PROCEDURE

Leg lengthening and shortening

Leg lengthening or shortening is surgery that changes a leg bone's length to improve balance, alignment, or height.

PURPOSE
Correct a leg-length difference or change overall height

PROCEDURE TYPE
Therapeutic surgery using bone cuts and internal or external fixation

WHERE IT IS DONE
Operating theatre

ANAESTHESIA
General

HOW LONG IT TAKES
About 2-4 hours for one planned operation

PREPARATION
Preoperative tests, fasting, and a medication plan

RECOVERY
Several hospital days; no driving until mobility and medicines allow

MAIN RISKS
Infection, poor bone healing, nerve injury, joint stiffness

RESULTS
Alignment is immediate; final length develops over months

Overview

Leg lengthening and shortening are operations that change the length of a thigh bone or shin bone. They may correct a difference between the legs, improve alignment, or change a person's overall height.

For lengthening, the surgeon cuts the bone in a controlled way. A device gradually separates the bone ends. New bone forms in the widening space. This slow process is called distraction osteogenesis .

The device may be an adjustable rod placed inside the bone or a frame attached to the bone through the skin. Some people need more than one operation, including later removal of the device.

For shortening, the surgeon usually removes a section of bone and brings the remaining ends together. A rod, plate, or screws hold the bone while it heals. Shortening reduces overall height and is limited by how much bone can be removed safely.

Treatment includes months of X-rays, device adjustments, and physical therapy. The operation is only the first stage.

Why the procedure is performed

A healthcare team may recommend surgery when a leg-length difference causes problems that cannot be managed well with simpler options. These may include difficulty walking, an uneven pelvis, pain, joint strain, or trouble using a shoe lift.

Differences in leg length may be related to a condition present from birth, a previous fracture, bone infection, a growth plate injury, or surgery that removed bone. In children, treatment planning considers how much growth remains and the predicted difference at adulthood.

Lengthening can also be part of reconstruction after bone loss, severe deformity, or treatment of a bone tumour. In some cases, it corrects length and alignment at the same time.

Stature lengthening is performed to increase height in a person without a medical leg-length difference. This is elective surgery with a long recovery and significant risks. It requires detailed physical and psychological assessment before consent.

Who should and should not have it

You may be considered for surgery if the expected benefit is greater than the burden of treatment. Your joints, muscles, nerves, blood supply, bone quality, general health, and ability to complete rehabilitation all matter.

Lengthening or shortening may not be the right choice when a smaller difference can be managed with observation or a shoe lift. For a growing child, controlling growth in the longer leg may be simpler than lengthening the shorter leg.

Surgery may be avoided or delayed if you have:

A major length difference or complex deformity is best assessed by an orthopaedic surgeon experienced in limb reconstruction. A second opinion can be useful because the available methods involve different risks and recovery demands.

- An active infection, open wound, or poor skin condition near the surgical area

- Inadequate blood flow to the leg
- A medical condition that is not controlled well enough for major surgery
- Bone quality too poor to hold the planned device safely
- Nicotine use that raises the risk of delayed bone and wound healing
- Joint stiffness or muscle tightness that cannot safely accommodate lengthening
- Difficulty attending frequent appointments or following adjustment and therapy plans

How to prepare

The treating facility's own instructions take priority over general information in this article.

Planning usually includes standing X-rays that measure both legs and show their alignment. CT or other imaging may be needed in complex cases. Blood tests and an anaesthetic assessment may also be arranged.

Tell your team about all prescription medicines, over-the-counter products, vitamins, and supplements you take. They will tell you whether any need to be paused, including blood thinners like warfarin or apixaban . Do not stop prescribed medicine on your own.

Follow the facility's instructions about when to stop eating and drinking before anaesthesia. Arrange help with transport, meals, household tasks, and personal care after discharge.

You may meet a physical therapist before surgery to practise using crutches or a walker. Preparing your home with clear walking routes, a suitable chair, and a safe bathing plan can make recovery easier.

What happens during the procedure

You receive general anaesthesia, so you are unconscious during the operation. The team may also use a nerve block to reduce pain afterward.

The surgeon makes one or more controlled cuts in the bone. In a lengthening operation, an internal rod or external frame is fitted to keep the bone aligned. The surgical wounds are then closed.

Lengthening does not usually begin during the operation. After a short initial healing period, you or your care team begin adjusting the device according to a precise schedule. With some internal rods, an external controller turns a mechanism inside the rod. External frames are adjusted by turning specific parts of the frame.

For shortening, the surgeon removes the planned amount of bone and brings the ends together. Internal hardware holds them in position while they join.

The team checks alignment with X-rays during surgery. Tendon or soft-tissue procedures may also be needed if tight muscles would restrict the planned correction.

Recovery and what to expect afterward

Pain is expected after surgery, especially during the first several days. Lengthening can also cause aching, muscle tightness, or spasms as the bone gradually separates. Pain should remain manageable with the plan provided by your team. Increasing pain can mean the schedule or device needs review.

