

Limb Lengthening &
Deformity Correction

Height Increase Info

Pre-surgery Stretching
Exercises Protocol



A person wearing a maroon long-sleeved shirt and black leggings is standing on a concrete ledge, stretching their right leg by pulling their foot towards their knee. The background is a vibrant sunset with orange and yellow clouds. The person is wearing brown sneakers with white soles.

The Importance of Pre-operative Exercise

Following limb lengthening surgery, the soft tissues surrounding the affected area—comprising muscles, nerves, and fascia—experience stretching. This process may give rise to complications, including restricted joint movement, gait disruptions, pain, nerve damage, and the formation of deformities. To mitigate these issues, it is essential to adequately prepare the muscles and nerves through targeted exercises before the surgery.

By focusing on enhancing the flexibility and strength of these soft tissues, particularly the muscles, one can significantly improve the chances of a successful recovery. Strengthened muscles not only facilitate immediate post-surgery mobility but also play a crucial role in the overall success of the ensuing physical therapy. This, in turn, leads to a faster and more efficient return to daily activities, underscoring the importance of proactive preparation for optimal outcomes in limb lengthening surgery.

Consistent stretching routines contribute to an expanded range of motion while reducing muscle and nerve stiffness.

To optimize the limb lengthening process, prioritize regular stretching exercises for enhanced flexibility.

Hamstring Muscle

The hamstring, a large muscle at the back of the thigh, facilitates knee joint flexion and hip joint extension during activities like walking and running. Thigh lengthening surgery introduces tension in the hamstring muscle, potentially causing flexion contracture in the knee joint. To address this, hamstring stretching programs are implemented before and after surgery to enhance muscle flexibility and prevent complications.



HAMSTRING MUSCLE

Hamstring Stretches

Bend forward from your waist as far as possible while keeping your leg straight

Hold for 15-30 seconds

6-10 Reps



SEATED HAMSTRING STRETCH

Hamstring Stretches

Stand with the leg to be stretched just in front of the other one. Bend the backknee and lean forward from the hips. Place your hands on the bent leg's thigh, to balance yourself. If you can't feel a stretch, lean further forwards or tilt your pelvis forwards.

Hold for 15-30 seconds

6-10 Reps



STANDING HAMSTRING STRETCH

Hamstring Stretches

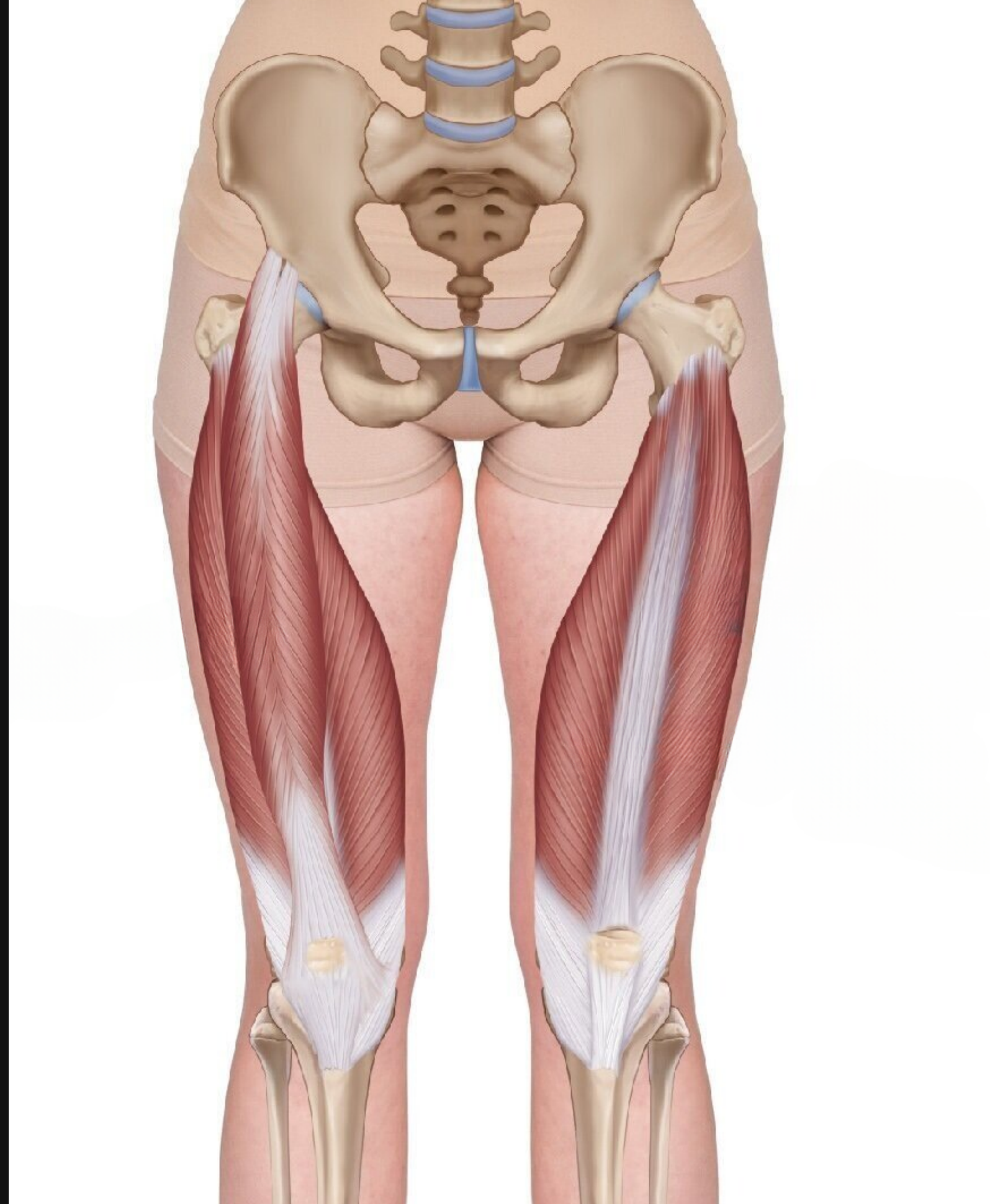
Lie face-up on the floor & loop a towel or resistance band around the ball of the foot. Gently stretch the leg straight up. Keep both knees straight, with the opposite leg flat on the floor. Relax your ankle to stretch the calf & hamstring.

