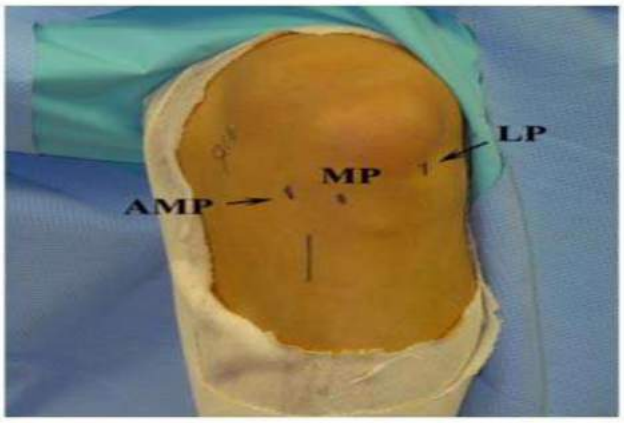
There is a significant amount of scientific evidence supporting double bundle surgery:

- The ACL is composed of two functional bundles, the anteromedial (AM) bundle and the posterolateral (PL) bundle, not just one.
- Between 10% and 30% of patients complain of pain and residual instability following Single-Bundle ACL reconstruction.
- Arthritis has been observed on x-rays in up to 90% of patients at long-term follow-up after Single-Bundle ACL reconstruction.
- Single-Bundle ACL reconstruction does not adequately restore normal knee stability, particularly tibial rotation
- Anatomic Double-Bundle reconstruction better restores knee stability compared to Single-Bundle reconstruction.

To better understand how "Double-Bundle" ACL reconstruction has evolved from "Single-Bundle" surgery, one should consider a door hinge. A door with one hinge is like a Single-Bundle reconstruction—it will open and close, but the hinge is required to work excessively. Over time the hinge will loosen and the door will wobble. In comparison, a Double-Bundle reconstruction is like a door with two or three hinges. The work is shared between the hinges, and the door can open and close smoothly for long periods of time without falling apart.

What are the details of the surgery?

- For ACL reconstruction, we typically use four small incisions:
  - Three arthroscopic incisions: AL—Anterolateral Portal, AM—Anteromedial Portal, AMP—Accessory Medial Portal
  - One tibial incision for the bone tunnels and harvesting graft for making ligaments.
  - Occasionally, an additional incision is made on the lateral (outer) aspect of the knee joint over the femur to help secure the graft for crosspin fixation.



□ ACL reconstruction usually takes 30 to 45 minutes.

□ First, the insertion sites of both bundles (AM and PL) of the old ACL are marked on the femur and tibia.

□ The injured ACL is then removed with arthroscopic equipment.

□ Care is taken to place the new tissue grafts in the exact position of the original bundles of the ACL, creating an "Anatomic" reconstruction.

□ For each bundle of graft tissue (AM and PL) one tunnel is created in the femur and one in the tibia (total = 4).

□ Each tunnel measures anywhere from 6 to 8mm in diameter, and this dictates final graft size

└ Tunnels are created by drilling over guide wires, and sutures are passed

□ The grafts are then passed through the tunnels and fixed to the femur and tibia with a combination of tight-rope or cross-pin and screws.

□ After Double-Bundle reconstruction, most patients achieve excellent range of-motion, typically equal to the other knee.

Is it possible to tear just one bundle?

□ Yes – this is rare but does happen

□ Clinically an isolated tear of the:

- AM bundle leads to anterior-posterior instability
- PL bundle leads to rotatory instability

□ In either case we save the intact bundle and "augment" the ACL with a single bundle reconstruction – either the AM or PL, whichever one is torn.

Where do the grafts for ACL reconstruction come from?

□ The graft tissue come from your own body (autograft)

□ Autograft options include: Hamstrings Tendons,

Quadriceps Tendon, and Patella Tendon (BTB)

□ When possible we prefer to use Hamstring Tendon or Quadriceps Tendon.

Frequently Asked Questions

Why bother with an "anatomic" or "double-bundle" reconstruction if it takes longer, with respect to operating time and time to return to sports?

This method of ACL reconstruction (anatomic) regardless of whether we do single (30%) or double bundle surgery is meant to reproduce YOUR OWN ACL, both in regard to ligament placement and ligament size. We believe that this more closely reproduces "your" native anatomy. In addition, there are certain benefits like rotational stability for a double bundle ACL reconstruction.

What happens to the knee joint, if anatomy is not restored?

The answer to this should be considered in two stages: the short term and the long term.

In the short term – a well-placed ACL reconstruction allows good restraint to both AP (front to back) and rotational stability. This "macro-stabilization" allows patients to feel stable both subjectively and objectively and is key to returning to sports at a high level. In the long term – subtle or "micro" motion about the knee likely accounts for the increased incidence of early arthritis in the affected knee (in addition to the damage from the initial trauma to that knee). Because my bone and ligament anatomy is different from yours, the forces across my ACL will be different. Because of this variation, a ligament meant for me will not work as well for you. Although this may be close enough to reproduce the "macro-stability" mentioned above, this will not stabilize the micro-motion that occurs around the knee in the long term.

Do we do a double-bundle reconstruction in every patient with a torn ACL?

No, we don't. We perform single bundle ACL surgery on 30% of patients. There are cases (taking the rest of the knee and patient into account) where single bundle is better: 1) too small of a knee to safely place two bundles (technical issue), 2) Open growth plates

3) severe arthritic changes, 4) multiple ligament surgery. Again, your ACL surgery should be what is best for YOU as a patient and this includes age, activity level, bony anatomy, size of knee, open vs. closed growth plates, etc.…

When can I go back to Sports?

Generally, jogging begins at 3-4 months after surgery. Sport specific training begins at 6 months. Return to competition is allowed at 9-12 months following surgery. Remember, returning earlier increases the chances of ACL re-rupture. Although you may feel fine otherwise, biologically, the ACL graft takes about 9 months to heal.

Is rehab any different after a double bundle reconstruction?
No. All aspects of rehab are the same for single and double bundle ACL surgery.

If I've already failed a previous ACL reconstruction, can I still do a double bundle ACL reconstruction on my knee?
Yes. In fact, if you've already failed single bundle ACL reconstruction, a double

GENERAL INSTRUCTIONS

PREPARATION FOR SURGERY

1. IN OPD: After you have been advised surgery you would be asked to undergo certain Blood and Urine tests for PAC (Pre Anaesthetic Check-up). Anaesthetist would do a comprehensive check up including your test reports to determine if you are fit for surgery.

