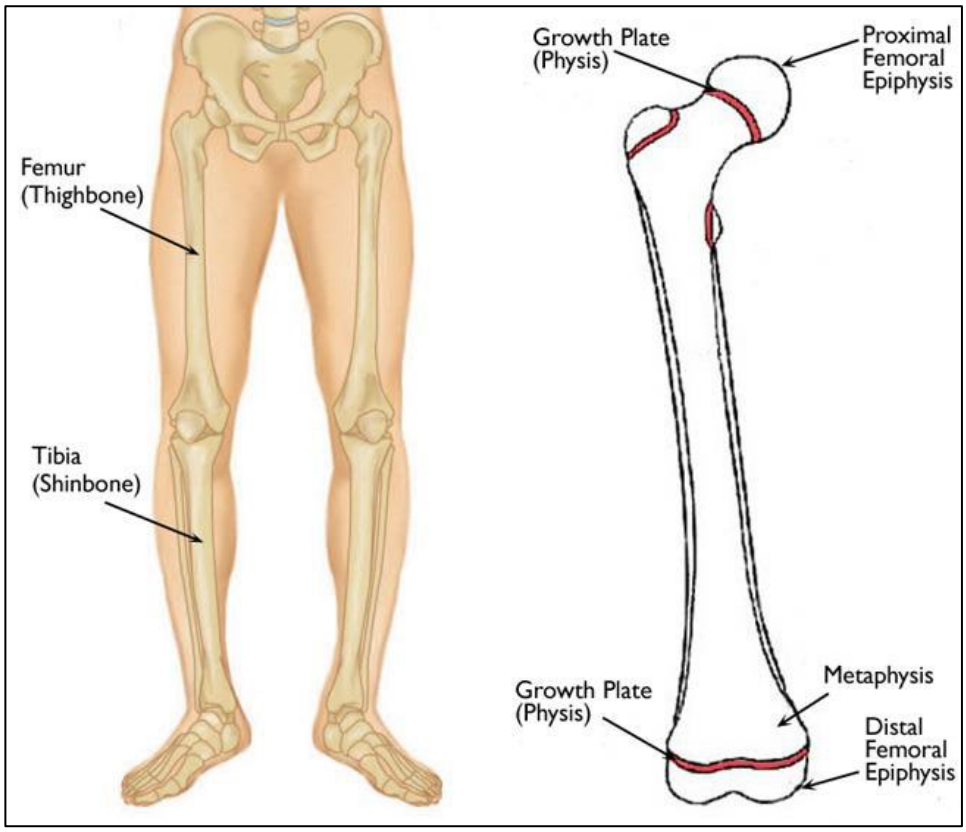
UCSF Benioff Children's Hospitals

Division of Orthopaedic Surgery
Limb Lengthening and Complex Reconstruction Center
https://www.ucsfbenioffchildrens.org/clinics/limb-lengthening-and-reconstruction-center
LimbDifferences@UCSF.edu
(877) 822-4453 (877-UC-CHILD)

Leg Length Discrepancy



A leg length discrepancy is a difference in the lengths of the legs. Minor differences (up to 1 cm) are common, may not cause symptoms and usually do not require treatment. However, a larger difference can cause a noticeable limp and affect the way a child moves.

The bones affected by leg length differences are the Femur (Thighbone) and Tibia (Shinbone). In children, bone growth occurs at the ends of the bones in specific areas called Growth Plates (Physis) located between the widened part of the shaft of the bone (Metaphysis) and the end of the bone (Epiphysis).

Causes:

Common causes of a leg length discrepancy include congenital causes, injury or fracture of the bone, previous infections in the bone, skeletal dysplasia, neurologic conditions, and other diseases that cause a difference in the growth rate of the bones.

Signs and Symptoms:

- Limp, walking on tip toes of shorter leg, dropping down the pelvis on the short side, keeping the knee on the long leg bent, and feeling tired after walking short distances.
- Some patients with larger differences may experience low back, knee and/or hip pain, along with premature arthritis and scoliosis.

