

Patient Education



ARNOLD PALMER HOSPITAL
For Children
Supported by Arnold Palmer Medical Center Foundation

Orthopedic Center
at Arnold Palmer Hospital
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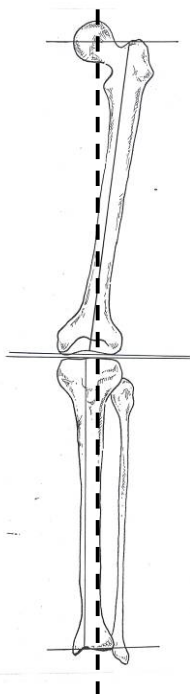
DEFORMITY CORRECTION BASICS

Surgery to correct crooked legs

Sometimes bones in the legs are crooked because of growth problems, or because of metabolic problems, injury, or infections that caused the legs to become crooked.

In these cases there are only two ways to correct the problems and both require surgery. One is by slowing the growth on one side of the bone for a few months or years. The other way is to divide the bone and put it in the corrected position. Braces won't correct crooked bones like correcting teeth because the bones are too deep in the body and stretching with braces is likely to stretch ligaments before it corrects bone deformity.

To evaluate the need for correction, we usually take x-rays of both legs from hips to ankles. When there is no deformity, a straight line between the hip and ankle will pass through the center of the knee. This is called the mechanical axis. Some people have legs that are slightly bowed, or knock-kneed and the mechanical axis is not perfect. A little bit of bowing or knock-knees is OK and does not need to be corrected. When the mechanical axis does not touch the knee joint, then correction is usually recommended to reduce the chances of early arthritis.



This is how an orthopaedic surgeon looks at a leg. This is called the mechanical axis. A normal mechanical axis has a line that passes straight through the hip, knee and ankle.

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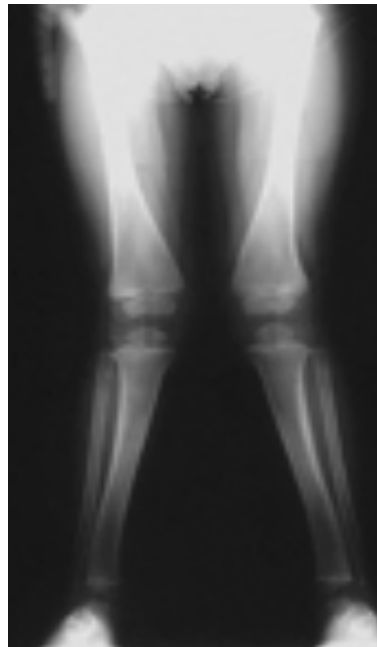
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Surgery to slow growth on one side of the bone.

Whenever possible we will use small plates and screws to stop the growth on one side of the growing bone to let the leg straighten itself as it grows. After the legs are straight, then the plates are removed and normal growth should resume.



BEFORE



AFTER



This works best when there is only angulation in one direction. This is a minor procedure performed under general anesthesia. The child goes home the same day. There will be 7-10 days of mild discomfort, but there is no need to restrict activities longer than a few days. The child can return to school in 5-7 days without crutches. Staples are sometimes used instead of plates, but either needs to be removed after correction has occurred.

Sometimes growth does not resume, or the deformity may re-occur when the plates are removed. When that happens, it is often necessary to perform osteotomy (divide the bone) to correct the deformity. If the bone is twisted, or bowed, then dividing the bone is often the best choice. Dividing the bone is a bigger procedure and takes longer to heal, so the plates or staples are often attempted instead of performing the more major surgery.

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Osteotomy

This is a bigger operation that requires dividing the bone and correcting the deformity. After the bone is divided, there are many different ways to hold them together while they heal in the corrected position. Some of these are shown below. All the surgical procedures are similar, but the methods to hold the bones together are different. The risks of surgery include infection, bleeding, slow healing of bone, breakage or loosening of the fixation devices, failure to correct alignment perfectly, need for implant removal, and other possible complications. The biggest complication that worries us is damage to nerves or arteries from the cutting, from stretching, or from swelling. More surgery will probably be required if any of these complications occur and it is possible that permanent loss of strength or feeling can result from nerve or artery damage. The main option to avoid surgery is to leave the deformity like it is and take your chances with early arthritis. But, there is a high probability that surgery will eventually be needed and all these complications will still be possible.

Fixation methods:

Pins and casts

These are often used around the ankle or wrist, or in young children with small bones. Pins are removed in the office at time of cast changes.