2. DATE OF SURGERY: You would be given a date of surgery and you would be asked to come a day or two before the day of surgery for admission and other formalities. Generally patients can go back home after the formalities and have to report back to the Centre on the day of surgery at 8:00 AM.

3. NIGHT BEFORE SURGERY: Shave off hairs on your leg to be operated upon with a hair removing cream. You would be given a lotion. Apply that lotion after hair removal and on the morning of surgery after taking bath. Take medication in night and on morning of surgery with only a sip of water as advised. You are required not to eat or drink anything after 10:00 PM on the night before surgery. Remember to take all your documents and X-ray/MRI with you to the hospital. Reach hospital by 8:00 AM.

4. DAY OF SURGERY: You will be directed to a waiting area and asked to wear a hospital gown and remove all jewellery and other articles on your person before surgery.
   - You will be taken to operating room and anaesthetist will give you regional anaesthesia, but in certain cases general anaesthesia is required depending upon the patient's condition.

   - Following surgery you will be kept in the recovery room for at least an hour till you are comfortable and then you will be shifted to your room. Strictly one attendant is allowed to stay with you in the room.

   - Your knee would be bandaged with a brace tied on it with a ice pack. Ice pack should be used at least for 20 minutes, 5 times a day.

- Ask for pain medication, if you feel pain or inform the nurse on duty regarding any other discomfort you feel.

- You would be visited by a physiotherapist on your arrival in the room and you would be advised certain basic exercises for prompt recovery. Move your feet starting from the recovery room when you regain sensation in your feet, this will improve circulation.

- You will be given advise how and when to start eating and drinking.

- A physiotherapist will attend to you on the day after surgery and teach exercises appropriate for you and would train you to walk with the help of crutches.

- You would be required to stay at the Centre for 3 days post surgery for better recovery and learning exercises.

- You would be discharged on 3rd day on the doctor's discretion. Before you leave, you would be given a Discharge Certificate with prescription for medicines that you would take till the time of suture removal. Next date of appointment would also be mentioned on the discharge certificate.

- You would be asked to follow-up on a OPD day (Wed/Sat) for suture removal and advise regarding further exercises. Outstation patients are usually advised to get the stitches removed at their home town and follow up at around 4 weeks after stitch removal.

Postoperative Instructions:

How do I take care of my surgical incisions after surgery?
The Ice packs should be should be used immediately after surgery.

Do not apply any cream, ointments, lotions or other substances to your incisions.

- Use the ice packs as needed for swelling, 3 to 5 times a day for 20 minutes
- Do not soak or submerge your incisions under water.

What should I be aware of after surgery?
If you experience any of the following symptoms after surgery, call our office immediately at 011-26181881, or show the doctor at Sports Injury Centre for immediate evaluation:

- Fever (>101.5°F)
- Chills
- Excessive redness or swelling around the incision

- Yellow drainage (Pus) from the incision
- Deep pain and/or excessive swelling in the calf
- Chest pain, shortness of breath, or pain with breathing

When do I follow-up after my surgery?

- After surgery, you will be evaluated in the clinic after 10 days, 1 month, 3 months, 6 months, 12 months, 18 months, and 24 months.
- A physical examination will be performed at each visit, measuring knee range-of motionand stability. Radiographs of the knee will also be taken periodically and a CT Scan may be required in some cases.

How long do I have to wear my brace?

In most cases, a knee brace will be required for 4 weeks after surgery. For the first 2 weeks after surgery it will be required to be worn day and night & will be removed only for exercises. After 2 weeks it will be required to be worn at night time only or during sleeping.

How long do I have to use crutches?

In most cases, crutches will be required for 2-3 weeks after surgery. This may vary if additional surgical procedures are performed on the meniscus, cartilage, or other knee ligaments. Patient discards crutches when he/she feels confident walking without them with good control of the leg.

How much weight can I put on my leg after surgery?

In most cases, full weight-bearing is permitted within the pain bearing capacity of the patients from the day after surgery with the use of crutches. This may vary if additional surgical procedures are performed on the meniscus, cartilage or other knee ligaments.

When do I start Physical Therapy?

The Physiotherapy will be started from the day of surgery itself. A prescription for Physical Therapy is given at the first postoperative visit. The physiotherapy regimen will continue till at least 6 months post surgery, but it all depends on how the patient responds to the regimen. A detailed rehabilitation protocol is provided to the patient individually depending upon his/her medical condition and physical capability.

When can I drive?

Driving is permitted after:

- 6 week for four wheelers.
- 12 weeks for 2 wheelers.

When can I return to competitive sports?

After Double-Bundle ACL reconstruction, rehabilitation guidelines are usually as follows:

• Day of Surgery: Walking with crutches

□ 3 weeks: Discontinue crutches (when comfortable)

□ 1 Month: Discontinue brace

□ 3 Months: Jogging / Running In-Line

□ 6 Months: Sport-specific agility training

□ 9-12 Months: Return to competitive sports

□ A functional knee brace is often recommended for 1 year after return to sports

POST-OPERATIVE PHYSIOTHERAPY REGIMEN

Important:

All the activities mentioned here are according to the time spent after the surgery but these may vary depending on the ***variation in surgery*** *and* ***type of the patient****. So, this material should be taken as a 'patient information booklet'* ***not a replacement of the doctor's advice and supervision.***

Day of Surgery (Day 0)

1. Head flat on bed without pillow, till next morning.
2. Knee fully extended in brace.
3. Pillows under ankle to keep the knee above heart level.
4. Apply Cold Packs on the operated knee for 20min every 2hrs.

Move the foot up and down at the ankle. 30 times in a go, every 15 minutes.

Phase 1 (Days 1-7, 1st week)

To repeat the whole session of exercises (given ahead) for 4 times a day and apply a cold pack after each session.