Hold for 15-30 seconds

6-10 Reps



LYING HAMSTRING STRETCH



Quadriceps Muscle

The quadriceps muscle, located at the front of the thigh, serves as both a hip flexor and a knee extensor. Comprising three vastus muscles and the rectus femoris, it is a powerful muscle group involved in activities like kicking, jumping, cycling, and running.

Thigh lengthening surgery induces tension in the quadriceps muscle, leading to extension contracture in the knee joint, making activities like standing and walking challenging. To mitigate these complications, a quadriceps stretching program is implemented both before and after the operation.

QUADRICEPS MUSCLE



STANDING QUAD STRETCH

Quadriceps Stretches

While standing, hold onto a countertop or chair back to assist in balance. Bend your knee back by grasping your ankle with one hand. Assist in bending your knee back as far as possible. Maintain position for 30 seconds. Return to standing position.

Hold for 15-30 seconds

6-10 Reps



LYING SIDE QUAD STRETCH

Quadriceps Stretches

Lie on your side. Bend the knee of your top leg as far as you are able. Maintain position for 30 seconds. Return to starting position. Being on the floor in a supported position can help you focus in on the stretch in your quads.

Hold for 15-30 seconds

6-10 Reps



KNEELING QUAD STRETCH

Quadriceps Stretches

Start off in a high lunge position, with your right foot forward. Then, slowly drop your left knee to the ground. Take a few moments to find balance, and once you're stabilized, with your left arm, reach back for your toes on your left foot. Slowly release your hold on your left foot. Come back to the high lunge position, then switch sides with your left foot forward. Perform this move on your right quad.

Hold for 15-30 seconds

6-10 Reps

Leg Adductor Muscles

The muscles in the medial compartment of the thigh collectively form the hip adductors, including gracilis, obturator externus, adductor brevis, adductor longus, and adductor magnus. These muscles primarily function to adduct the thigh at the hip joint, pulling it toward or past the median plane. Thigh lengthening operations can induce tension in the adductor muscles, restricting abduction movement in the hip joint. To prevent this complication, a leg adductor muscle stretching program is implemented both before and after the operation.



LEG ADDUCTOR MUSCLES

Leg Adductor Stretches

Stand with your legs wide apart. Shift your weight to the left. Allow your left knee to bend until it is over your left foot. You will feel the stretch in your right groin. Keep your feet on the ground facing forward. Repeat the stretch on the opposite side.

Hold for 15-30 seconds

6-10 Reps



STANDING ADDUCTOR STRETCH

Leg Adductor Stretches

Get into a seated position. Bend your knees & bring the soles of the feet together. Hold your feet with your hands & rest your elbows on your knees. Allow your knees to fall toward the ground while keeping your back straight. You can apply gentle pressure on the inner thigh by pressing gently on the knees with the elbows. You should feel gentle pulling & tension in the groin.