Tests and Imaging studies

- Physical examination including walking, sitting, and standing or to stand on wooden blocks to even out the hips.
- X-ray: images of the bones.
- Bone length/ Scanogram X-ray: images with a ruler to measure the entire length of both legs.
- Bone Age: images of the left hand and wrist compared to expected results for the patients age group.
- Computerized Tomography (CT): images with additional detail of bones and joints.
- Magnetic Resonance Imaging (MRI): evaluates structures such as joint cartilage, ligaments, tendons, blood vessels and nerves.

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Treatment:

At our multidisciplinary Limb Lengthening and Complex Reconstruction Center (https://www.ucsfbenioffchildrens.org/clinics/limb-lengthening-and-reconstruction-center) your child is evaluated by our Orthopaedic Surgeons, and the entire Rehabilitation team including Physiatrists, physical therapists, orthotist and prosthetists, nurses, clinical nurse specialist, social worker, child life specialist and other advanced health providers all in one visit. Physical therapy with both inpatient and outpatient rehabilitation services can be arranged.

Treatment depends on leg length difference, age, development of the child and the cause of the difference.
Nonsurgical treatments for minor limb length discrepancies or as a temporary measure while waiting for surgery.

- Monitoring through follow up appointments and repeated imaging studies until the child is older.
- A shoe lift can be fitted to the inside (up to 1.5cm) or outside of the shoe (individual limits may apply). A full-length shoe lift, rather than a heel lift only, is recommended to help balance out the child's walk.

Surgical treatments for larger leg length differences are designed to either slow down or stop the growth of the longer leg or lengthen (and straighten) the shorter leg. Your provider will discuss the advantages and disadvantages of each type of surgery based on your child's individual needs.

Guided Growth Surgery (Epiphysiodesis)

Growth Period: Active
Come & Go Same day Procedure

Under General Anesthesia
Follow Up: Required Until Growth Period Ends

Typically involves 1-2-inch-long surgical cuts on either side of the knee. Can put full weight on the operated leg after surgery but will need crutches/walker for balance and support.

- Option 1) Place a metal plate* on either side of the growth plate to temporarily slow down the growth.
- Option 2) Scrape out the growth plate to entirely stop the growth at that particular site permanently.

The surgery needs to be appropriately timed to decrease the difference in leg length by the time the child is done growing.

*If metal plates are used, they may need to be removed once the correction is achieved, or they are no longer needed.

Limb Shortening

Growth Period: Over
Admitted to the hospital: 1-2 Days &
Crutches/Walker/Wheelchair Up to 12 Weeks after surgery

Under General Anesthesia
Follow Up: Required Until the Shortened Bone Heals

The surgeon removes a piece of bone from the longer limb (typically the Femur) and applies plates with screws*, or rods* to allow the bone to heal back together.

*If metal implants are used, they may need to be removed once the correction is achieved, or they are no longer needed.

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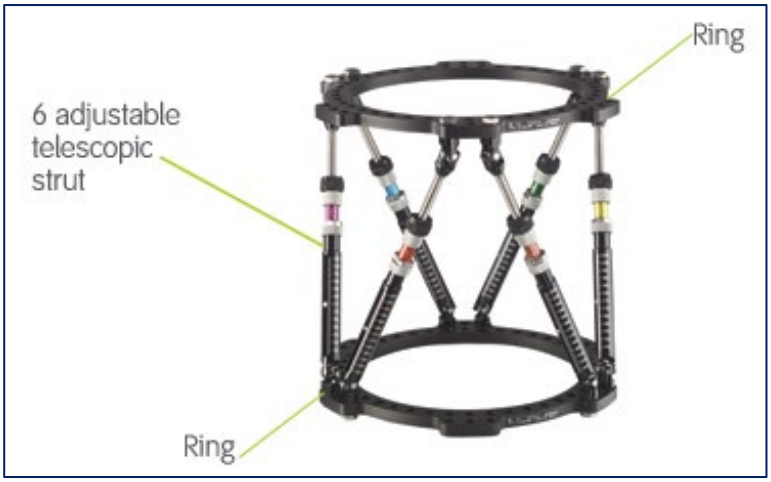
Limb Lengthening

Growth Period: Active or Over
Admitted to the hospital for 1-2 days (or longer-if needing inpatient rehabilitation) & Crutches/Walker/Wheelchair as Needed

Under General Anesthesia
Follow Up: Every 1-2 Weeks During Lengthening phase & Every 2-4 Weeks After, while the lengthened bone is getting stronger

The surgeon cuts the short bone in half with special instruments that do not injure the surrounding tissues. The bone covering (Periosteum) will help make new bone as the bone ends are slowly stretched daily, millimeter by millimeter, by devices* that are either visible from outside (external fixation) or are completely inside of the body (internal lengthening). The gap between the two separated bone ends will fill with new bone slowly. *After reaching the desired length or correction, the device remains in place until the bone fully hardens (consolidates). After the lengthened bone has regained its strength, the lengthening device is removed.