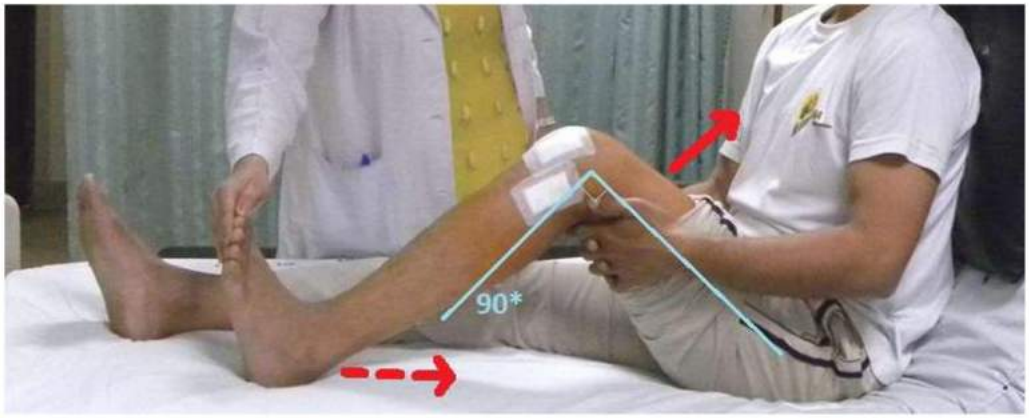
Move the foot up and down at the ankle, keeping the leg flat on the bed, 30 times every hour.

To start, keep your operated limb straight with towel roll under the knee, and heel stuck to bed. Then, tighten up the front thigh muscles (Quadriceps) and press down the roll by knee, and simultaneously move your foot towards your face. Hold it for 5 seconds and then relax for a while, and repeat this for 15 times.

To start, keep your operated limb straight with towel roll under the ankle and heel. Then, press the heel on the roll downwards. Hold it for 5 seconds and then relax for a while, and repeat this for 15 times.

To start, keep your operated limb straight. Then, hold your '**knee cap**' between your thumbs and index fingers of both hands. Now, with your hands, move your knee cap right, left, up and down by holding for 10 seconds in each direction. Do not press down the knee cap. Repeat this cycle for 10 times.

Lie down with your face towards the bed and your both knees on the bed but near the edge. Then, let your both legs hang freely under gravity for 10 minutes.



Support the operated knee with both of your hands and lift your thigh while keeping your heel on the bed. As a result, your operated knee will start getting bend and heel closer. Hold it there for 30 seconds, then straighten your leg and relax for a while. Repeat this for 10 times. Do not bend your knee beyond 90 degrees

To start, lie down on the bed with the operated leg in a brace. Bend your healthy leg, so that foot comes near the operated knee on the bed. Keep both hands flat on the bed. Now, lift your operated leg till your operated knee reaches half the height of your bent knee, keeping your forefoot towards you. Hold there for 10 seconds, then come back to normal position and relax for a while. Repeat for 10 times.

Lie flat on the bed with healthy leg half bent. Now, lift your operated leg as in previous exercise and then lift your hips also, off the bed. Hold this position for 5-10 seconds, then come back to normal position and relax for a while. Repeat for 10 times.

Come in side lying position with operated leg above. Now, lift your operated leg till around half of your full range. Hold it there for 10 seconds, then come back to normal position and relax for a while. Repeat for 10 times. Your healthy leg will rest on the bed in slightly bent position

To start, lie down flat on the bed and get thick pillows in between your legs. Now, squeeze the pillows between your legs. Hold for 10 seconds, then come back to normal position and relax for a while. Repeat for 10 times.

1. Put your body weight (as much as tolerated) on the **hand-grips,** firmly held under your hands. And, hold the crutches in your axilla by **axillary-pads**.
2. Start with both the feet and crutches on the ground. Both the feet side by side at normal distance. And, with both the crutches slightly out and ahead of toes

Lift and move forward both the crutches and operated leg simultaneously, while bearing whole body weight on the healthy leg.

Place both the crutches and operated leg simultaneously on the ground, around 1 ft ahead

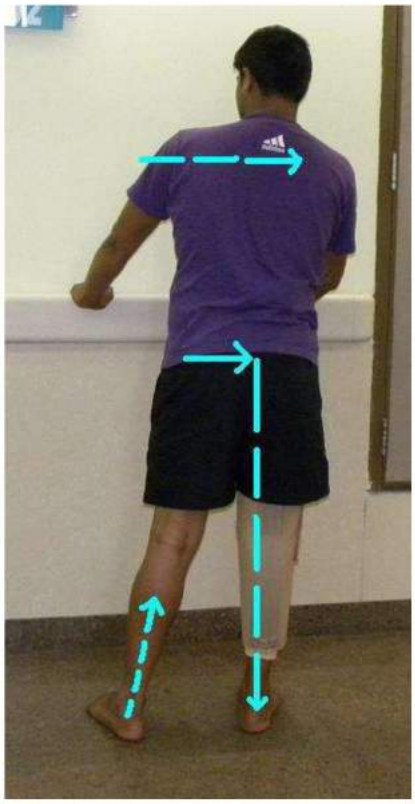
Now, with the crutches braced against the body, the strength of the hands and forearms are used to push down on the hand-grips as you lift the good leg and swings through forward.

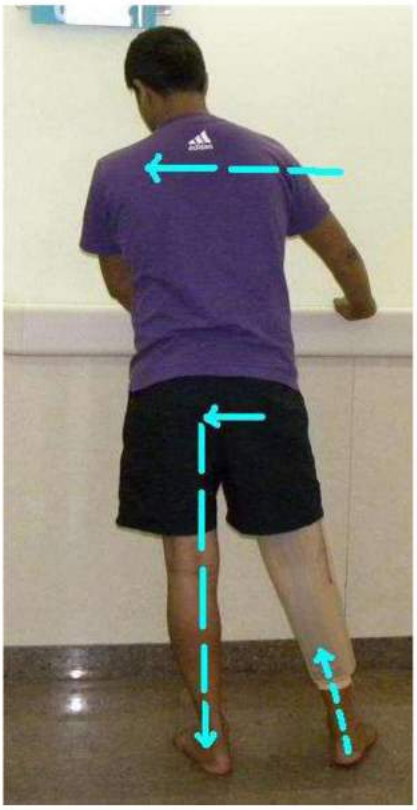
Finally, the foot of the healthy leg is landed about 12 inches (30 cm) ahead of the crutches. Then, you will place your weight on the uninjured leg and the process is repeated.

Stand, by holding stable support with brace on the operated leg.

Now, gradually shift your body weight on the operated leg, as tolerated, by tilting your whole body towards the operated side. Hold it for a count of 2, and then do the same towards the healthier side.

