
Case 55: Supramalleolar Dome Osteotomy for Malunion of the Tibia

Pablo Wagner, Lauren Thornberry, and John E. Herzenberg

Contents

1	Brief Clinical History	391
2	Preoperative Clinical Photos and Radiographs	391
3	Preoperative Problem List	391
4	Treatment Strategy	393
5	Basic Principles	393
6	Images During Treatment	393
7	Technical Pearls	396
8	Outcome Clinical Photos and Radiographs	396
9	Avoiding and Managing Problems	396
10	Cross-References	396
	References and Suggested Reading	396

Abstract

A 31 year old healthy female was involved in a motor vehicle accident (MVA) in 2002 resulting in a distal tibia fracture. The follow-up X-rays showed a distal tibia valgus deformity that was interpreted as a post-traumatic tibial malunion. The patient started with pain at the ankle approximately 10 years after the accident. A supramalleolar osteotomy (SMO) was offered to the patient to correct the deformity. It was performed with internal and external fixation achieving an aligned extremity and a good clinical outcome.

1 Brief Clinical History

A healthy 31 year old female patient was involved in an MVA in 2002 with multiple fractures. Intramedullary (IM) rod was used to treat the tibial fracture on the left resulting in a distal tibia valgus malunion. Ten years later, the patient started with pain and discomfort with activity. She presented to the clinic complaining of left ankle and foot pain and deformity. At the physical examination, a significant left foot valgus and pronation was evident. On the leg X-rays, a middle third fibula absence could be seen.

2 Preoperative Clinical Photos and Radiographs

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

3 Preoperative Problem List

Distal tibia/ankle valgus deformity
Extensive leg scar tissue
Shortened fibula (absence of middle third)

P. Wagner (✉) • L. Thornberry • J.E. Herzenberg
Rubin Institute for Advanced Orthopedics, International Center for
Limb Lengthening and Reconstruction, Sinai Hospital of Baltimore,
Baltimore, MD, USA
e-mail: pwagnerh1@gmail.com; laurendpm@gmail.com;
jherzenberg@lifebridgehealth.org; frsc@aol.com



Fig. 5 AP ankle: shows the center of the dome osteotomy at the apex. Place a pin or wire at this site

Fig. 6 (a and b) AP ankle: perform drill holes using a plate that rotates around the apex



4 Treatment Strategy

SMO (dome osteotomy) to correct valgus deformity of distal tibia

Internal fixation (crossing screws)

External fixation augmentation in case of insufficient stability of the internal fixation

5 Basic Principles

To perform a dome osteotomy, the center of the dome has to be located at the apex of the deformity. In case the deformity is intrarticular, locate the apex of the dome in the subchondral plate.

A fibula osteotomy has to be performed to allow for adequate rotation of the bone segment.

6 Images During Treatment

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



Fig. 7 AP ankle: drill holes can be seen in a dome shape



Fig. 8 Crossing screws through the osteotomy site

Fig. 9 (a and b) Unstable osteotomy in the sagittal view. Compare both images

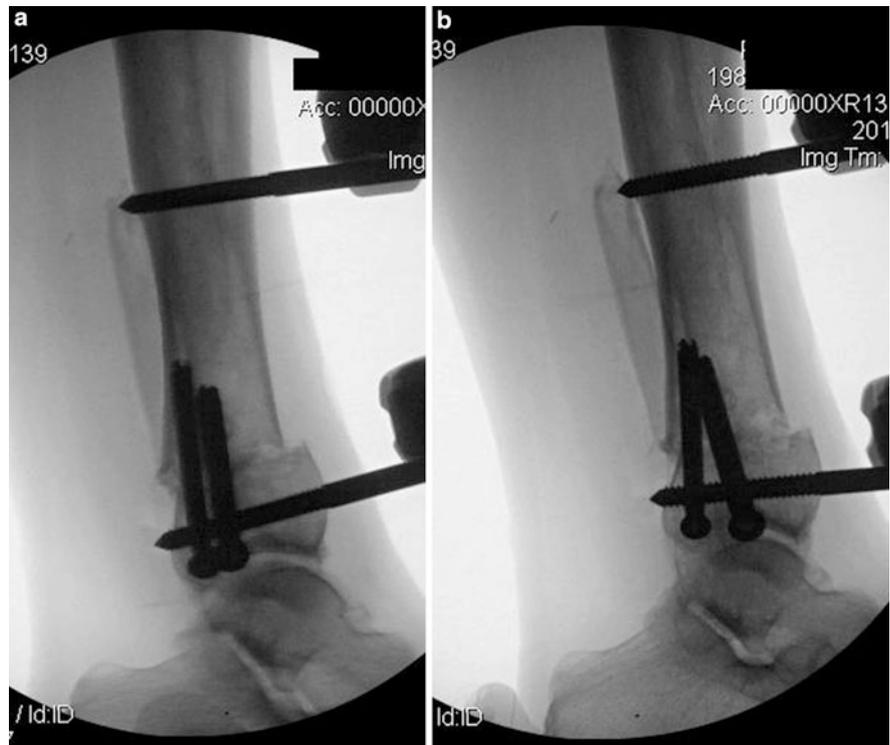




Fig. 10 Lateral ankle: healed osteotomy



Fig. 12 AP ankle: healed osteotomy after ex fix removal



Fig. 11 AP ankle: healed osteotomy



Fig. 13 Lateral ankle: healed osteotomy after ex fix removal

7 Technical Pearls

When performing the dome osteotomy, make sure that the lateral and medial cortices are drilled too. A mediolateral drill hole can be added.

To mobilize the distal tibial segment, a Hintermann retractor can be of help.

Fixation methods can be crossing screws, plates, or a hybrid construct (this case) with internal and external fixation.

8 Outcome Clinical Photos and Radiographs

See Figs. 12 and 13.

9 Avoiding and Managing Problems

If after the placement of the crossed screws the osteotomy is found to be unstable, there are a couple of options. Adding an external fixator in the plane of instability until bone healing is the option that was chosen in this case. This is preferred in cases of very osteoporotic bone. To add more internal fixation is another solution, such as more screws or

plates. In case plates are the method of choice, locking plates should be used given their higher stability to avoid lose of correction.

10 Cross-References

- ▶ [Case 52: Ankle Distraction and Supramalleolar Osteotomy for Arthrosis and Deformity](#)
- ▶ [Case 53: Supramalleolar Osteotomy with Ankle Distraction](#)

References and Suggested Reading

- Becker AS, Myerson MS (2009) The indications and technique of supramalleolar osteotomy. *Foot Ankle Clin* 14:549–561
- Knupp M, Stufkens SA, Bolliger L, Barg A, Hintermann B (2011) Classification and treatment of supramalleolar deformities. *Foot Ankle Int* 32:1023–1031
- Maquet P (1976) Valgus osteotomy for osteoarthritis of the knee. *Clin Orthop Relat Res* 120:143–148
- Paley D (2002) Malalignment and malorientation in the frontal plane, chapter 2. In: Paley D (ed) *Principles of deformity correction*. Springer, Berlin/New York, pp 23–27. Corr 3rd printing 2005
- Wagner P, Colin F, Hintermann B (2014) Distal tibia dome osteotomy. *Tech Foot Ankle* 13:103–107