WIN Flexible Nail System

Surgical Technique
Indications and Contraindications

**WIN Nail System (Pediatric)**
WIN Nails are to be used for treatment of long-bone fractures including non-comminuted and comminuted mid-shaft fractures, subtrochanteric fractures, distal third fractures, combination fractures of the shaft and neck, intertrochanteric fractures, combination intertrochanteric and subtrochanteric fractures. Not for sale in Canada.

**CONTRAINDICATIONS**
1. Infection.
2. Patient conditions including blood supply limitations, and insufficient quantity or quality of bone.
3. Patients with mental or neurologic conditions who are unwilling or incapable of following postoperative care instructions.
4. Foreign body sensitivity. Where material sensitivity is suspected, testing is to be completed prior to implantation of the device.

This material represents the surgical technique utilized by David Weisman, M.D. Biomet does not practice medicine. The treating surgeon is responsible for determining the appropriate treatment, technique(s), and product(s) for each individual patient.
Implants

WIN Nail Coloring Scheme

4.5mm Nail - Silver

4.0mm Nail - Dark Blue

3.5mm Nail - Bronze

3.0mm Nail - Light Green

2.5mm Nail - Dark Magenta

2.0mm Nail - Gold

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Instrument Focus

Pre-Drilling Instruments

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<tr>
<td>Soft Tissue Guide</td>
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Low Profile Drill Guide 2.5mm / 3.0mm 466142
Low Profile Drill Guide 3.5mm / 4.0mm 466146
Instrument Focus

Nail Insertion

WINserter 466110

WINserter Spanning Wrench 466184

WINserter Spanning Wrench Further Tightening The WINserter

Nail Removal - Utilizing The Vice Grips

Needle Nose Vice Grips 466171
Slap Hammer 466173

Slap Hammer 466173
Slap Hammer Adapter 466175
WINserter 466110
Bending The Nail

WIN Nail Bender (2 in Tray) 430031

Fracture Reduction

Radiolucent F-Bar 466182

Malleting

Mallet 430030

Tamping To Specific Depths

Nail Tamp 0.0mm Offset 466186
Nail Tamp 1.5cm Offset 466188
Instrument Focus (Continued)

Cutting The Nail

WIN Nail Cutter  466114

Low Profile Nail Cutter  13180
Femoral Insertion

Step 1: Patient Preparation
Position the patient in a supine position on a radiolucent table or on a traction table using a traction boot (Figure 1 & 2).

Step 2: Skin Marking And Identification Of Insertion Site
A line is made on the skin directly over the physis (Figure 3) and a second line is drawn proximal directly over the insertion site (Figure 4), at the metaphyseal-diaphyseal junction. The third line connecting these two transverse lines is made directly over the medial and the lateral aspects of the distal femur (Figure 5).
Femoral Insertion (Continued)

Step 3: Incision
The incision is made to the level of the cortex. The incision is made in layers and the cortex identified (Figure 6).

Step 4: Opening The Insertion Site
A drill 0.5mm larger than the size of the intended WIN Nail is chosen. The drill guide is loaded in the soft tissue sleeve and the assembly is placed at the proposed insertion site and position is confirmed radiographically (Figure 7). The cortex is drilled and the drill angled to create an oblique entry (Figure 8).

Figure 6

Figure 7

Figure 8
Step 5: Contour The Nail
The tip of the nail (approximately 2cm long) can be bent to the appropriate amount of angulation desired using the bender or the drill sleeve. To aid in gaining access to the proximal fragment, the contoured face on the tip of the nail faces away from the direction of the bend (Figure 9).

The remainder of the nail is contoured using the bender to introduce a bow along the length of the nail. The bow height apex, measured from a perpendicular line created between the ends of the nail and the bow’s apex should be three times the diameter of the canal isthmus (Figure 10).

Step 6: Insert The Nail
After contouring, the nail is loaded into the inserter/remover. The tip of the nail is first directed to the central portion of the canal with the arc of the nail curving proximally towards the fracture site. The inserter is angled to allow the nail to follow the intramedullary canal (Figure 11 & 12).
**Step 7: Reducing The Fracture**

Once the nail reaches the fracture site, the fracture is reduced (Figure 13) using the F-Bar to aid the reduction, if required. Once the fracture fragments are aligned, the nail is passed across the fracture site (Figure 14). The bent tip of the nail should face laterally for the lateral nail insertion and medially for the medial nail insertion. The laterally inserted nail should abut the greater trochanteric physis when fully inserted. The medially inserted nail should be advanced to just above the lesser trochanter (Figure 15). If added stability is needed for a more proximal fracture, the greater trochanteric physis may be crossed.
Step 8: Placing The Second Nail