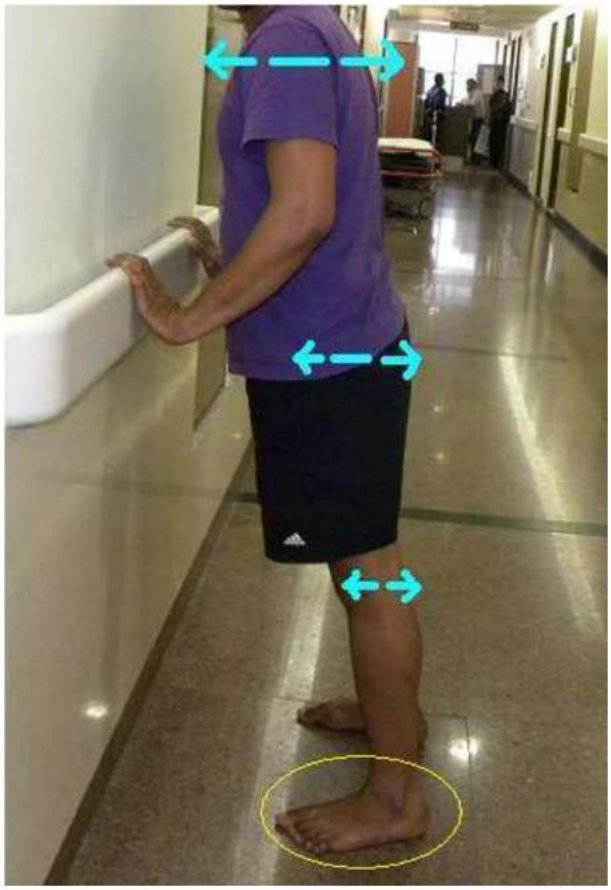
In this manner, shift your body weight side to side in continuous rhythm. Total 30 times for each side.

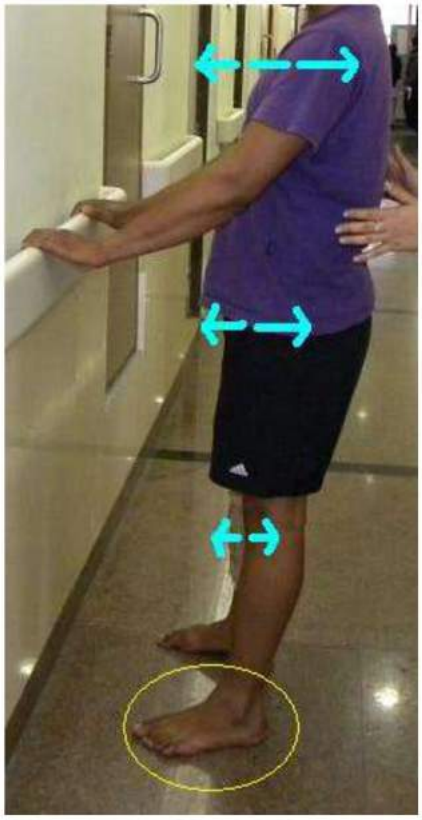




Stand, by holding stable support around 1-1.5 ft away from your body, with brace on the operated leg.

Now, lean your whole body forward and then come back to the initial position by the power of your ankles (not the hands). Repeat this swing for 30 times.





(A) By bearing your bodyweight on both the crutches and the operated leg, lift and put forward your healthy leg on the step above.

(B) Now, lift up your body on the healthy leg, and put the operated leg and both the crutches simultaneously on the step.

Repeat the same to climb further, if required

(C) By bearing your bodyweight on both the crutches and the operated leg, lift and put forward your healthy leg on the step above.

(D) Now, lift up your body on the healthy leg, and put the operated leg and both the crutches simultaneously on the step.

Repeat the same to climb further, if required

Put your full weight on the healthy leg and take your operated leg and the crutches off the ground. Then, lower down your body and bring the operated leg and both the crutches to lower level.

Now, bring down the healthy leg also to the lower level. Repeat the same to walk down further, if required.

Now, bring down the healthy leg also to the lower level. Repeat the same to walk down further, if required.

Phase 2 (Days 8-14, 2nd week)

Continue previous exercises, in addition to the following..

Sit at the edge of the bed with legs freely hanging and crossed (operated leg under the healthier one). Now, try to straighten your operated leg and at the same time oppose it by healthier leg. Hold it for 10 seconds then relax for a while. Repeat this for 10 times.

Stand on the operated leg in brace. Hold it for as long as you are comfortable. Relax for a while and repeat for 10 times.

Phase 3 (3^{rd} -4^{th} Week)

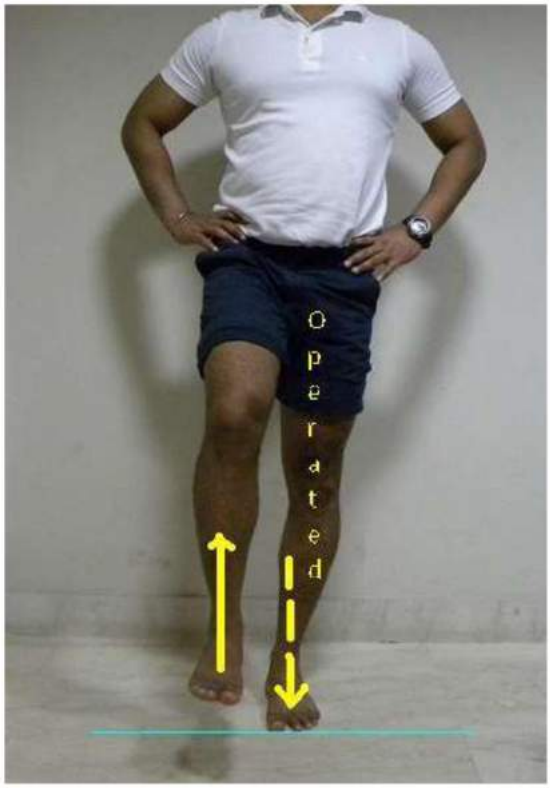
Start walking with only one crutch (on the **opposite side** of the operated leg) and the brace on. Operated leg and crutch will move together.Gradually remove crutch

After getting comfortable with a single crutch, usually in 2-3 days, start walking without crutches but brace on, that also you can leave in next 2-3 days.

Walk forward at comfortable speed.

Lower down your body by bending your knees (around 30 degrees) and hips. This position is around 1/3rd of the complete sitting on a chair. Repeat this 20 times.

Lower down your body by bending your knees (around 60 degrees) and hips. This position is around 2/3rd of the complete sitting on a chair. Repeat this 20 times.



Stand on the operated leg. And, try to hold for a 1 minute then relax for a while. Repeat for 10 times.

