
Case 20: Distraction of Hypertrophic Nonunion

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Abstract

A 51 year old woman with rheumatoid arthritis had a closed fracture of her right tibia after a motor vehicle accident. One year after the accident, she had a severe varus and procurvatum tibial deformity and reported difficulty ambulating. The apex of the deformity had minimal mobility. External fixation was applied and used to slowly distract the hypertrophic nonunion. After 8 months, the external fixation was removed. The patient experienced one minor pin tract infection, which was managed with oral antibiotics. After external fixation removal, the patient ambulated (partial weight-bearing) with a walker for a month. Weight-bearing was advanced as tolerated, and the patient achieved full weight-bearing at the end of the month.

1 Brief Clinical History

A 51 year old woman with rheumatoid arthritis and diabetes mellitus had a closed tibial fracture (right leg) after a motor vehicle accident. She declined initial surgical treatment and underwent treatment with a Bledsoe leg brace. One year after the accident, she presented with severe deformity and reported difficulty ambulating. After examination, it was determined that she had severe tibial varus and procurvatum with minimal mobility at the apex of the deformity. She also had planovalgus deformity of the left foot with intact neurovascular status.

2 Preoperative Clinical Photos and Radiographs

See Figs. 1, 2, and 3.

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Fig. 1 Pre-operative anteroposterior (a) and lateral (b) view radiographs (Copyright 2014, Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore)

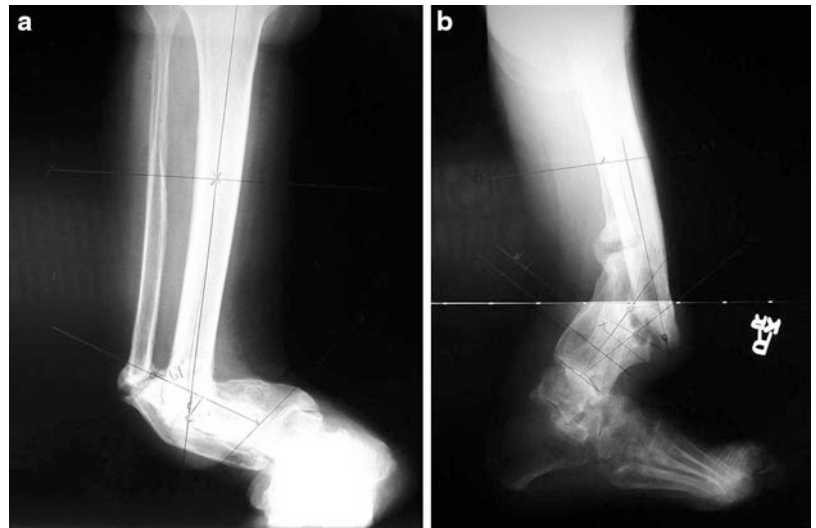


Fig. 2 Pre-operative anteroposterior (a) and lateral (b) view clinical photographs (Copyright 2014, Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore)

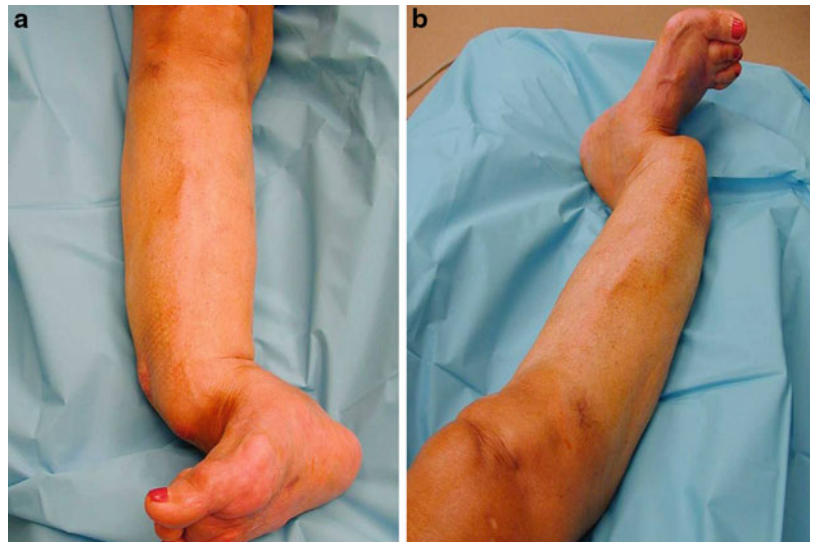
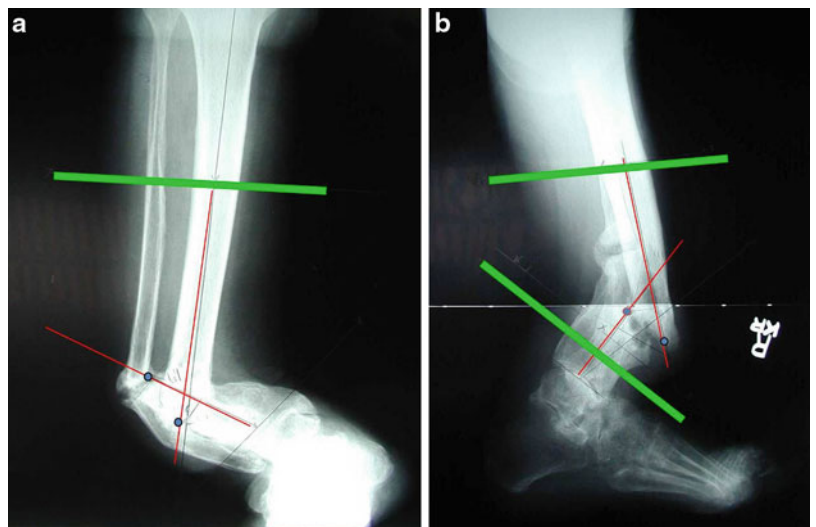


