
Case 114: Fourteen Year Old Female with Residual Clubfoot Deformity Treated with Taylor Spatial Frame

Craig A. Robbins

Contents

1	Brief Clinical History	833
2	Preoperative Clinical Photos and Radiographs	833
3	Preoperative Problem List	834
4	Treatment Strategy	834
5	Basic Principles	834
6	Images During Treatment	835
7	Technical Pearls	835
8	Outcome Clinical Photos and Radiographs	836
9	Avoiding and Managing Problems	836
	References and Suggested Reading	837

Abstract

Fixed bony deformity as a sequela of clubfoot in an adult is a difficult problem. The option of acute correction with closing wedge osteotomies further shortens an already small foot. Gradual correction through a midfoot osteotomy with an external fixator offers the ability to correct multiple deformities simultaneously as well as obtain foot length for a longer lever arm to improve gait mechanics.

This case describes the treatment of a 14 year old girl with residual fixed bony deformities resulting from infantile clubfoot. A midfoot osteotomy was performed with a Gigli saw, and then a circular external fixator (Taylor Spatial Frame) was used to gradually obtain a plantigrade foot. A prophylactic tarsal tunnel release was performed.

1 Brief Clinical History

KA is a 14 year old adolescent girl who was born in Kenya with a severe clubfoot. As a child she had multiple surgeries but records are not available. She presented with the main complaint of toe walking and some vague forefoot pain. Her desire was for a plantigrade foot that would allow for normal shoe wear.

2 Preoperative Clinical Photos and Radiographs

See Figs 1, 2, and 3.

C.A. Robbins (✉)
Paley Advanced Limb Lengthening Institute, West Palm Beach,
FL, USA
e-mail: CraigRobbinsMD@gmail.com



Fig. 1 Preoperative lateral foot X-ray showing talar dome depression, hindfoot and midfoot coalitions, and cavus



Fig. 2 Preoperative mortise X-ray showing adductus and coalitions

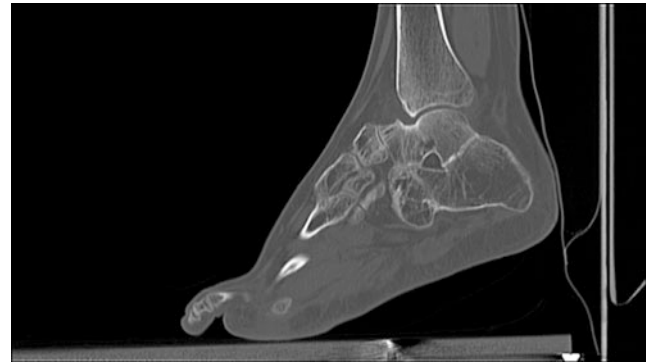


Fig. 3 Preoperative sagittal plane CT slice showing talar dome depression, cavus, and coalitions in the hindfoot and midfoot

3 Preoperative Problem List

- Midfoot cavus
- Midfoot adductus
- Dense scar tissue from previous unknown surgeries
- Anticipated toe flexion contractures
- Hindfoot and midfoot coalitions
- Limited ankle joint motion
- Supination deformity

4 Treatment Strategy

KA's main complaint was her inability to wear a normal shoe due to fixed bony deformities and limited ankle motion. Her hindfoot was in neutral alignment and the adductus and cavus were in the midfoot. Due to her dense scar tissues and degree of calculated correction, a prophylactic tarsal tunnel release and toe slings to prevent toe contractures were planned. Because of her coalitions, a multi-planar deformity correction of cavus, adduction, lengthening, and rotation through a single, percutaneous Gigli saw osteotomy were to be performed. A miter frame to allow ankle joint distraction and to stabilize the hindfoot was planned.

5 Basic Principles

Circular external fixation allows for gradual, precise, simultaneous correction of multi-planar deformities. The use of a miter frame construct allows simultaneous correction of adjacent deformities such as ankle joint distraction, hindfoot stabilization, and correction of midfoot deformities. Dense scar tissue and the degree and amount of anticipated correction were the main considerations for prophylactic tarsal tunnel decompression and the use of toe slings. Temporary toe pinning could also be considered.

6 Images During Treatment

See Figs. 4, 5, 6, and 7.

7 Technical Pearls

Miter frames are technically challenging to apply due to the bulk of the frame and close proximity of the rings. As such, passing the Gigli saw should be done prior to frame placement to allow unhindered access to the foot. Remember



Fig. 4 Intraoperative images showing subperiosteal Gigli saw placement, subperiosteal freer elevator through lateral incisions, and olive wires proximal and distal to osteotomy site positioned to correct adductus



Fig. 5 Intraoperative fluoro image showing subperiosteal Gigli saw placement; extent of midfoot deformity is evident

