
Case 45: Ankle Fusion and Tibial Lengthening (LATN Technique) for Failed Ankle Replacement

S. Robert Rozbruch

Contents

1	Brief Clinical History	321
2	Preoperative Clinical Photos and Radiographs	321
3	Preoperative Problem List	321
4	Treatment Strategy	322
5	Basic Principles	323
6	Images During Treatment	324
7	Technical Pearls	324
8	Outcome Clinical Photos and Radiographs	325
9	Avoiding and Managing Problems	325
10	Cross-References	326
	References and Suggested Reading	326

Abstract

This case is about a young woman with a failed total ankle replacement (TAR) who has an additional leg-length discrepancy (LLD) of 3.5 cm. Removal of the TAR resulted in a total bone loss of 8.5 cm. Infection was present in the ankle, and this required additional treatment with intravenous antibiotics. A proximal tibial lengthening using the lengthening and then nailing (LATN) technique and an ankle fusion were done with a two-level Ilizarov/Taylor spatial frame (TSF).

1 Brief Clinical History

A 35 year old woman had a TAR 4 years earlier and a triple arthrodesis 8 years earlier done elsewhere. She had mild cerebral palsy. Her chief complaint was LLD and progressive ankle pain.

2 Preoperative Clinical Photos and Radiographs

See Figs. 1 and 2.

3 Preoperative Problem List

1. Failed TAR
2. Additional LLD of 3.5 cm
3. Total bone loss expected is = LLD + bone defect after removal of TAR
4. High suspicion of infection

S.R. Rozbruch (✉)
Limb Lengthening and Complex Reconstruction Service, Hospital for
Special Surgery, New York, NY, USA
e-mail: Rozbruchsr@hss.edu

Fig. 1 Pre-operative standing radiograph showing LLD of 3.5 cm

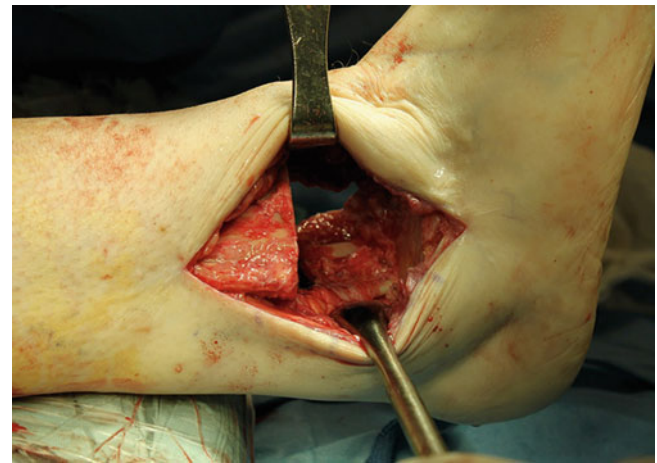


Fig. 3 Intra-operative defect of 5 cm



Fig. 4 Intra-operative X-ray showing defect



Fig. 2 Pre-operative lateral radiograph showing collapse of talar component

4 Treatment Strategy

1. Remove TAR and use Ilizarov/TSF to close defect with acute and gradual shortening.
2. Take cultures at surgery to rule out infection. Hold pre-operative antibiotics to get reliable cultures.
3. Staged surgery (4–6 weeks later) to lengthen the tibia. Bone defect of 5 cm after removal of TAR is anticipated. Total bone loss is equal to LLD (3.5 cm) + bone defect after TAR removal (5 cm) = 8.5 cm.
4. Use LATN technique to shorten time in frame.



Fig. 5 Acute compression of defect is possible but would make skin closure impossible



Fig. 7 End of distraction (ED) standing picture

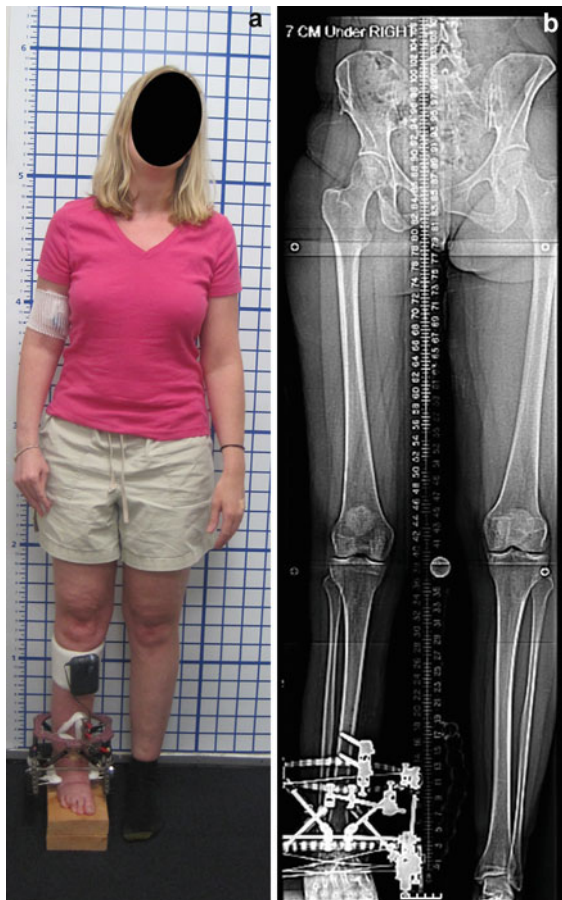


Fig. 6 (a, b) After gradual shortening and contact between tibia and talus, there is 8.5 cm of LLD. Note intravenous line for antibiotic treatment

5 Basic Principles

1. Excise TAR through medial and lateral incisions.
2. Acute plus gradual shortening of bone defect with TSF.
3. Avoid bone graft in setting of infection.
4. Acute shortening of more than 3 cm is inadvisable. This will make wound closure difficult and can adversely affect neurovascular status.
5. Check pulses during surgery to make sure you are not acutely shortening too much.
6. Total bone loss is preexisting LLD plus bone defect from removal of TAR.
7. LATN shortens time in frame by substituting an intramedullary nail during the consolidation phase. The rod is inserted before the frame is removed. There is no contact between internal and external fixation. The proximal tibial external fixation is placed peripherally in the bone out of the path of the intramedullary rod.