Fig. 3 Pre-operative anteroposterior (a) and lateral (b) view radiographs show deformity parameters (fracture method) (Copyright 2014, Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore)



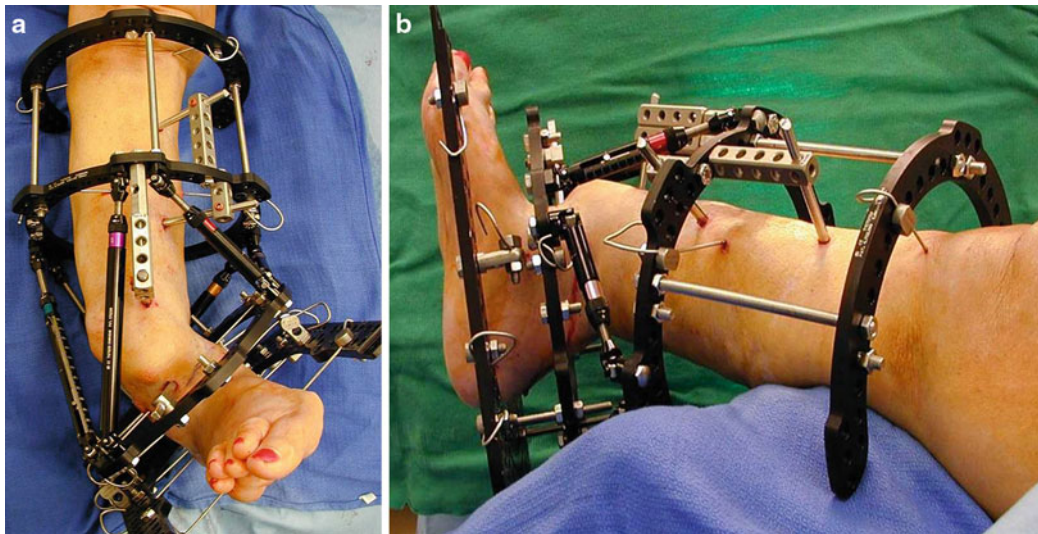


Fig. 4 Immediate post-operative anteroposterior (a) and lateral (b) view clinical photographs (Copyright 2014, Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore)

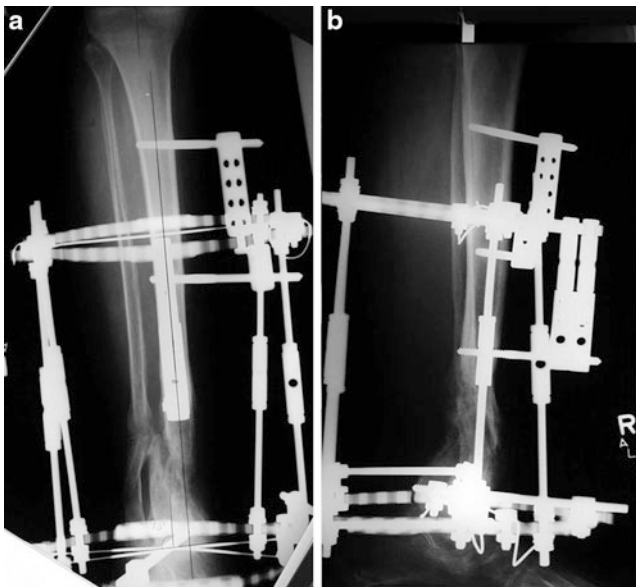


Fig. 5 Anteroposterior (a) and lateral (b) view radiographs obtained when full correction was achieved. External fixation was maintained for a total of 8 months. The patient experienced a minor pin tract infection, which was managed with oral antibiotics (Copyright 2014, Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore)