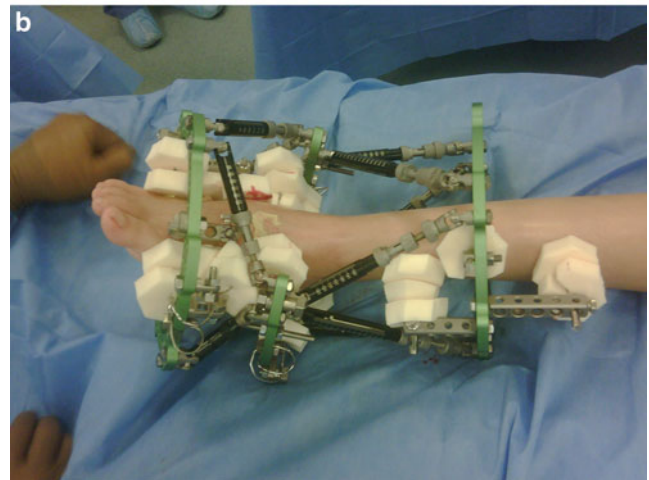
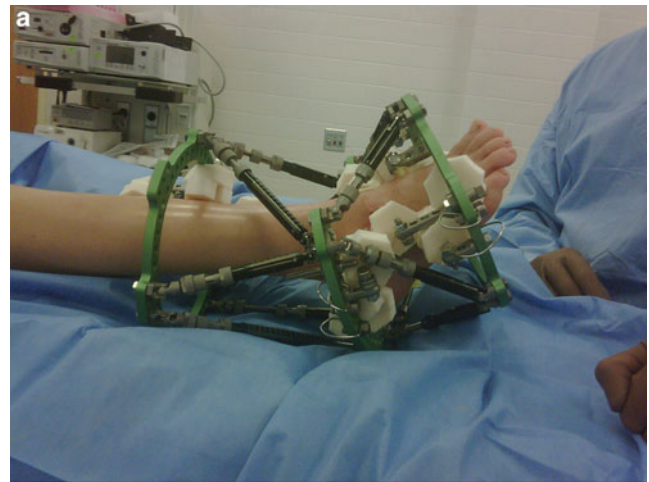


Fig. 6 (a, b) Intraoperative clinical pictures of miter frame showing forefoot ring mounted orthogonal to rotational deformity

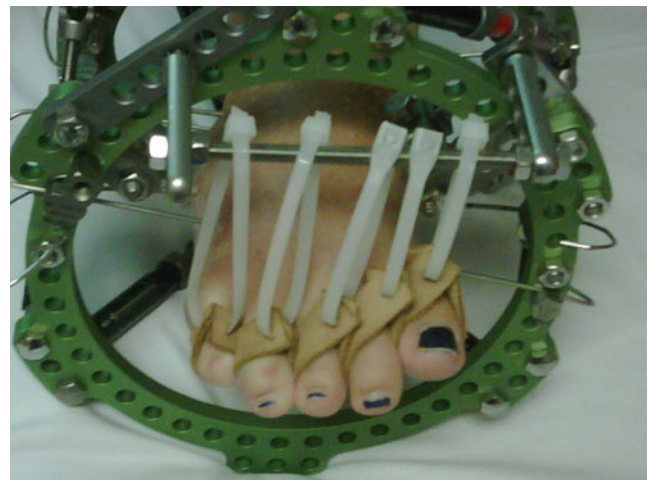


Fig. 7 Clinical picture showing adjustable toe slings to prevent flexion contracture during correction



Fig. 8 Intraoperative lateral fluoro image taken in maximal dorsiflexion at time of frame removal



Fig. 10 Postoperative standing AP X-ray showing improvement in adductus



Fig. 9 Postoperative standing lateral X-ray showing plantigrade foot

to make your incisions along the line of pull of the saw to avoid damaging soft tissue. The hindfoot ring should be mounted along the axis of the calcaneus, but you must consider the ultimate position of the forefoot and tibial rings and make adjustments as necessary to allow placement of the struts. Placing threaded rods or long bolts to mark the equator of the hindfoot ring is helpful for getting orthogonal mounting X-rays. Because of the hindfoot fusion, a talar neck wire was not needed but should be considered if control

of the talus is required. Finally, a butt-type frame that statically spanned the ankle and allowed pure midfoot correction could be considered as well.

8 Outcome Clinical Photos and Radiographs

See Figs. 8, 9, 10, and 11.

9 Avoiding and Managing Problems

As with any surgery, preoperative planning is essential. Anticipating problems before they occur makes treating them easier. Performing the tarsal tunnel release at the time of the index surgery prevents having to do it later as an unplanned surgery with the frame in place. Similarly, passing the Gigli saw prior to frame application allows unhindered access. It is also important to have adequate frame mounting and deformity parameters prior to leaving the OR because visualization of the osteotomy site can be difficult once the fixator is in place.



Fig. 11 (a, b, and c) Postoperative clinical standing front view of the foot and ankle

References and Suggested Reading

- Beaman DN, Gellman R (2008) The basics of ring external fixator application and care. *Foot Ankle Clin* 13(1):15–27
- Floerkemeier T, Stukenborg-Colsman C, Windhagen H, Waizy H (2011) Correction of severe foot deformities using the Taylor Spatial Frame. *Foot Ankle Int* 32(2):176–182
- Lamm BM, Paley D, Testani M, Herzenberg JE (2007) Tarsal tunnel decompression in leg lengthening and deformity correction of the foot and ankle. *J Foot Ankle Surg* 46(3):201–206
- Paley D, Tetsworth K (1991) Percutaneous osteotomies. Osteotome and Gigli saw techniques. *Orthop Clin North Am* 22(4):613–624
- Wukich DK, Dial D (2006) Equinovarus deformity correction with the Taylor Spatial Frame. *Oper Tech Orthop* 16(1):18–22