

LIMB LENGTHENING AND RECONSTRUCTION USING THE NEW FULLY IMPLANTABLE INTELLIGENT NAIL

1) How can bone be lengthened?

Bone lengthening has been performed for many years using various techniques including Wagner and Hoffman methods. This was associated with significantly high complications. The recent Ilizarov technique has improved results. It involves distraction of cut bone ends at 1mm per day resultant in bone regeneration. The soft tissue including skin, nerve and vessels also lengthen gradually during this procedure.

2) What are the common indications for such a procedure?

The Ilizarov technique has been used successfully for many years to treat adult and pediatric cases of bone loss, limb shortening and deformity. The main disadvantage is that an external fixator that was used had problems of pin tract infection, nerve and soft tissue irritation and discomfort during treatment. Cosmetic lengthening was not offered because of this risk.

The fully implantable nail utilizes the same principles but have significant advantages since it is entirely implantable. The risks are minimized and therefore it can be used for medical and cosmetic lengthening/deformity correction.

3) Can bone be lengthened by medical methods?

Growth hormones have been used in young children with dwarfism. However, it is expensive and has serious side-effect like pituitary dysfunction/tumor induction, 2^o diabetes mellitus and acromegaly. It cannot induce bone growth in adults.

4) Tell me about this modern technique of utilizing the fully implantable nail?

This is an intelligent "state-of-the-art" nail where distraction is performed by an electronically controlled distractor set, including a power unit and a two-part guide nail. The operation of the system is regulated transcutaneously by a portable mini-radio control device.

Depending on the indication, the device can insert unilaterally or bilaterally, into the femur or tibia.

Before the operation, the patient is instructed about the application of this technique and postoperative care.

A weight bearing X-ray of both lower limbs is required. Routine screening for any patient for GA is done. Blood tests and chest X-rays are not screened unless there are some medical problems. A preoperative screening by psychologist or psychiatrist is mandatory requirement in Singapore (consultation will be arranged and costs about S\$100) only for cosmetic lengthening cases.

The surgery usually taken between 2 to 4 hours depending on number of limbs involved. Patient has to stay in hospital for 5 to 7 days.

5) What is the postoperative care required?

In the first 24 to 48 hours, postoperative, pain is controlled by intravenous analgesic. Following that only oral analgesics are required for a few days. Some patients require a one to two day stay in high dependency to observe for fat embolism.

Distraction is NOT painful and no analgesic is required. The patient is taught to perform bone distraction 3 times a day using simple portable radio control device.

The stitches are removed at the 10th postoperative day. Patient will require use of crutches for 0 to 9 months period till the bone consolidates.

Physiotherapy to the knees and ankles commences immediately, post-operatively to prevent knee and ankle contractures.

For unilateral lengthening, crutches can be used for mobility with opposite leg for weight bearing.

For bilateral lengthening, a wheel chair is required for mobilization until bone consolidates in 6 to 9 months.

6) What are the potential benefits and risks of cosmetic lengthening?

Limb lengthening and reconstruction has been performed using the Ilizarov techniques for many years with good results. Because of the risks mentioned in para 2 with was not offered for cosmetic lengthening. The fully implantable nail has significantly lower complication rate and has been used for cosmetic lengthening. The maximum lengthening possible is 8cm for the femur and 6cm for the tibia respectively. Body image improved. Males usually prefer thigh lengthening versus female who prefer lower leg lengthening.

Potential complication includes knee or ankle stiffness which requires intensive physiotherapy. Most improve after lengthening although some patients may have some difficulty squatting. Other complications include infection (1-2%), nerve injury (3-5%), mal-union, delayed union especially in tibia (30-40% patients need a minor bone grafting procedure 4 months later), implant failure (failure to distract to full length which is uncommon and may need exchange nailing).

General complications include death (<1%), fat embolism, heart attacked, chest infection, blood clot in legs. Of this the only significant complication is fat embolism which is uncommon if done by experienced surgeon and easily treatable with oxygen therapy.

7) What is the quality of the “new” bone?

The new bone regenerates is normal and allows full bearing after 9 to 12 months depending on distraction length. It is good as normal bone and patient can return to sports after 18 months.

8) Do the implants require removed?

The antenna can be easily removed under local anesthesia. Removal of the nail is not mandatory. This can be easily removed under general anesthesia 2 years after the bone lengthening.

9) How long do I stay in Singapore?

We will assist you to obtain hotel and service apartments at corporate rates. These are wheelchair friendly with clean rooms & shower facilities. Internet facilities are also provided.

You can return to your home country after 3 to 4 weeks if follow up X-rays at clinic confirm good distraction of the bones.

10) Every month you need to send X-rays to surgeon and ensure that you see a physiotherapy prevention of joint contractures.

11) How much height can be gained?

Total estimated achievable height gained is approximately 12-14cm. This consist of thigh bone (femur) ranges from 6-8cm while for the lower leg is 6cm.