You can usually eat and drink once you are awake and any nausea is controlled. A balanced diet with enough protein supports healing. Supplements are not automatically needed unless your team recommends them.

Activity begins with help from nurses and physical therapists. Your weight-bearing limit is based on the bone, device, and operation. Follow it closely. Physical therapy is essential for maintaining movement and reducing joint stiffness.

You will have frequent appointments and X-rays throughout lengthening and bone hardening. Pin sites on an external frame need regular care. An internal rod avoids external pins but still requires monitoring.

Do not drive while taking medicines that impair alertness, while unable to control the vehicle safely, or while restricted from putting enough weight through the leg. Your team should confirm when driving is safe.

Return to work depends on your job and mobility. Desk work may be possible earlier with suitable transport and positioning. Physical work may require several months or longer. The complete lengthening and strengthening process often lasts many months.

Risks and possible complications

Possible complications include:

Lengthening too quickly can place pressure on muscles, nerves, blood vessels, and joints. Too-slow lengthening may allow the bone to join before treatment is complete. Frequent monitoring helps the team adjust the plan.

- Infection in the wound, bone, or around external-frame pins

- Delayed healing or failure of the bone ends to join
- Bone healing too early, before the planned length is reached
- New bone forming slowly or with inadequate strength
- A change in bone alignment during lengthening
- Joint stiffness, muscle contracture, or joint instability
- Injury or irritation affecting a nerve or blood vessel
- Blood clots in the leg or lungs
- Device breakage, loosening, or loss of adjustment
- Ongoing pain, scars, or the need for another operation

Results and follow up

The initial bone position and alignment are visible on X-rays immediately after surgery. A lengthening result develops gradually as the device is adjusted. Final healing takes longer because the new bone must harden enough to support normal activity.

Follow-up includes examinations, X-rays, physical therapy, and checks of wounds or pin sites. Your team may slow, pause, or change the adjustment schedule based on bone growth, pain, nerve function, and joint movement.

An external frame is removed when the bone is strong enough. An internal rod may remain in place for a period and can require a later removal operation. Ask whether device removal is part of your expected treatment plan.

Surgery can reduce a leg-length difference and improve walking or alignment, but it may not create perfectly equal legs. Some people still use a small shoe lift or have limits in movement or strength.

Alternatives

The realistic alternatives depend on your age, remaining growth, size of the difference, symptoms, and goals.

- Observation: avoids surgery and is reasonable when the difference is small or causes little difficulty, but it does not correct the difference

- Shoe lift: is simpler and avoids surgical risks, but it must be worn consistently and may not suit every shoe or larger differences
- Physical therapy: may improve strength, flexibility, and walking comfort, but it cannot make a bone longer or shorter
- Growth control surgery: can slow growth in the longer leg of a child who is still growing, but timing must be accurate and final height may be reduced
- Shortening the longer leg: provides correction without months of gradual lengthening, but reduces height and cannot safely correct every difference
- Prosthetic or orthotic support: may improve function after major bone loss or complex deformity, but does not restore natural bone length
- No stature surgery: avoids the risks, cost, scars, and long rehabilitation of elective height lengthening, but does not increase height

When to call your healthcare team

Routine follow-up is expected throughout treatment. Contact your healthcare team promptly for fever, worsening wound redness, drainage, a loose pin, new numbness, increasing joint stiffness, pain that is getting worse rather than better, or a device that does not adjust as instructed.

Seek urgent medical advice for new calf swelling or pain, sudden difficulty moving your toes, or a clear change in the leg's position.

Call emergency services for chest pain, sudden shortness of breath, fainting, uncontrolled bleeding, or a foot that becomes cold, pale, blue, or suddenly numb. Severe rapidly increasing pain, especially with a tense swollen leg, also needs emergency assessment.

Common questions

Will I be asleep?

Yes. Leg lengthening and shortening are usually performed under general anaesthesia. A nerve block may provide additional pain relief.

Can I drive home?

No. You will normally stay in hospital after surgery and must not drive until your movement, weight-bearing ability, and medicines allow safe vehicle control.

How painful is it?

Pain is expected after surgery. Lengthening may also cause tightness and aching during adjustments. Medicines, schedule changes, positioning, and physical therapy can help.

When will I know if it worked?

The surgeon can check initial alignment immediately. The final length and strength are known only after gradual correction and months of bone healing.

How long does the whole process take?

The operation takes several hours, but treatment often lasts many months. The planned length, bone-healing rate, device, and need for additional surgery affect the timeline.

Will I have scars?

Yes. Internal devices leave surgical scars. External frames also leave small scars where pins or wires pass through the skin.

Sources

- American Academy of Orthopaedic Surgeons: Lower Limb Length Discrepancy
- Pediatric Orthopaedic Society of North America: Leg Length Discrepancy
- National Institute for Health and Care Excellence: Intramedullary Distraction for Lower Limb Lengthening
- Hospital for Special Surgery: Limb Lengthening Surgery
- Royal National Orthopaedic Hospital: Limb Reconstruction Patient Information