



“Maverick”
Surgeon: Gayle Jaeger
Antebrachial Deformity PSI Instructions

General Information:

- Please ensure that you have all bone models and PSI. Your package should contain the following:
 - Left antebrachium - native bone x2
 - Left antebrachium - virtual realignment v1 x1
 - Left antebrachium - virtual realignment v2 x1
 - Osteotomy guide - x2
 - Reduction guide v1- x2
 - Reduction guide v2- x2
- All parts may be sterilized using standard steam autoclave or ethylene oxide gas sterilization methods for use in surgery with the exception of the caps located on the pins used to secure the guides to demonstrate positions on the models.
- Familiarizing yourself with the models and guides is highly recommended. We advise applying the cutting guide to the printed left radius and gently translating it to get a feel for how it should sit on the bone surface - this assessment can be challenging intraoperatively due to the presence of soft tissues if not done on the printed models first.
 - Application Recommendation: The guide is applied over the craniomedial aspect of the radius. Partial tenotomy of the pronator muscle may be necessary proximally. Then the guide is slid distal until the distal drill guide is seated against the proximal aspect of the metaphysis at the styloid process. A gentle lateral roll will lock the guide in place. Secure the guide using a 5/64” pin in one of the posts. While there is no strict order in which to do this, we tend to start at one of the extremities to ensure centering.
- If you choose to use a set of bone models and PSI for a dry rehearsal. Do not cut the guides during rehearsal, as they can serve as back-up parts during surgery.

Surgical Protocol:

1. Approaches:
 - a. A routine cranio-medial approach should be made to the entire radius, from proximal to distal metaphysis. The extensor retinaculum will need to be opened distally to retract the ECR and CDE tendons.

- b. Ensure that the approach extends sufficiently to allow full seating of the guide without interference. Using baby Hohman retractors may be useful to retract extensor tendons and muscles laterally during this part of the procedure.
2. Securing the Osteotomy Guide:
 - a. Apply the osteotomy guide over the cranio-medial surface of the bone and secure using four 5/64" pins in the drill guide tunnels.
 - b. Note that pre-drilling with a 1.8 mm drill bit is recommended if the cortical density is such that pin advancement generates too much heat. This step will also reduce the risk of the pin 'walking' off the medial ridge of the radius.
 - c. Verify that the guide is in full contact with the bone, including at the osteotomy site.
3. Ulnar Osteotomy/Ostectomy:
 - a. A secondary caudal approach to the ulna is made to create an osteotomy at a similar level than the planned radius osteotomy. In Maverick's case, we would recommend avoiding the site of the previous ostectomy, as fibrous tissue will inhibit motion.
 - b. Commonly, we will perform a simple transverse cut using a saw blade. Alternatively, a partial segmental osteotomy is made with morcelization of the mid-segment over a few mm. This option allows you to minimize the risk of interference of the ulnar osteotomy edges during radius reduction and may be necessary in cases with large corrections.
 - c. Close this approach as it is no longer needed for the rest of the procedure.
4. Radius Ostectomy:
 - a. The guide is designed to create a cranio-medial closing wedge segmental ostectomy.
 - b. Start both the proximal and distal osteotomies by scoring the surface with a sagittal saw blade. Ensure that the blade is in contact with the osteotomy shelf. A short, wide blade is beneficial initially to reduce bending of the blade. A longer blade may be required to complete the osteotomy.
 - c. Any cancellous bone present in the resultant ostectomized bone may be morselized and reserved for bone graft.
5. Radius Reduction:
 - a. Remove the divergent pins (pin numbers 1 and 4)
 - b. Remove the osteotomy guide.
 - i. Stabilize the parallel pins (pin numbers 2, and 3) with a needle driver to avoid inadvertent pin removal
 - ii. Alternatively, the parallel pins may be advanced further laterally
 - c. Manually reduce the radius and thread the reduction guide over the parallel pins
 - d. Visually ensure good bone contact with the footprint of the reduction guide. Bone reduction forceps may be placed across the bone and guide to aid in firm guide placement. Do not overtighten as this could break the reduction guide.
 - e. Replace the convergent pins
 - f. Confirm the step configuration of the reduced bone and alignment resembles the printed virtually corrected radius.

- g. If soft tissue tension/laxity or limb alignment is suboptimal, you may use the 2nd version of the reduction guide that provides alignment of the elbow and antebrachio-carpal joint. Please note that pins 2 and 3 will not be parallel if using this guide and temporary removal of one pin will be necessary to fully seat the reduction guide.
6. Radius Stabilization and Staged Guide Disassembly:
 - a. A contoured plate is now applied over the cranial radius. We recommend precontouring on the virtual planning model fitted with the drill guide prior to surgery to ensure clearance from the guide and minimize surgical time.
 - b. Apply self-tapping non-locking screws on either side of the osteotomy in compression.
 - c. Apply remaining locking screws starting with the extremities of the construct
 - d. Apply additional screws based on your preference to achieve satisfactory construct stability.
 - e. Removal of all pins and reduction guide.