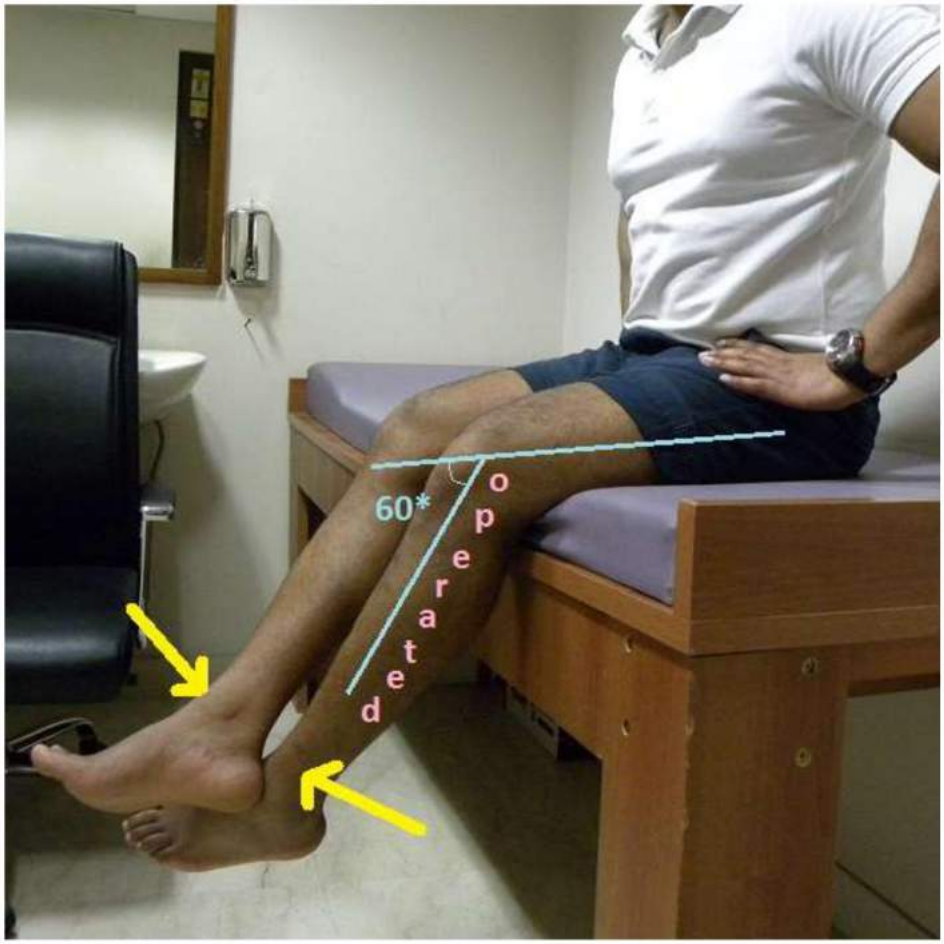
After few days of 1 minute holds, try to do the same with closed eyes.

4TH TO 8TH WEEK

(A) Sit on a bed with legs fully extended, keeping the operated knee in a brace.

(B) Lean forward to hold your toes then pull them gently towards you, keeping the knees fully

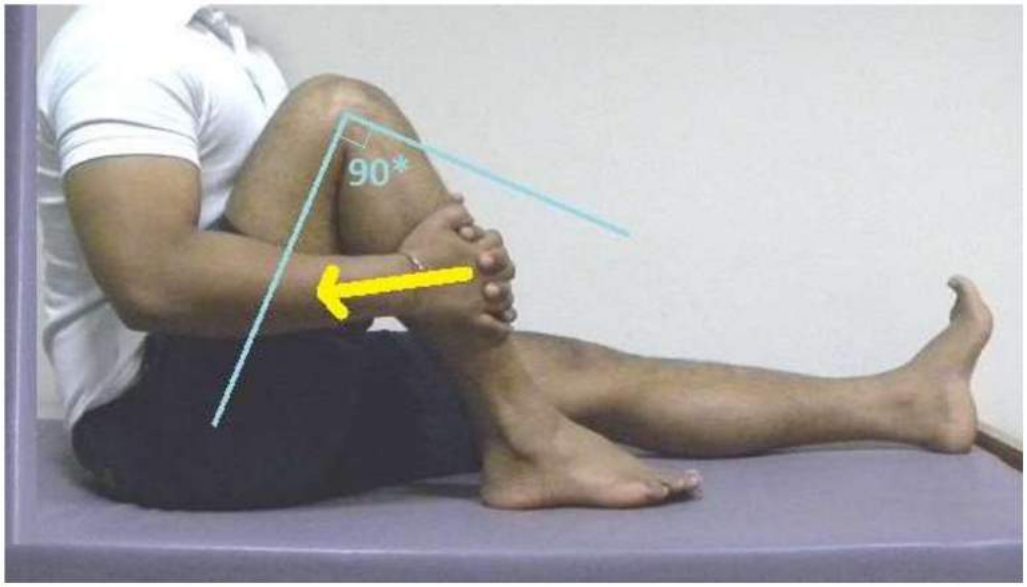
(C) extended . Hold for 30 seconds, then relax for 1-2 minute. Repeat for 5 times.



(A) Sit at the edge of the bed with legs freely hanging and crossed (operated leg under the healthier one).

(B) Open/Extend both of your knees just up to 1/3rd of the complete opening (60 degrees knee position).

(C) Now, at this position, try to straighten your operated leg and at the same time oppose it by healthier leg. Hold it for 10 seconds then relax for a while. Repeat this for 10 times.