Hold for 15-30 seconds

6-10 Reps



SEATED ADDUCTOR STRETCH



Iliotibial Band (ITB)

The IT band, or iliotibial tract, is a tendon running along the outer thigh from the pelvis to the shin. It connects the hip flexor (tensor fasciae latae) and hip extensor (gluteus maximus), stabilizing hips and knees during activities like running and jumping. Thigh lengthening operations create tension in the IT band, restricting hip joint adduction. To prevent this, an IT band stretching program is applied before and after the operation, ensuring flexibility and optimal function of this tendon as a stabilizing bridge between the pelvis and knee.

ILIOTIBIAL BAND



STANDING ITB STRETCH

ITB Stretches

Place your right palm against a wall. Stand with your front (left) leg bent and in parallel and your back (right) leg crossed behind it and slightly turned out. Place more weight on the back leg and sit your right hip toward the wall. Fine-tune the stretch by slightly tucking or sticking out your rear end. This set-up will stretch your right IT band. Repeat the stretch on the opposite side.

Hold for 15-30 seconds

6-10 Reps



LYING ITB STRETCH

ITB Stretches

Lie straight with one leg raised about 90 degrees and a yoga strap wrapped around the foot. Put your leg over your body and try to keep your hips square and your spine long. Feel the stretch on the side of your upper leg. Repeat the stretch on the opposite side.

Hold for 15-30 seconds

6-10 Reps

Calf Muscle

The calf muscle, located at the back of the lower leg, consists of two muscles: the larger gastrocnemius and the smaller soleus. The gastrocnemius, visible as a bulge beneath the skin, has two heads forming a diamond shape, while the soleus is a flat muscle beneath it. These muscles combine and connect to the Achilles tendon at the base of the calf, which inserts into the heel bone. During activities like walking, running, or jumping, the calf muscle lifts the heel, facilitating forward movement. In tibia (lower leg) lengthening operations, tension in the calf muscle can lead to ankle plantar flexion and ballerina syndrome. To prevent this complication, stretching exercises for the calf muscle are crucial. In tibia lengthening surgery, special attention is given to the calf muscle due to its significance in preventing complications.



CALF MUSCLE

Calf Stretches

Start in a high plank with your hands directly under your shoulders. Pressing through your fingers and palms, shift your weight back to bring your butt to the ceiling, so your body's in an inverted V shape. Press your heels toward the ground—the closer they get to the floor, the deeper the calf stretch will be. To stretch the lower part of your calves, bend your knees slightly while you continue to press your heels toward the ground.

Hold for 15-30 seconds

6-10 Reps



DOWNWARD DOG CALF STRETCH

Calf Stretches

Sit on the floor with your legs extended. Loop a resistance band, towel (or whatever tool you're using) around one foot, holding both sides of it with your hands. Gently pull your toes toward your shin until you feel the stretch in your calf. Repeat on the other side.

Hold for 15-30 seconds

6-10 Reps



SEATED CALF STRETCH

Calf Stretches

Place your hands on the wall for support and step one foot back into a mini lunge, bending your front leg and keeping your back leg straight. Lean into the wall and press your back heel down so it's flat on the ground. The further apart your feet are, the deeper the stretch will be. Once you've held this stretch, change the angle of your foot positioning. Repeat on the other side.

Hold for 15-30 seconds

6-10 Reps



STANDING CALF STRETCH

Calf Stretches

Stand with the balls of your feet on the edge of your step. Drop one heel toward the floor. Bend your other leg and try not to put much weight into it. Repeat on the other side. To make this a dynamic stretch, you can slowly pedal your heels back and forth, or drop both heels toward the ground and raise them up and down.

Hold for 15-30 seconds

6-10 Reps



STANDING CALF STRETCH



Tibialis Anterior Muscle

The Tibialis anterior, situated alongside the tibia, plays a crucial role in lifting the foot. In tibia lengthening surgeries, tension can develop in this muscle, potentially limiting ankle movement. To address this, incorporating a consistent routine of stretching exercises becomes paramount. These exercises not only aim to alleviate tension but also ensure ongoing flexibility, thereby minimizing the risk of complications and supporting optimal ankle mobility throughout the recovery process.

TIBIALIS ANTERIOR MUSCLE



Tibialis Anterior Stretches

Lie on your side with the knee bent on the upper leg so your foot is now behind your back. Reach back and grab your forefoot, pulling it to your back. Repeat for each foot.

Hold for 15-30 seconds

6-10 Reps

SIDE LYING TIBIALIS STRETCH



Tibialis Anterior Stretches

Kneeling can be used for gently stretching the shins. Kneel on a mat with the tops of your feet flat on the floor and your buttocks over your heels.

Hold for 15-30 seconds

6-10 Reps

SEATED TIBIALIS STRETCH



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