Surgical Technique Guide
Introduction

The Sonoma WRx® wrist fixation device is the latest in minimally invasive technology for distal radius fracture fixation. The device is ideal for extraarticular and simple, minimally displaced intraarticular fracture patterns that are not stable with closed reduction alone or for which prolonged immobilization is not desirable to the patient.

This minimally invasive, intramedullary approach to distal radius fracture fixation provides for fracture stability and early range of motion without risking hardware irritation of surrounding structures.

1 Curved Hub Design with WAVIBODY Technology
5mm or 6mm options use flexible WAVIBODY® Technology to conform to patient’s unique anatomy.

2 Intramedullary Fixation
Proximal and distal ACTIVLOC grippers engage bone upon implant activation to provide solid foundation for fracture fixation.

3 Locking Cortical Screws
2.7mm screws lock into implant providing a solid fixation of fragments and 3-dimensional subchondral support.
The Sonoma WRx® Outrigger is designed to optimize Proximal and Buttress Screw placement by allowing visualization of their trajectories using K-wires before activating the device grippers and finalizing the device’s position in the IM canal.

**K-wire Visualization**
The Outrigger Guide incorporates K-wires to visualize screw trajectories in AP fluoro views to optimize implant position.

**Provisional Fixation**
K-wires can be driven through provisional fixation holes, maintaining implant positioning and preventing countersinking when actuating the implant grippers.

**Parallax Elimination**
The Outrigger is designed to eliminate X-ray parallax and gauge the true position of the screws. When the Outrigger “Dot” is in the “Circle” in the AP fluoro view, the view will be straight down and the screw trajectory true.
STEP 1
Patient Positioning and Fracture Evaluation

The patient will be positioned supine on the operating table with the operative extremity on a stable arm board or table. General or regional anesthesia is used as appropriate for the patient. It is helpful to use fluoroscopy to characterize the fracture and perform a provisional closed reduction prior to sterile preparation of the extremity.

If the fracture is not acceptably aligned following closed reduction attempts, an open volar approach with volar locking plate fixation should be considered. Alternatively, it is possible to assist the closed reduction through the radial column approach used for insertion of the WRx® device.

Surgical Approach

Following closed reduction of the fracture, the wrist is positioned in neutral forearm rotation with a rolled towel beneath the ulnar border of the wrist to assist with ulnar deviation and stability of the wrist. – Figure 1

The first and second extensor compartments as well as the tip of the radial styloid are palpated. A 2-3cm incision is marked just dorsal to the first extensor compartment and centered on the tip of the radial styloid. – Figure 2
STEP 1
Patient Positioning and Fracture Evaluation (Cont.)

The extremity is exanguinated and a tourniquet is inflated. The incision is made through the skin only. – Figure 3

Careful dissection through the subcutaneous tissues is required to protect the invariably present superficial branch of the radial nerve. With the nerve protected, the first extensor compartment is identified and incised along the dorsal margin to expose the extensor pollicis brevis (EPB) and abductor pollicis longus (APL) tendons. – Figure 4

The EPB and APL tendons are retracted volarly to expose the radial styloid. – A and B in Figure 5
STEP 2  
Identify and Establish the Entry Point

Use a free 0.054” K-wire positioned dorsally over the wrist to establish the approximate orientation and position of the starting wire under fluoroscopic guidance. – Figure 6

The ideal placement of the starting guide wire will be approximately 5mm proximal to the radial styloid and parallel to the articular surfaces of the radioscapoid and radiolunate fossas. Once the general orientation is determined, the K-wire is positioned just dorsal to the EPB and APL tendons along the prominence of the radial styloid. The wire is then positioned and advanced in the previously determined position and orientation.

Fluoroscopy is then used in AP and lateral planes to confirm acceptable guide wire placement. The cannulated 3.5mm step drill is then advanced over the guide wire to create a cortical path for the starting awl. The guide wire is then removed. – Figure 7
STEP 3
Preparing the Intramedullary Canal

With the fracture held reduced, the S-shaped starting awl is passed through the prepared entry site into the intramedullary canal. — Figure 8

Care must be taken to ensure the awl is held in appropriate alignment with respect to the long axis of the radius in all planes. The awl is initially inserted in a vertical orientation and then redirected and advanced with a gentle back and forth rotational motion.

With each small advancement of the awl, the handle should be pivoted toward the thumb to ensure the tip of the awl remains within the intramedullary canal. It is advisable to check the position of the awl periodically with fluoroscopy to ensure that the awl continues to advance in an acceptable position within the intramedullary canal and is not protruding through cortical bone. — Figure 9
STEP 3
Preparing the Intramedullary Canal (Cont.)

The awl is then removed, and the 5.5mm S-shaped reamer is advanced across the reduced fracture in a similar fashion to the starter awl. — Figure 10

If there is little resistance with passage of the 5.5mm reamer, the 7.0mm reamer is used to prepare for insertion of the large diameter WRx™ implant.

