

FRACTURE MANAGEMENT

Surgical  
Technique

*Herbert Bone Screw*

Free-Hand Insertion



## Open Procedure with Free-Hand Guide

This technique should be used whenever the Alignment Guide cannot be applied. Indications include small proximal pole fractures of the scaphoid, as well as fixation of other intra-articular fractures, fixation of osteochondral fragments, and small joint fusions.

When using this technique, a Guide Wire should be used to maintain reduction and may be used to check the position of the x ray. The Free-Hand Guide and Insert Sleeve may be used both to direct the Guide Wire and also the accessory fixation wires parallel to the intended screw axis.

It is imperative that the two fragments are held firmly together during free-hand insertion of the screw. This can usually be achieved by applying manual pressure on the handle of the Guide, and/or using the bone holding forceps as the fracture reduction clamp.

## Surgical Procedure

### Step 1 — Apply Free-Hand Guide

(Figure 2-1) Following fracture reduction use the Free-Hand Guide to compress the bone fragments and align the instruments. The Insert Sleeve can be inserted into the Free-Hand Guide, a Guide Wire may then be passed through the Insert Sleeve to check the exact alignment. Remove the Insert Sleeve. The Free-Hand Depth Gauge is then used in conjunction with the Guide Wire to determine the proper screw length. Insert the Gauge over the primary Guide Wire and into the barrel of the Free-Hand Guide until the tip touches the surface of the bone (Figure 2-2). Then read the screw length directly

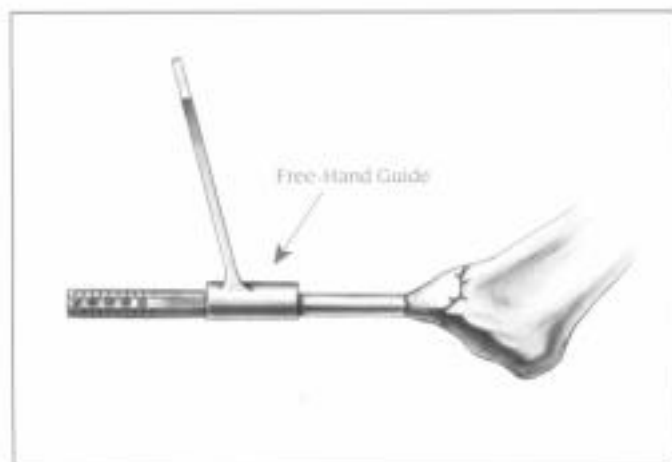


FIGURE 2-1 Apply manual pressure to firmly hold anatomic reduction of the fracture fragment

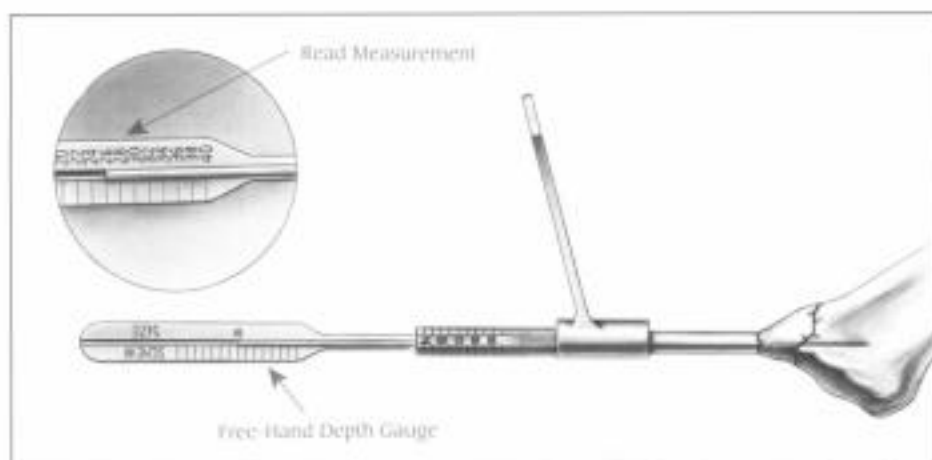


FIGURE 2-2 Optional measurement of the penetration depth of the K-wire (less 2 mm). This may be helpful when determining the drill depth or ultimate screw length

from the calibrations on the gauge (Figure 2-2 Inset). This reading is the longest possible screw that should be used. If a shorter screw can be chosen without having threads present across the fracture site, selection of the shorter screw will reduce the risk of penetration. For bicortical fixation instructions refer to the Technique Variations on page 34. The Guide Wire is then removed. It is imperative that only the wires included with the set are used to perform this procedure. These wires are sized appropriately for the Depth Gauges and the Free-Hand Guide Insert Sleeve.

## Step 2 — Temporary K-Wire Fixation

(Figure 2-3) Whenever possible, place a second (accessory) wire through one of the alignment holes located on either side of the Free-Hand Guide to further secure the bone fragments. This will prevent any displacement or fragment rotation during the procedure. Use of these guide holes will ensure that the K-wires are parallel. They can accept a stabilization K-wire up to 1.1mm in diameter.

## Step 3 — Drill the Pilot Hole

Insert the Pilot Drill into the barrel of the Free-Hand Guide. Turn the handle and advance the Drill until it bottoms out (Figure 2-4). This will remove a small amount of bone from the cortical surface and facilitate further instrumentation. If drilling into very dense cortical bone, use either the *Herbert 3.2mm Power Drill* or a 3.2mm *ECT Drill*.

## Step 4 — Drill the Main Hole

Insert the Main Drill into the Guide and advance it into the appropriate depth. Withdraw the Drill in a clockwise direction to maximize efficiency in cutting and chip removal. If the bone is hard, withdraw the Drill periodically to remove bone fragments. If a Guide Wire has not been used, the length of screw can be determined by reading directly off the calibrated scale the depth to which the Drill has been inserted (Figure 2-5).