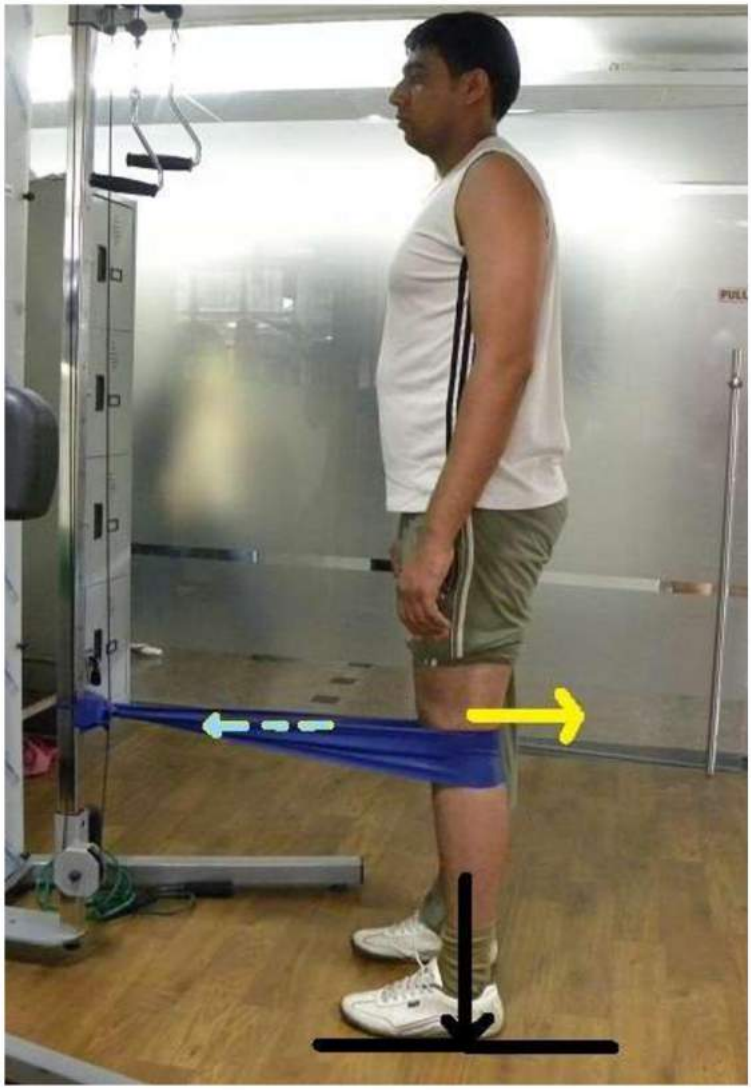


Hold your operated leg with both of your hands and try to bend your operated knee as much as possible, within tolerable pain. Hold it there for 30 seconds, then straighten your leg and relax for a while. Repeat this for 10 times.

Lie on on your stomach and bend your operated knee by the healthy leg, as much as possible. Hold it there for 20-30 seconds then relax for a while. Repeat for 10 times.

Now, add 1 kg of **ankle weight** in 'front straight leg raising exercise' that you have been doing. Again, hold for 10 seconds each, and repeat 10 times.

Add 1 kg of **ankle weight** in 'side straight leg raising exercise' that you have been doing. Again, hold for 10 seconds each, and repeat 10 times



(A) Tie the one end of an elastic band to a pole (or furniture leg or a door handle) in front of you, at your knee level.

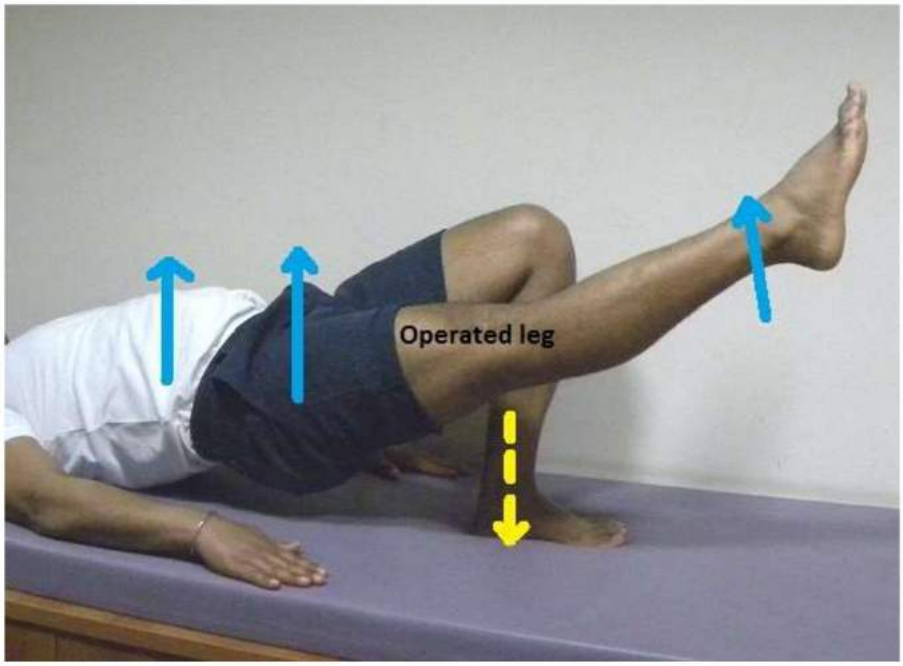
(B) Loop this band around your operated knee and tie the other end to the same pole.

(C) Then, walk backwards to stand at a distance where elastic band is in good tension.

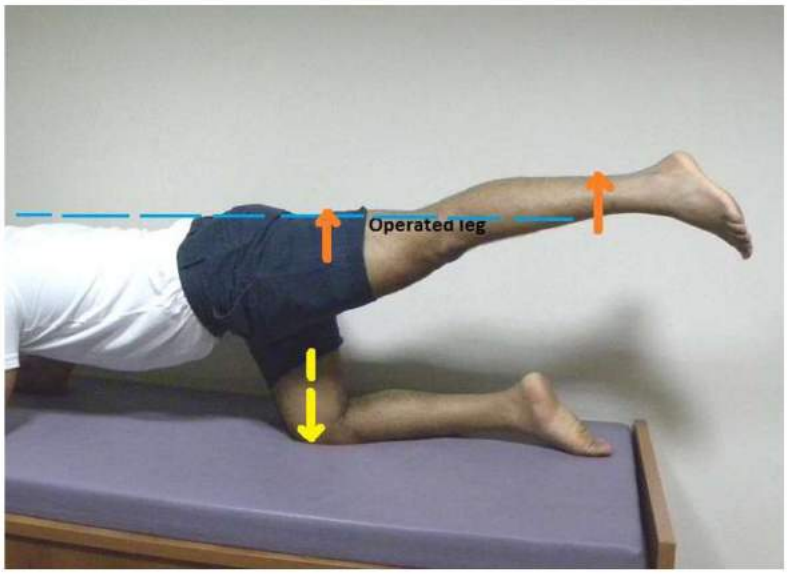
(D) Now, with both the feet fixed on the ground, push your operated knee hard backwards i.e against the tension of the elastic band. Hold for 5 seconds, then relax for a while. Repeat for 15-20 times.

Add 1 kg of **ankle weight** in 'back straight leg raising exercise' that you have been doing. Again, hold for 10 seconds each, and repeat 10 times.

Come in a side lying position with operated leg on down side. Keep your healthy leg bent and resting on the edge of the bed while use your opposite side hand to hold the edge. Now, lift your operated leg off the bed, as tolerated, with 1 kg ankle weight. Hold it there for 5-10 seconds, then relax for a while and repeat again 10 times.