Fig. 8 ED standing radiograph showing optimal length and alignment

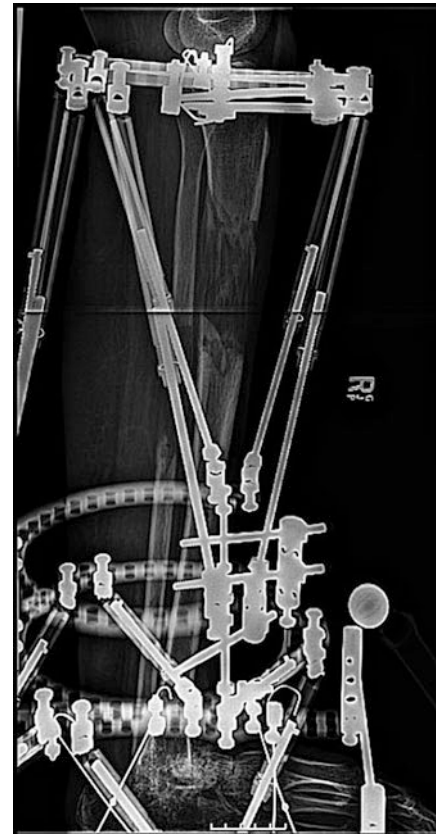


Fig. 9 ED radiograph showing distraction of 8 cm

6 Images During Treatment

See Figs. 3, 4, 5, 6, 7, 8, 9, 10, and 11.

7 Technical Pearls

1. After the bone cuts are made for the ankle fusion and the surfaces are prepared, insert two wires retrograde from the bottom of the foot to hold tibiotalar position. The tibia and talus can be pulled apart over the wire to enable wound closure. The frame is then applied. After the frame is applied, acutely shorten as much as soft tissue and vascular status will tolerate (usually 3 cm).
2. Acute/gradual shortening allows docking of the tibia to the talus quickly. This is good for dead space management and for bony healing of the ankle fusion.
3. Staging the lengthening is advantageous since the patient can decide to simplify the treatment by deciding not to proceed and simply wear a shoe lift. Also, if there is infection at the ankle, the tibial lengthening is done after 6 weeks of IV antibiotics and clearance of the infection.

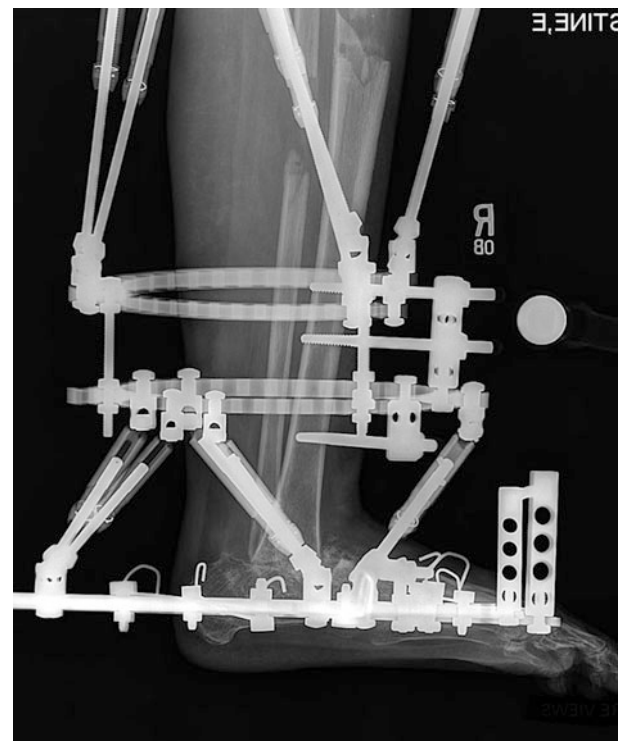


Fig. 10 ED radiograph showing ankle fusion stabilized by TSF



Fig. 11 Patient performing physiotherapy to work on knee extension. Note bump under foot ring that helps patient work on knee extension by pushing posteriorly on the knee

8 Outcome Clinical Photos and Radiographs

See Figs. 12, 13, and 14.

9 Avoiding and Managing Problems

1. Avoid excessive acute shortening. This increases risk of wound breakdown, pathological swelling, and neurovascular compromise.
2. Excise adequate bone at ankle. Make sure all dead bone is removed and that flat congruent surfaces are created.
3. With LATN procedure, it is critical to avoid contact between internal and external fixation to decrease risk of infection.
4. When lengthening the tibia in the setting of a fused ankle, the gastrocnemius will get tight and lead to loss of knee flexion. It is critical to work with on maintaining knee extension (Fig. 12).

Fig. 12 (a, b) Six-month follow-up showing plantigrade foot and optimal leg lengths





Fig. 13 Six-month follow-up showing healed ankle fusion after LATN

10 Cross-References

- ▶ [Case 41: Ankle Arthrodesis with Tibial Lengthening for Failed Pilon Fracture](#)
- ▶ [Case 44: Complex Ankle Fusion and Tibial Lengthening Using the LATN Technique](#)
- ▶ [Case 46: Failed TAR: Conversion to Ankle Fusion with Tibial Lengthening](#)

References and Suggested Reading

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Fig. 14 Six-month follow-up showing healed tibial lengthening