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# Case 63: Residual Clubfoot: Equinovarus Deformity/Knee Valgus/Limb Length Discrepancy

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## Abstract

A 22 year old active male with history of Asperger's syndrome, asthma, and left idiopathic clubfoot deformity with subsequent recurrence after open release as an infant is presented. He presented with pain to his hip, knee, and ankle associated with ankle instability. He had a rigid equinovarus deformity in addition to a 3 cm shortening limb length discrepancy. The patient had undergone surgery for correction of limb length disparity, distal femoral valgus, and hindfoot equinovarus deformity to include distal femur fixator-assisted plating and a gradual correction through a supramalleolar osteotomy (SMO) of the tibia using a Taylor Spatial Frame (TSF). No complications happened in this case with a successful final outcome.

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## 1 Brief Clinical History

The patient was treated as an infant for clubfoot deformity with a posteromedial release. The patient presented to our institution as an adult with persistent pain to his left ankle and multiple episodes of sprains, hip pain, and knee pain. On exam, a 3 cm limb length discrepancy and residual equinus deformity (15°) was noted. Radiographically, a distal femur valgus was identified (mLDFA was 82°). Given the patient's stiffness at the ankle and subtalar joint, an SMO through gradual distraction using the Taylor Spatial Frame (TSF) was performed to correct the equinus contracture and hindfoot varus simultaneously to achieve a plantigrade foot position relative to the tibia. In addition, fixator-assisted plating of the femur was performed to correct the distal femoral valgus.

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## 2 Preoperative Clinical Photos and Radiographs

See Figs. 1, 2, 3, and 4.

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**Fig. 1** AP foot with metatarsus adducts



**Fig. 2** Lateral foot: flat top talus, subtalar varus

### 3 Preoperative Problem List

- Limb length Discrepancy: Femur (0.5 cm); Tibia (2.5 cm). Total of 3 cm.
- Distal femoral valgus
- Equinus ankylosis of 15°
- Peroneal nerve at risk

**Fig. 3** Erect leg standing radiographs: short left femur (5 mm) and left tibia (25 mm). Mechanical Axis Deviation (MAD): 15 mm Lateral on the left. (Normal MAD: 0–3 mm). Mechanical Lateral Distal Femoral Angle (mLDFA): 82° (Normal range: 85–90)



### 4 Treatment Strategy

- Peroneal nerve release
- Osteotomy of the femur (multiple holes technique)
- Temporary application of external fixator device (fixator-assisted plating)
- Internal fixation of femoral osteotomy with locking plate
- Tarsal tunnel decompression
- Supramalleolar osteotomy of tibia
- Application of multiplane hexapod computer-assisted fixator (TSF)

### 5 Basic Principles

Postsurgical adhesion/scar tissue formation may guide the surgeon to perform gradual correction, while smaller-magnitude deformity in areas of no prior surgery may be treated with acute correction techniques such as opening/closing wedge osteotomies. Utilization of the osteotomy rule