The second nail is inserted in a similar manner as the first. Be sure to use nails of the same diameter to avoid varus/valgus deformities as a result of unbalanced forces. As the nail begins distally and advances to the isthmus, the tip of the nail should be turned in an anterior or posterior direction to assure that the second nail does not spiral up the already placed first nail (Figures 16-19). Once the isthmus is passed, the tip of the nail should be turned back to a medial or lateral direction and pointed towards its final placement location (Figure 20).
**Step 9: Bending And Cutting The Nail**

There are two options for cutting the nail and positioning it for removal later. The technique utilized most frequently is to cut the nails down, leaving 1cm of nail exposed, and bent perpendicularly to the long axis, for easy removal and rotational stability. Another option is to leave the nail flush with the insertion hole angle, and utilize the cutter to leave 1cm remaining, again for removal purposes.

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**Figure 21**

**Figure 22**

**Figure 23**

**Figure 24**
Step 10:
Visualize the fracture again. If less than 5° of deflection from varus or valgus forces are noted on the stress views, then no casting is necessary. If more than 5° of deflection is noted then a single leg spica cast is applied.

Postoperative Care:
No physical therapy is required. The patient is instructed in weight bearing as tolerated but will not begin weight bearing until the patient regains their quad function. Therefore, they are instructed on quadriceps and straight leg raising exercises. Once they are able to straight leg raise they can bear weight on the extremity. It usually takes approximately four weeks.

Nail Removal:
Once the fracture has healed, nails can be removed. The removal usually occurs by four to six months post-insertion. The nails are grasped by the end of the inserter/remover, struck with a mallet and backed out. The slap hammer adapter may be used in conjunction with the inserter/remover. Vice Grip pliers can be used with or without the slap hammer.

Nail Removal - Utilizing the Vice Grips
Needle Nose Vice Grips 466171
Slap Hammer 466173

Nail Removal - Utilizing the WINserter
Slap Hammer 466173
Slap Hammer Adapter 466175
WINserter 466110
Technique Variations

Variations On The Femoral Technique
For Tibial Insertions

Step 2: Skin Marking And Identification Of Insertion Site
A proximal insertion site behind the tibial tubercle is used medially and laterally and guided by appropriate lateral insertion position.

Step 4: Opening The Insertion Site
Be sure that the point of the drill is not too anterior so that it stays out of the tibial tubercle physis. Also, due to the triangular nature of the proximal tibia, an insertion site which is too anterior will make passage of the nail difficult. In this case, the nail will need to be driven posterior before it will enter the canal. Therefore, an anterior starting point is to be avoided.

Pre Op Reduction

Post Op Reduction

12 Weeks Post Op
Variations On The Femoral Technique
For Forearm Insertions

Radial Insertion

Step 2: Skin Marking And Identification Of Insertion Site
A skin mark is made at the physis. A second mark is made at the insertion point metaphyseal / diaphyseal junction. The position of each mark is confirmed by fluoroscopy directly overlying the radial border.

Step 3: Incision
An incision is made connecting the two marks. Blunt dissection protects the soft tissues and the prominence of the distal radial metaphysis is visualized.

Step 6: Nail Insertion
The nail should be inserted just proximal to the Radial Styloid and directed towards it. This will allow the bow of the nail to recreate the natural bow of the radius.

Ulnar Insertion

Step 2: Skin Marking And Identification Of Insertion Site
A small stab wound is made over the olecranon and an entry hole is made through the olecranon cortex.

Step 5: Contour The Nail
No nail contouring is necessary.

Step 6: Insert The Nail
The nail is placed through the ulnar canal to the level of the fracture. The fracture is reduced, the nail inserted across the fracture site and brought to the distal ulna.
Technique Variations (Continued)

Surgeon Tip

**Issue To Consider With The Forearm -**
Which bone should be treated first?

It is preferable to do the radius first, because of the additional mobility afforded by not having a fixed ulna, it is easier to recreate the radial bow. It is often necessary to do an open reduction for one of the fractures. It is simpler to open reduce the ulna after the radius is treated since the ulna is subcutaneous. One advantage to doing the ulna first is that the radius can sometimes reduce once ulnar length is restored.

Pre Op Reduction

Post Op Reduction

Post Op Nails Removed. Full Healing Demonstrated
## Tray Layout

### Top Tray

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<thead>
<tr>
<th>Part #</th>
<th>Description</th>
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<tbody>
<tr>
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<td>466171</td>
<td>Needle Nose Vice Grips</td>
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<td>466118</td>
<td>Side Cutting Drill Bit, 2.5mm</td>
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Tray Layout (Continued)

Middle Tray

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<td><strong>WIN</strong> Nail Bender</td>
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<td>Nail Tamp - 1.5cm Offset</td>
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### Bottom Tray

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<td>Radiolucent F-Bar</td>
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