Lie flat on the bed with healthy leg half bent. Now, lift your operated leg straight and then hips and lower back also, off the bed. Hold this position for 5-10 seconds, then come back to normal position and relax for a while. Repeat for 10 times. *Earlier you were doing this with brace on operated leg*



Rest your body on both elbows and healthy knee. Then, while keeping your torso straight, extend your operated leg straight in line of torso. Hold this position for 10 seconds, then come back to normal position and relax for a while. Repeat for 10 times.

(A) Stationary bicycling for 15 minutes. Start with lower half circles (to and fro) and if tolerated well, proceed for full revolutions.

(B) Initially keep the seat high to avoid knee bending of 90 degrees or more.

(C) If comfortable you can add resistance, after 2 weeks.

(D) After a month, you can even lower the seat.

Walk backward at comfortable speed

Side walking, both sides. 10 steps on each sides. Repeat for 10 times.

Keep your operated foot in front and healthier one at back side. Now, lower down your body by bending the operated knee. Hold this position for 10 seconds, then straighten your front knee by getting back your torso in middle and relax for a while. Repeat for 10 times. *Don't bend your operated knee beyond 60 degrees as shown in the picture*

Stand comfortably on a ground with both feet shoulder width apart. Now, raise your heels by bearing weight on the toes and balls of feet. Hold the position for a moment and come down. Repeat this 20-30 times.

Stand on the operated leg and lower down your body by bending the operated knee. Hold for a second and then lift your body back to the starting position. Repeat this continuously 15-20 times. Increase the descent of the body over the period of time, as per your tolerance.

Start stair walking, both up and down. To begin with minimal speed, which you can increase very slowly over the period of time, as per your tolerance.

Height of an individual step should not be more than 7 inches*. And, be more cautious while walking down stairs.*

Sit at the edge of the bed with legs freely hanging and 1 kg 'ankle weight' tied at the ankle of the operated leg. Now, open your operated knee, lifting the ankle weight. Hold for a moment and then bring it down in full control. Repeat this for 20 times.

Stand on the healthy leg. And, keep the operated leg off the ground with weight tied to the ankle. Now, bend your operated knee till tolerance, lifting the weight. Hold for a moment and then bring it down in full control. Repeat this for 20 times.

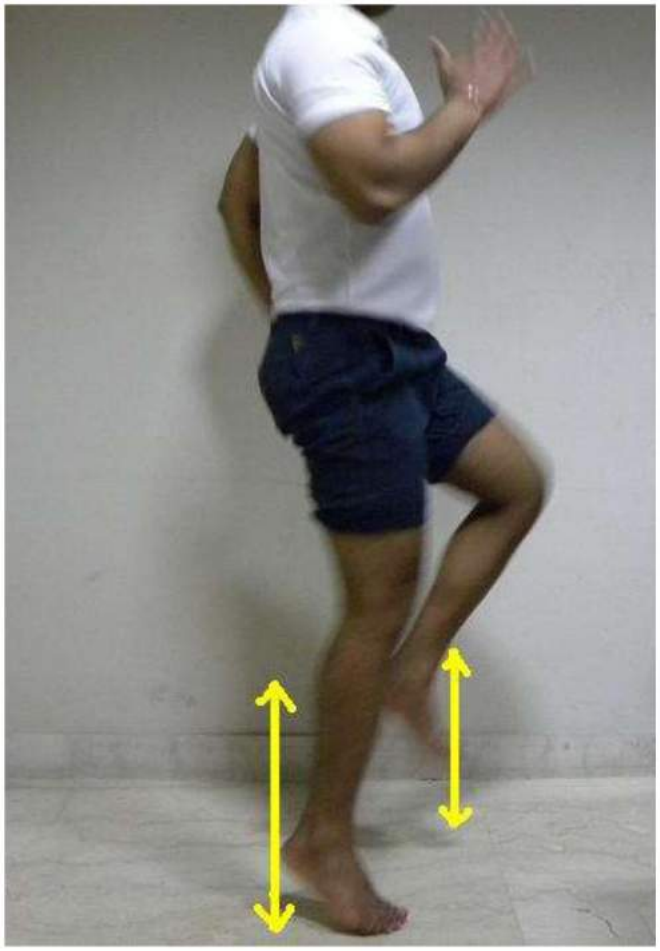
Try to balance your body on **balance board**, in front and back direction.

Try to balance your body on **balance board**, in side to side direction.

Do ball tossing while standing on the **mini-tramp board.** 20-30 times.

Phase 5 (3rd Month)

Lie down on your stomach with ankle weight tied to the ankle of the operated leg. Now, bend your operated knee, lifting the weight. Hold for a moment and then bring it down in full control. Repeat this for 20 times.

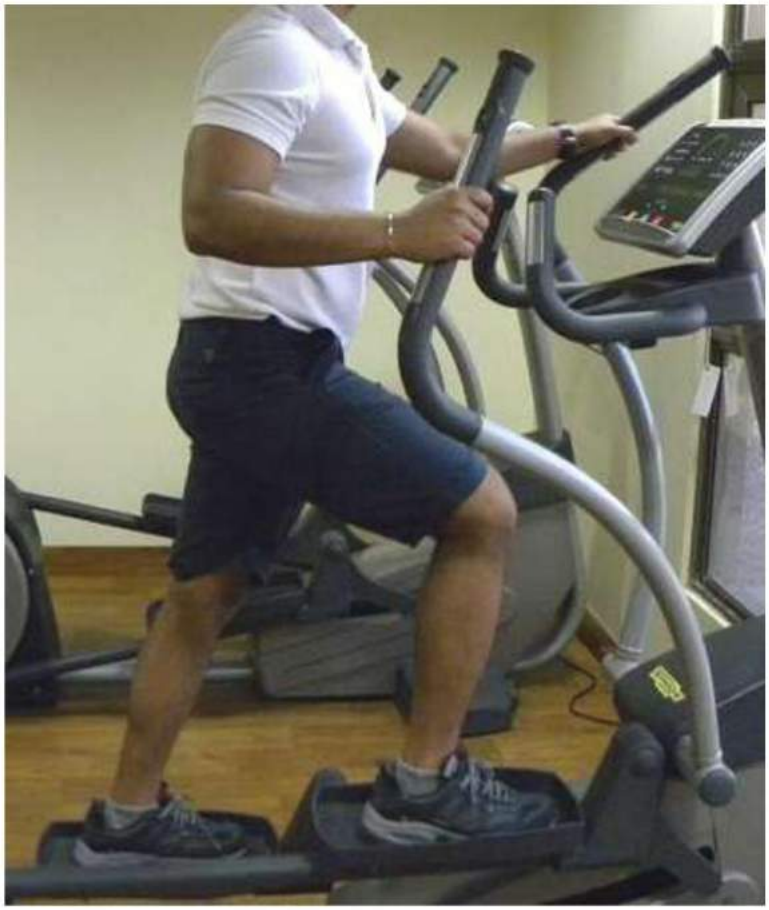


Perform on the spot jogging. To start with minimal height, which you can increase as per your tolerance.