**Fig. 4** Long leg lateral Xray



**Fig. 6** Lateral translation/varus angulation implemented with use of unilateral fixator assistance



**Fig. 5** Intra-operative supramalleolar gli saw osteotomy

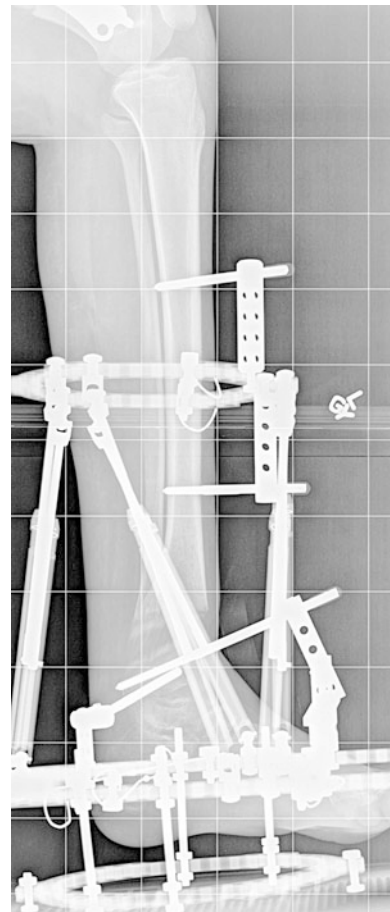


**Fig. 7** Distal femoral plate

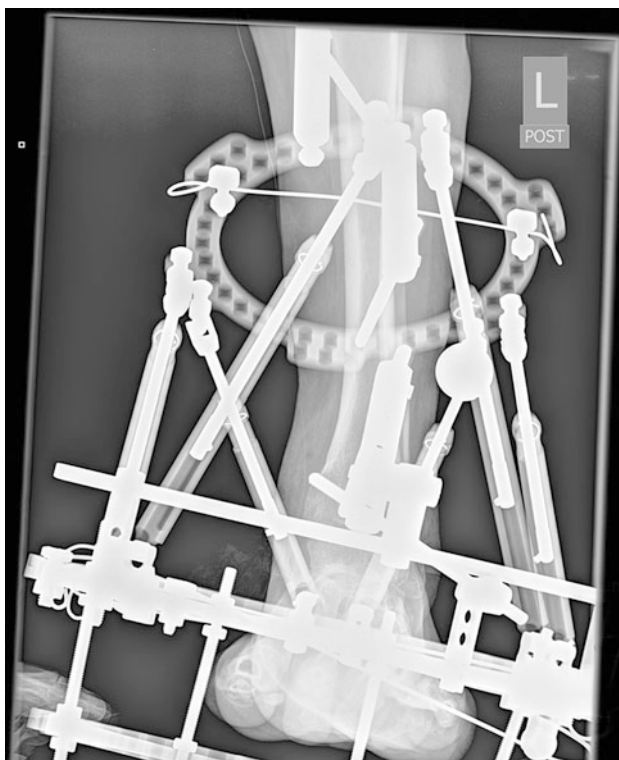
principles is helpful in preventing malposition through incorporation of translation when the osteotomy is placed outside the apex of deformity, as with the case presented of equinus contracture where the apex was located at the center of rotation of the ankle and the osteotomy placed proximal at



**Fig. 8** Lateral view of TSF in place



**Fig. 10** Lateral view with TSF in place after correction



**Fig. 9** AP view of TSF in place

the supramalleolar region. It should also be noted that the acute femoral osteotomy was made proximal to the apex of deformity, necessitating medial angulation and lateral translation of the distal fragment.

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## 6 Images During Treatment

See Figs. 5, 6, 7, 8, 9, 10, 11, and 12.

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## 7 Technical Pearls

- Regarding the femoral osteotomy, test the alignment using the bovie cord technique. Use of temporary external fixator to obtain a stable correction prior to definitive internal fixation application.



**Fig. 11** Ap view with TSF in place after correction



**Fig. 12** AP femur with healed osteotomy



**Fig. 13** Ankle AP radiograph with an valgus distal tibia to compensate for the hind foot varus

- Regarding the distal tibia osteotomy,
- Use of low-energy osteotomy techniques (Gigli saw) and periosteal preservation to ensure proper healing of the regenerate bone after distraction. Incorporation of gradual distraction in areas of severe scar contracture.
- Prophylactic use of tarsal tunnel decompression for both equinus and varus to valgus correction.
- Locate pins in distal segment of the SMO and/or incorporate the foot for further construct stability.
- In cases of ankle and hindfoot varus, an overcorrection through the SMO leaving it in valgus is a feasible solution to correct the alignment with minimally invasive surgery.

## 8 Outcome Clinical Photos and Radiographs

See Figs. 13, 14, and 15.



**Fig. 14** Lateral ankle radiograph

**Fig. 15** Erect long leg films after hardware removal: no discrepancy or MAD deviation



## 9 Avoiding and Managing Problems

Considerations should be given for gradual versus acute correction. A peroneal nerve release should be performed in knee valgus to varus corrections. The foot should be included in the construct to increase the stability. If the foot is not included, make sure to include pins and wires through the distal tibial segment. Prophylactic use of tarsal tunnel decompression for both equinus and varus to valgus correction is recommended. In cases of ankle and hindfoot varus (like this case), an overcorrection through the SMO leaving it in slight valgus is a feasible solution to correct the alignment with a minimally invasive surgery.

## 10 Cross-References

- ▶ [Case 61: Older Clubfoot with Osteotomy Treated with MAC External Fixator](#)
- ▶ [Case 67: Clubfoot Sequela Treated with a Multilevel, Hexapod, External Fixator](#)

## 11 See Also in Vol. 1

- Case 76: Treatment of Complex Clubfoot Using Midfoot Osteotomy and Taylor Spatial Butt Frame (TSF)
- Case 114: Fourteen Year Old Female with Residual Clubfoot Deformity Treated with Taylor Spatial Frame

## References and Suggested Reading

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