The cannulated power reamer sheath is then inserted into the canal with the flexible portion retracted. — Figure 11

Fluoroscopy may be used to verify appropriate position of the sheath and reduction of the fracture. — Figure 12

The flexible reamer is then advanced to the mark indicated on the reamer shaft. The entire assembly is then removed from the canal.
STEP 4
Sonoma WRx Implant Insertion
The appropriate size WRx implant is attached to the combination insertion handle and Outrigger guide. The implant is then advanced across the reduced fracture and into the intramedullary canal. — Figure 13

Fluoroscopically determine the appropriate implant depth by locating the scalloped edge of the implant assembly. — Figure 14

This scalloped edge should be just below the cortex of the radial styloid. Appropriate depth of insertion will ensure that all fixation will remain within the cortical boundary of the radial styloid while achieving maximal fixation in the distal fragment.

K-wires are placed through the provisional buttress screw holes in the outrigger in order to assess buttress screw position. The k-wires should be positioned to run just proximal and parallel to the articular surface. To change buttress screw position, the implant depth will need to be adjusted and k-wire position reassessed. — Figure 14a
**STEP 5**

**Activation of the WRx® ActivLoc® Grippers**

With the fracture held reduced, the appropriate sized flexible actuation driver is inserted through the end of the implant. – Figure 15

The driver is then turned in a clockwise direction until the laser lines on the driver come into alignment. This occurs when the appropriate amount of torque has been generated between the implant and surrounding cortex. At this point, the flexible portion of the WRx® has become rigid and the ActivLoc® Grippers maintain secure rotation of the implant. Fluoroscopy should be used to ensure appropriate maintenance of reduction and position of the implant. – Figure 16

At this point, the insertion assembly is removed from the implant. Visual inspection should reveal the implant to be just beneath the cortex of the radial styloid. As a final verification of implant position, a K-wire is advanced through the distal buttress screw hole to ensure accurate targeting of the buttress screw in the distal fragment. This predrills the hole for the buttress screw. If the implant is improperly positioned, the flexible actuation driver may be used to release the ActivLoc® Grippers and allow the implant to be repositioned by repeating the insertion steps.

**Placement of the Proximal Locking Screws**

Insert the assembled drill guide into the outrigger #1 or #2 hole. Take care to mobilize soft tissue to ensure that the guide is in direct contact with bone. Use the calibrated 2.0mm drill to create a pilot hole into the radius. The drill should touch but not penetrate the far cortex. Select a screw that is 2mm shorter than the depth measured by the drill markings to allow for countersinking of the screw into cortical bone. Repeat the above steps for the remaining proximal screw. – Figure 17
STEP 6
Locking Screw Placement

Placement of the Distal Buttress Locking Screw

Insert the depth gauge through the buttress hole of the nail. – Figure 18

The depth gauge will follow the path created by the K-wire used to ensure appropriate targeting of the buttress screw. When the depth gauge probe encounters cortex along the ulnar border of the radius, measure the appropriate screw length.

As the buttress screw will recess into the nail, 4mm should be subtracted from the true depth gauge measurement to ensure appropriate screw length. The screw is advanced and locked into the implant. Buttress screw position is then examined fluoroscopically to ensure acceptable placement and length. The screw should be recessed in the implant and beneath the cortex of the radial styloid. – Figure 19
STEP 6
Locking Screw Placement (Cont.)
At this point, the fracture should be stable to gentle stress. Fluoroscopy may be used to assess stability of the distal fragment.
– Figure 20

STEP 7
Closure
The tourniquet is released and the wound is copiously irrigated. The first extensor compartment tendon sheath is not repaired. The subcutaneous layers and skin are closed with the surgeon’s preference of suture. Care should be taken to avoid injury to the superficial branch of the radial nerve during closure.
STEP 8
Post-Operative Management

The patient is placed in a fixed or removable volar wrist splint following the procedure. Immobilization may be discontinued and gentle range of motion started as soon as the soft tissues are amenable, typically 7-10 days. Strenuous activity is avoided until there is evidence of clinical or radiographic healing.

STEP 9
Implant Removal

Sonoma Orthopedic Products, Inc. recognizes that the reasons for removal are very diverse, as there are many factors for the physician to consider. Removal of such devices as the Sonoma WRx® Implant is generally not considered less than 12-16 weeks after surgery and only after radiographic healing can be verified.
Implant Specifications

Sonoma Orthopedic Products, Inc. has made these technique guidelines available for informational purposes only and to illustrate the physician authors’ suggested treatment for an uncomplicated procedure. Proper surgical procedures and techniques are the responsibility of the surgeon, who must evaluate the appropriateness of the procedures described, based upon his/her own personal medical training, experience and the needs of the individual patient. Prior to the use of the Sonoma Orthopedic Products system, the surgeon should refer to the product instruction for use (IFU) for complete indications, warnings, precautions and contra indications. Package inserts are also available by contacting Sonoma Orthopedic Products, Inc.

Implant Part Numbers

**Sonoma WRx® Implants**
- WRX-5470 WRx® 5mm x 70mm Implant
- WRX-6470 WRx® 6mm x 70mm Implant

**Bone Screws**
- SC2720 2.7mm x 20mm Self-Tapping Bone Screw
- SC2722 2.7mm x 22mm Self-Tapping Bone Screw
- SC2724 2.7mm x 24mm Self-Tapping Bone Screw
- SC2726 2.7mm x 26mm Self-Tapping Bone Screw
- SC2728 2.7mm x 28mm Self-Tapping Bone Screw
- SC2730 2.7mm x 30mm Self-Tapping Bone Screw
- SC2732 2.7mm x 32mm Self-Tapping Bone Screw
- SC2734 2.7mm x 34mm Self-Tapping Bone Screw