After a week, you can start moving forward. Increase speed and distance over the period of time, as per your tolerance.

Start balancing on **multi-directional balance board**. First, with both legs and then proceed for single (operated) leg, as per your confidence develops with time.

Phase 6 (4^{th} Month)



Start **cross-trainer** training, forward and then backward also.

Start balancing on **mini-tramp board**. First, with both legs and then proceed for operated leg only.

Progress for half squats on **mini-tramp board**. First, with both legs and then proceed for operated leg only.

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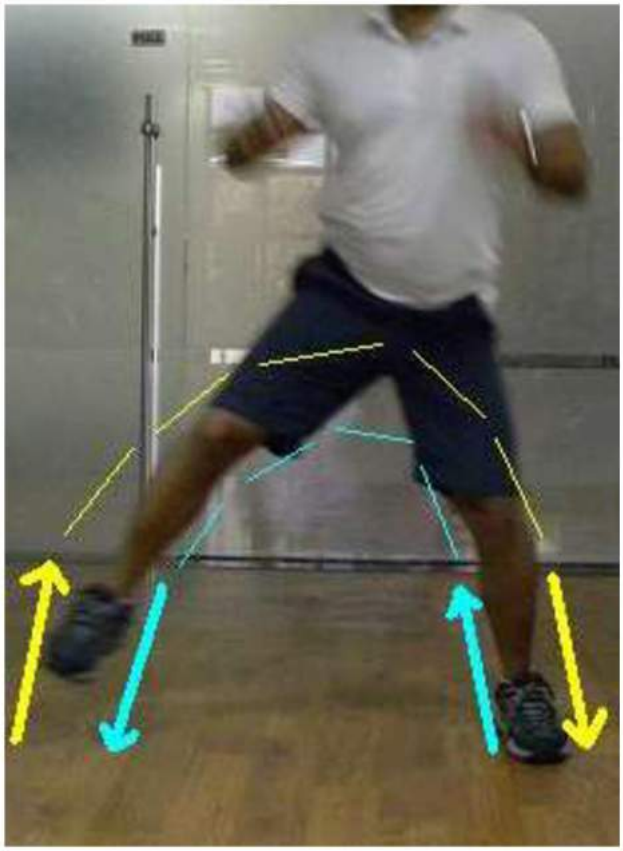
Now, do jumps on **mini-tramp board**. First, with both legs and then proceed for operated leg only.

Phase 7 (5th Month Onwards)

Start skipping. First, with both legs and then proceed for operated leg only.

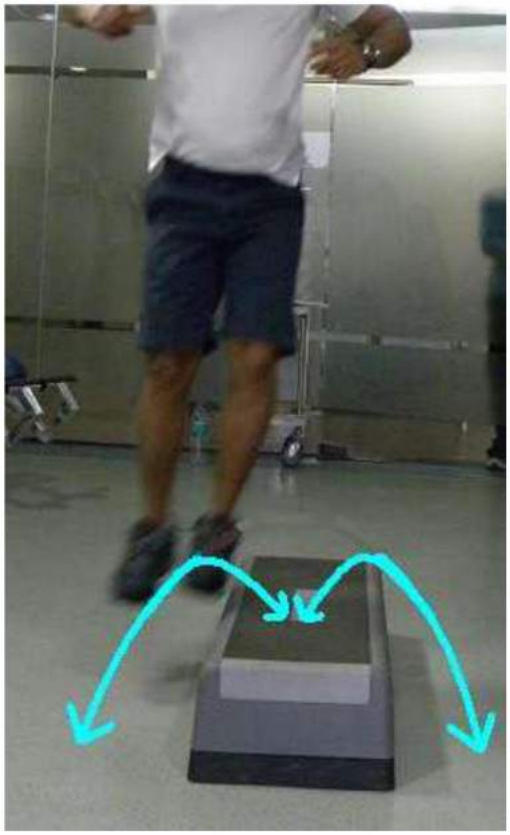


Alternate leg jumps. When you take jump at the right leg then you land on the left, and vice versa.

On the spot jumps. First, with both legs and then proceed for operated leg only.

Box jumps to height.

Box jumps to depth.

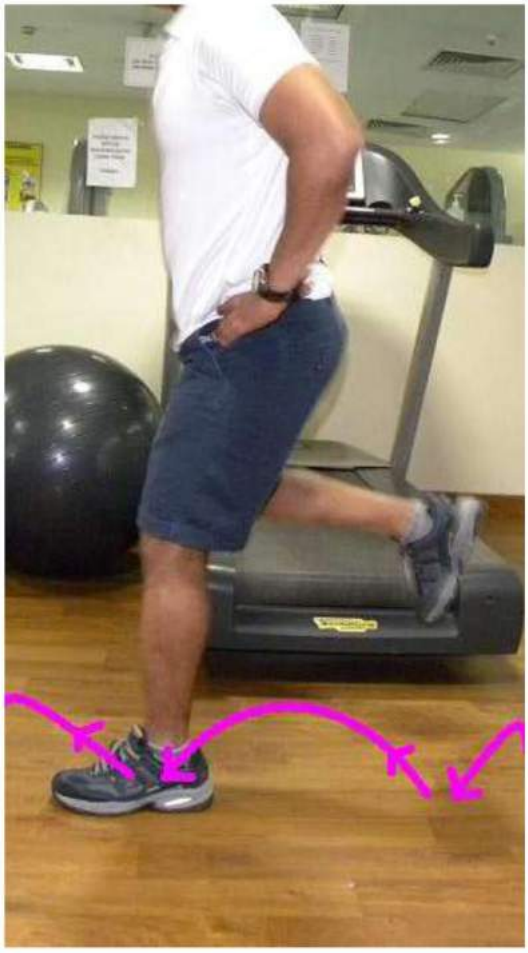


Box jumps, side to side

Hurdle crossing

Controlled running.

Cone running.



Running on the operated leg only.