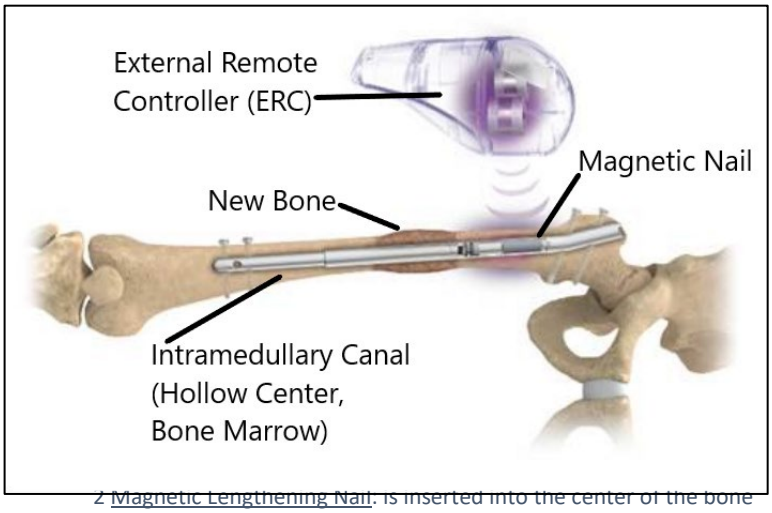
1 External Fixator: Two rings encircle the leg and are connected by six struts. The fixator is anchored to the bone and skin by pins and wires.

External lengthening device, "external fixator" or "frame," is used to lengthen and/or straighten the bone.

- Customized lengthening schedule and education to turn the dials of the six struts on the external fixator according to the schedule.
- Exceedingly small increments daily and should not cause any discomfort during the lengthening process. Pins and wires need to be cleaned and cared for throughout the duration of treatment.

Internal lengthening device, "nail," has a magnet on the inside. Once the bone is cut the "lengthening nail" is implanted through a small incision into the intramedullary canal (bone marrow or hollow center).

- Customized lengthening schedule and education for the External Remote Controller (ERC) to be placed outside the skin, over the magnetic nail, and hold a button to control the lengthening for 2-4 minutes, 2-4 times a day as instructed.



2 Magnetic Lengthening Nail: is inserted into the center of the bone and is lengthened with an external remote control (ERC)

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- This process should not cause any discomfort.

Regardless of the type of lengthening, it is important to perform the prescribed exercises at home and with the physical therapist in order to avoid stiffening of the adjacent joints (contractures) as the bone is lengthened and the surrounding muscles need to stretch to accommodate the new length. Additionally, your provider may prescribe a brace to protect the joints during the lengthening process.

Amputation with Reconstruction

Growth Period Active or Over
Admitted Recovery & Observation 1-2 days;
Crutches/Walker/Wheelchair until Prosthetic Fitting After the Surgical Site Heals

Under General Anesthesia
Follow up: Life long

If a limb is shorter and cannot be safely lengthened, or the limb has severe deformities or missing parts, your surgeon may recommend an amputation reconstruction and prosthetic fitting. Your surgeon will work closely with a certified prosthetist to create a customized, highly functional prosthesis.

Follow Up Care:

We will work together to create a plan to best support your child and ensure they reach their highest level of function, comfort, and mobility. Regular follow up care will ensure your child rebuilds strength, flexibility, and coordination. Typically, routine follow up appointments after the bone has healed, are every 6 to 12 months to determine the overall change and plan treatment accordingly.

Contact Information:

If you have a question or concern about your child, please call us:

- Weekdays (8 am - 4:30 pm): 510-428-3238 and ask to speak to your surgeon's nurse
- After 4:30 pm or Weekend/Holiday: 510-428-3000 (main hospital number) and ask to speak to the orthopedic resident on-call