Fig. 6 Anteroposterior (a) and lateral (b) view radiographs obtained 1 month after removal of external fixation. Note that a cast was applied at the time of frame removal to provide support. The patient ambulated with a walker, and weightbearing was advanced as tolerated. The cast was removed during this office visit (Copyright 2014, Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore)

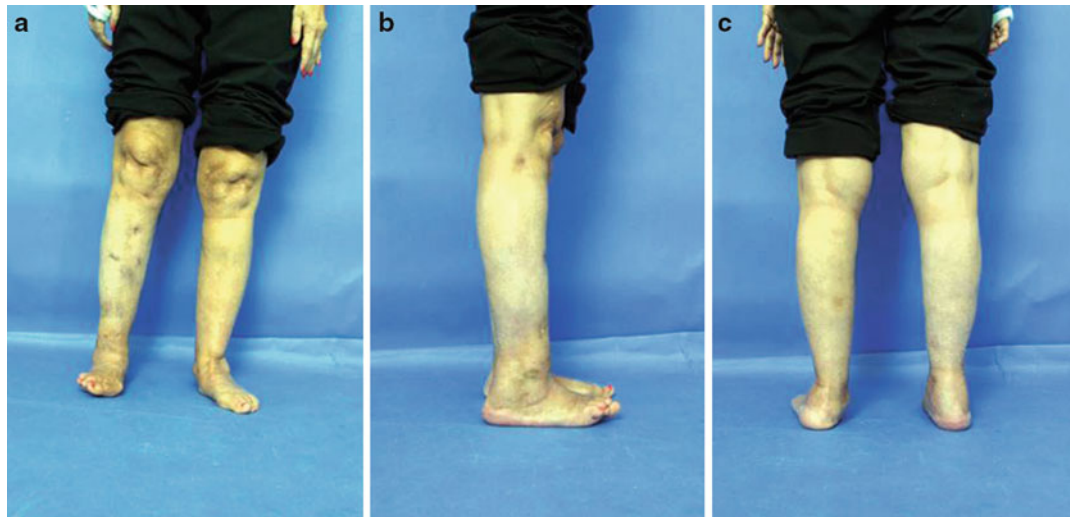


Fig. 7 Clinical photographs (a, b, c) obtained after the cast was removed (Copyright 2014, Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore)

3 Preoperative Problem List

- Severe deformity
- Long duration
- Rheumatoid arthritis and diabetes mellitus

4 Treatment Strategy

Gradual deformity correction was combined with minimally invasive fixation. The foot was included when planning the deformity correction. Ankle range of motion was preserved, but the foot was included in the frame. The hypertrophic nonunion was distracted 0.5 mm/day at the concavity of the deformity. Additional bone grafting was not needed because the distraction allowed the regenerate process to occur. A cast was applied after frame removal to provide support and remained in place for 1 month.

5 Basic Principles

Gradually correct the deformity to avoid neurovascular injury. Also allow the hypertrophic nonunion to heal without bone graft. Address the ankle to avoid development of any equinus deformity. Include the foot in the frame for stability.

6 Images During Treatment

See Figs. 4 and 5.

7 Technical Pearls

Slide tibial rings onto the limb without mounting them. Then, mount the foot ring first. This allows the surgeon to adjust the location of the proximal tibial rings. The surgeon should consider pinning the toes at the completion of frame mounting (not done in this case) to prevent claw toe deformity during gradual correction. Distract for 0.5 mm/day, and then gradually perform angular correction. Allow hypertrophic nonunion to heal, and dynamize the frame prior to removal.

8 Outcome Clinical Photos and Radiographs

See Figs. 6 and 7.

9 Avoiding and Managing Problems

Correct very slowly (0.5 mm/day) around structures at risk to allow the bone to heal. Be diligent with pin care in patients with diabetes mellitus or rheumatoid arthritis. Pin toes prevent contractures (not done in this case). Dynamize the frame before removal. See the patient in the office every week to prevent problems.

10 Cross-References

- ▶ [Case 19: Hypertrophic Tibial Nonunion with Oblique Plane Deformity Treated with TSF](#)

References and Suggested Reading

- Brinker MR, O'Connor DP (2007) Outcomes of tibial nonunion in older adults following treatment using the Ilizarov method. *J Orthop Trauma* 21(9):634–642
- Rozbruch SR, Helfet DL, Blyakher A (2002) Distraction of hypertrophic nonunion of tibia with deformity using Ilizarov/Taylor Spatial Frame. Report of two cases. *Arch Orthop Trauma Surg* 122(5):295–298
- Sen C, Eralp L, Gunes T, Erdem M, Ozden VE, Kocaoglu M (2006) An alternative method for the treatment of nonunion of the tibia with bone loss. *J Bone Joint Surg Br* 88(6):783–789