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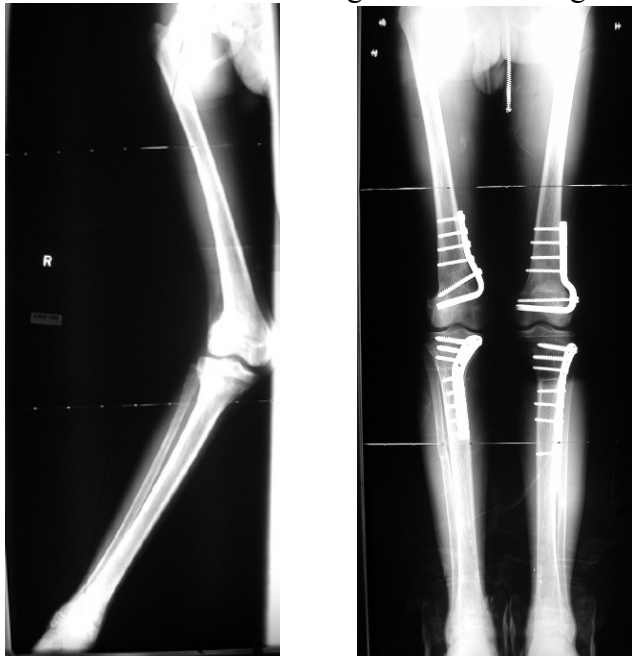


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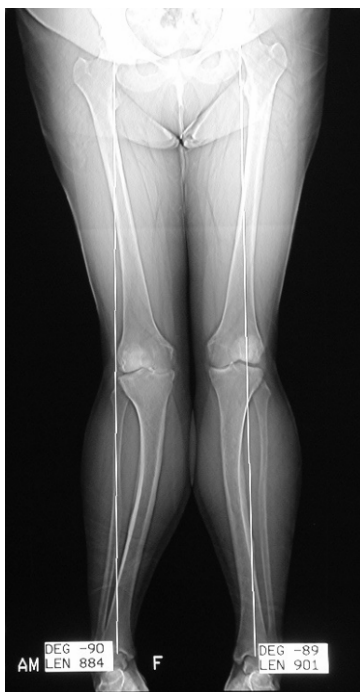
Internal Plates or Nails

These can be used after completion of growth for mild deformities, but using internal fixation in children can interfere with growth when the growth plates are still growing.



Plates and screws are placed on the outside of the bones after correction. Unfortunately, this does require larger incisions.

Advantages include this being done as a single surgery. Disadvantages mean it cannot be changed slowly with time. "What you get is what you got."



Nails are placed inside the bone with screws that cross through the bone and nail. This shows a nail from the front and side views. Note that the small bone is divided too, but only the shin bone (tibia) needs a nail.

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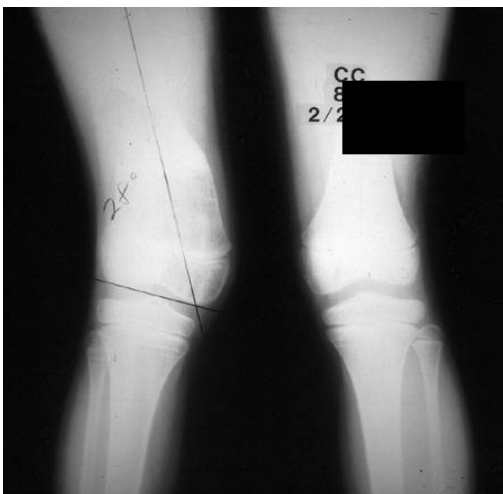
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External Fixation

This method is often used for the most severe deformities with twisted and angulated bones.

External fixation is also used in growing children because plates and nails can damage the growth centers. Osteotomy of the upper tibia (shin bone) has the greatest risk of injury to nerves and arteries. For this reason, external fixation is often chosen for the upper tibia because it may be safer.

There are two main types of external fixation. One type is a single bar with large pins and the other is a circular fixator (Ilizarov type). The single bar is used mainly for smaller deformities in children to avoid growth problems. The circular type allows gradual correction after the bone is divided. This may be the safest and most accurate way to do some complicated corrections.



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Two cases of single bar fixation:



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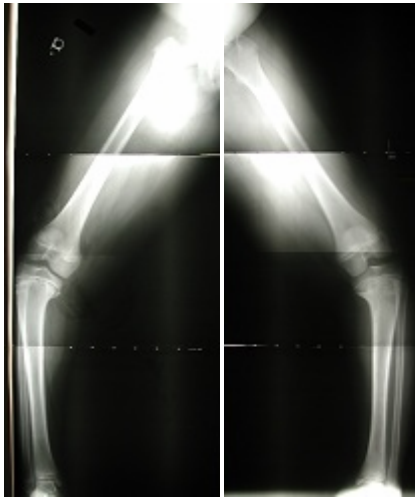
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Circular fixation is used for complex deformities



Circular fixation allows very precise control to realign the bones as perfectly as possible. The major advantage is safety and the ability to precisely align the bones.

Disadvantages are the bulkiness of the frame and the need to wear the frame for long periods of time. (usually months)