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LIMB LENGTHENING

- Ilizarov Method
- LON Method
- PRECICE-2 Nails Method

1. ILIZAROV METHOD

Ilizarov is a system that can give controlled movement to the bone parts with the help of hinges and rods, where the bones are fixed with thin wires and circles. This method relies on the practice of completing the part of a bone that is destroyed by lengthening it with a piece cut from the bone again. With this method, which is applied without placing a new bone on the corrected area, the existing bone can be extended by 1 mm per day and 30% of the short bone length can be achieved in congenital shortness. Surgical interventions can be applied to child or adult patients with arm and leg inequality developing after congenital diseases, bone loss, and traumas (such as early closure of growth cartilage). In this process, a low-energy fracture is created in the bone and it is extended (1 mm/day). Elongation up to 80% of the original length of the bone can be achieved. In parallel with the developing implant technology in appropriate cases, the use of new techniques and technology alternatives to the Ilizarov technique are also carried out.

Lengthening the bone usually begins 7–10 days later. Although it varies according to the patient and pathology, it is usually divided into 1 mm 4 equal intervals per day and applied as 0.25 mm every 6 hours. However, during this period, the team of physiotherapy specialists lifts the patient on his/her feet and teaches walking with support and exercises to the necessary muscles.

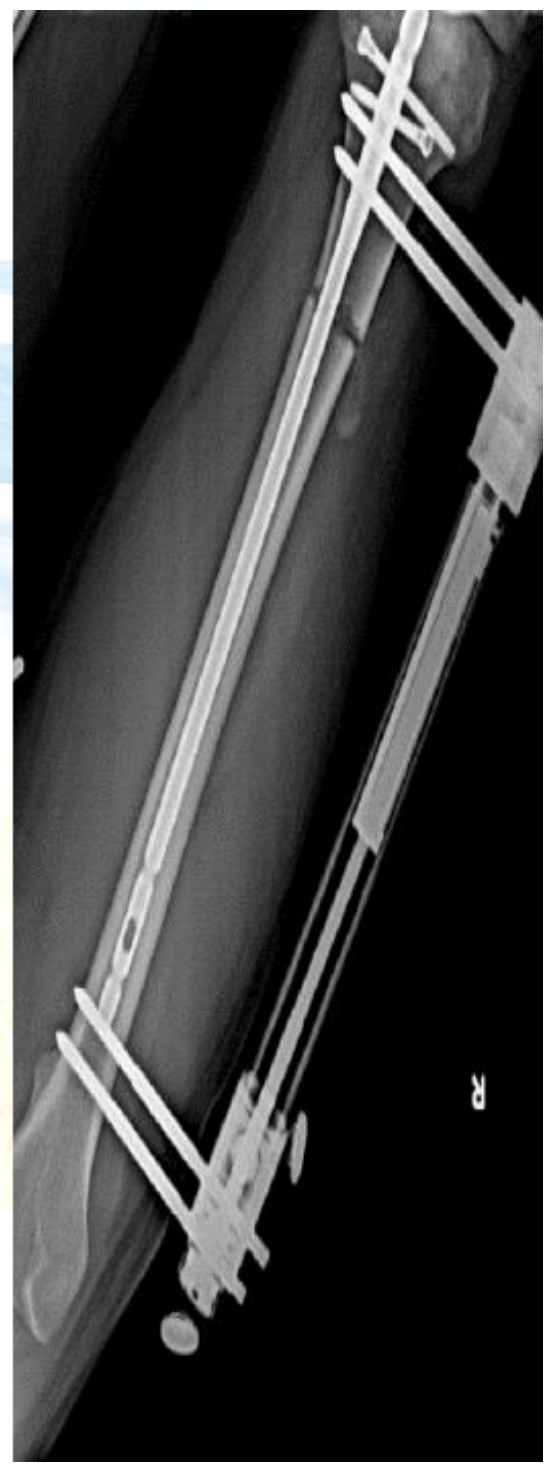
Patients usually stay in the hospital for 7–10 days. However, in complicated cases, they may need to stay longer. During this period, the maintenance of the wires and screws at certain times is carried out by the support staff, and the patient is given the necessary training for his/her own application athome.

LON(Lengthening Over Nail– The Combined) METHOD

The LON method is one of the existing methods used in leg lengthening surgeries. As thename suggests, in this method, both an intramedullary nail and an external fixator are
used together. When an external fixator is used, the patient may have to compromise on comfort and aesthetics to some extent, since this device is attached to the skin from the outside and maintenance is more difficult. However, the LON method allows the leg length to be increased reliably. The most obvious reason why the LON method is preferred by patients is that it allows supported walking even if there is a fixator outside the leg. It is also a much more economical optioncompared to internal nails such as Precice. The application phase of the LON method can be summarized as follows.

First, an osteotomy (bone cutting) is performed at the desired bone level in the leg.

During the process of increasing bone length, the intramedullary nail is positioned inside the bone cavity to keep the bone segments stable, thus acting as an internal support. The external fixator usedin the bone lengthening process is placed outside the skin and fixed to the bones allowing the process to be controlled. After the surgery, the bone is removed a certain distance (usually 1 millimeter) every day according to the device settings. The body fills this gap by creating new bone tissue, thus increasing leg length.



Once the target leg length is reached, the lengthening process is terminated and the newly lengthened bones are given time to heal. During this consolidation (hardening) phase, patients usually gradually gain the ability to walk by putting their weight on the external fixator. The fixator is removed 2.5–3 months after the surgery and walking with support continues for another 2–3 months.

Walking without support begins 5-6 monthsafter the date of surgery.

2. Precice®2 METHOD

Precice® is an orthopedic extension nail in the form of an interlocking metal rod. It is inserted through a small incision into the bone canal. After the operation, a special remote control is given to the patient. Whenthis control is placed against the leg, the magnets inside the Precice® slowly extend the magnetic motor inside. Thus, as the nail lengthens, the bone also lengthens.

The decision is made by making measurements with X-rays. Precice® is accurate and controllable. It can be programmed to aid rapid recovery.

Components of Precice 2

External Remote Controller (ERC);

External Remote Controller is a portablea magnetic device that makes the elongation occurs by pushing the button on it. Thus, the controlled lengthening phaseis provided thanks to it.

Intramedullary Nail:

Intramedullary nail, or rod is used as an internal fixation and is made of titanium alloy. The doctor decides the size of the nail by reviewing the X-ray images. (8,5 mm, 10,7 mm, 11,5 mm or 12,5 mm)

During the operation, it is surgically embedded into the bone cavity. As the nail is biocompatible, it does not containany elements that will cause harm to the body.

LON METHOD VS. PRECICE 2 METHOD

FEATURES	LON METHOD	PRECICE 2 METHOD
Walking during lengthening	Supported walking is possible	Walking not possible except for basic
Appearance	Fixator present	No fixator, internal device (internal nail + control)
Unassisted Walking	5-6 months	6-7 months
Pain	Pain related to fixator possible 9-12 months	Less pain was observed compared to other methods
Full Recovery	12 months	9-12 months
Maximum Extension	Femur 6-8 cm Tibia 5- 7 cm	Femur 6-8 cm Tibia 5- 7 cm
Wound Care	Regular dressing	Wound closes after the first 2-3 week