

LATN effective in lower extremity limb lengthening

By Mary Ann Pomcznik

A new technique—lengthening and then nailing (LATN)—is effective in correcting leg length discrepancy (LLD) for a variety of conditions, according to the researchers for poster exhibit P459. In addition to addressing the deformity correction, the LATN technique also minimizes the time needed in external fixation.

In 24 patients treated with LATN, LLD improved from 6.3 cm (range: 2.5 cm to 12.9 cm) to 1.0 cm (range: 0 cm to 5.5 cm). Full weight bearing was tolerated 7 weeks (range: 6 weeks to 11 weeks) after nailing and was considered the time of bony healing. Patients spent an average of 13 weeks (range: 3 weeks

to 27 weeks) in an external fixator frame, resulting in an external fixation index (EFI) of just 0.5 months/cm (range: 0.3 months/cm to 0.7 months/cm). In comparison, the classic Ilizarov method often requires an EFI of 1.5 months/cm to 2 months/cm in adults.

The LATN technique uses monolateral frames (such as the Ilizarov/Taylor Spatial or EBI frames) for the distraction phase. Pins and wires are placed to allow subsequent intramedullary nailing. At the end of the distraction phase, reamed large-diameter,

Continued on page 7



X-ray showing a 5 cm lengthening of the tibia with external fixation frame in place.

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Continued from page 1

full-length, statically locked intramedullary nails are inserted and the frames are removed. Contact between external fixation pins and wires and internal fixation must be carefully avoided.

Advantages of LATN

Although alternatives such as lengthening over a nail (LON) and using internal lengthening nails exist, they have limitations, many of which are addressed by the LATN technique.

Both LON and LATN allow frame removal after the distraction phase of lengthening. However, potential advantages of the LATN technique include the following:

- the ability to insert a full length large diameter nail for more stability
- elimination of concomitant use of internal and external fixation, thus lowering the risk of infection
- the ability to gradually correct diaphyseal deformity and lengthen prior to nail insertion, thus expanding the indications for use of this procedure
- reaming through the regenerate, which appears to enhance and quicken the bone healing

Study results

Physicians used LATN to treat 24 patients with LLD (36 limbs—33 tibiae and 3 femora). The patients had developed LLD due to a variety of causes: malunion (6), fibrous dysplasia (2), nonunion (2), polio (1), and congenital (1). In 12 patients, the procedure was used for stature lengthening.

For this retrospective, IRB-approved study of consecutive patients treated by a single surgeon, researchers recorded both clinical and radiographic data and compared the results with historical controls.



(Above) Top view of sawbone demonstration showing no contact between the rod and the external fixation pins. This is what allows insertion of the nail and avoids infection.

(Right) Front view of sawbone demonstration that shows the insertion of the rod while the frame is in place. This allows frame removal.



The average patient age was 35 years old (range: 22 years to 55 years old). The average follow-up was 36 months (range: 7 months to 64 months). LATN was successful in lengthening the legs an average of 5.7 cm (range: 2.5 cm to 10 cm), reducing LLD from an average of 6.3 cm to an average of 1.0 cm. In addition to the reduced time in frame, researchers also noted the following:

- The delay between the end of distraction and nailing averaged 9.8 days (range: 0 days to 35 days).
- Patients could tolerate full weight bearing an average of 7 weeks (range: 6 weeks to 11 weeks) after nailing. This was considered the time of bony healing.
- The bone healing index averaged 0.8 months/cm (range: 0.4 months/cm to 1.2 months/cm).
- Ankle and knee range of motion (ROM) did not change with treatment. Ankle ROM was 9° dorsi-

flexion to 39° plantar flexion. Knee ROM was 0° extension to 127° flexion.

- Sagittal plane deformities in one patient were fully corrected.
- Two patients had rotational deformities that were fully corrected.
- Preoperative mechanical axis deviation (MAD) averaged 9 mm lateral and 14 mm medial. Final MAD averaged 9 mm lateral and 10 mm medial.
- Final lateral distal femoral angle averaged 88° (range: 81° to 91°).
- Final medial proximal tibial angle averaged 87° (range: 83° to 93°).

One patient experienced skin breakdown over a prominent interlocking screw and a deep infection, which was treated successfully by removing the nail and administering a six-week course of intravenous antibiotics. At that point, the regenerate was fully healed and no other hardware was needed.

One patient with spina bifida developed temporary bilateral sciatic nerve palsy, but this eventually resolved. There were no nonunions, fractures or loss of position.

Several additional procedures were performed, including 14 gastrocnemius recessions, 9 intramedullary nail removals, 2 ankle fusions, 1 gradual correction of a knee contracture and 1 gradual correction of ankle contracture.

Based on this study, LATN seems to be a safe and effective procedure for limb lengthening and deformity correction, and researchers conclude that further study of LATN is warranted. The lead researcher is S. Robert Rozbruch, MD, of New York City. Additional researchers include: Dawn Kleinman, BA; Austin Fragomen, MD; and Svetlana Ilizarov, MD, all of New York City. Drs. Rozbruch, Fragomen and Ilizarov receive research funding from Smith + Nephew and EBI.