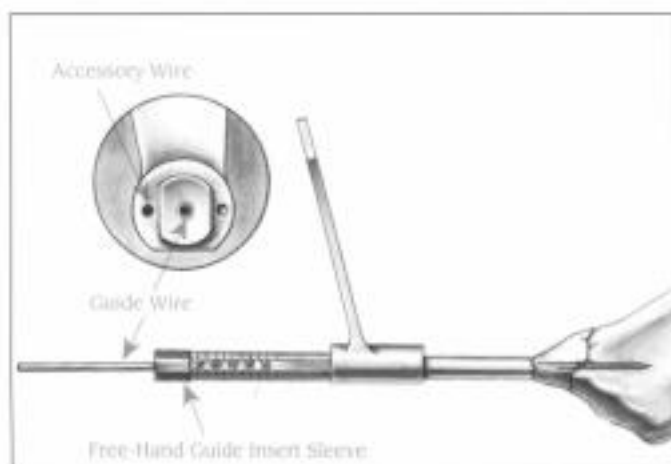


FIGURE 2-3 Optional use of accessory stabilization wires. The Free-Hand Insert Sleeve may be used to insert a central K-wire and verify correct alignment of the Guide with image intensification or x ray evaluation.

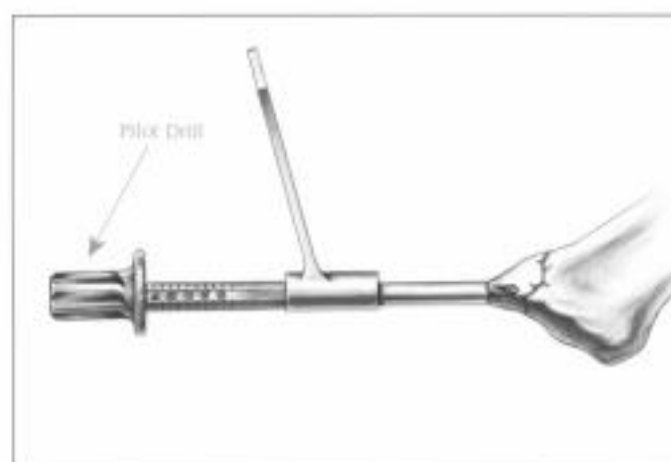


FIGURE 2-4 Drill the proximal cortex for the trailing threads with the Pilot Drill

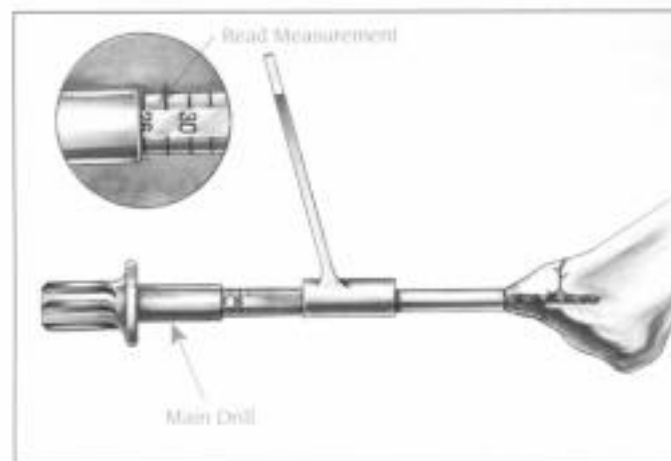


FIGURE 2-5 Drill the main hole for the core diameter of the leading threads and the shaft

## Step 5 — Tap

Tap the leading screw threads. Insert the Tap using a clockwise turning movement until the appropriate depth is read on the calibrated barrel (Figure 2-6). Remove the Tap by turning in a counter-clockwise direction. It is essential that the Tap be inserted to the full drill depth, otherwise the compressive action of the screw may be lost.

## Step 6 — Insert Screw

Select the appropriate length screw and lift it out of the sterilization rack with the Screwdriver. Check the length of the screw against the calibrated scale adjacent to the screw rack. (Packaged bone screws are presterilized.)

Insert the screw and Screwdriver through the Free-Hand Guide, turning the Screwdriver clockwise (Figure 2-7). As the trailing thread enters the bone, increased resistance will be felt and further reduction at the fracture site will be visible. Remove the Free-Hand Guide.

To apply additional reduction and/or compression at the fracture site, or to completely bury the screw head, rotate the screw one or more revolutions with the Screwdriver.

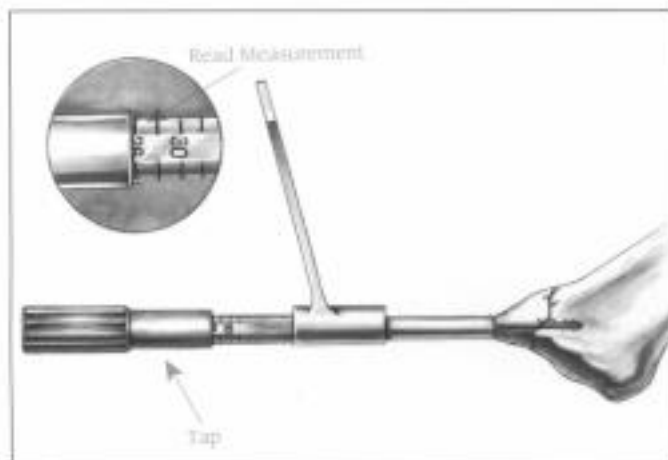


FIGURE 2-6 Tap the full depth of the main drill hole for the leading thread form.

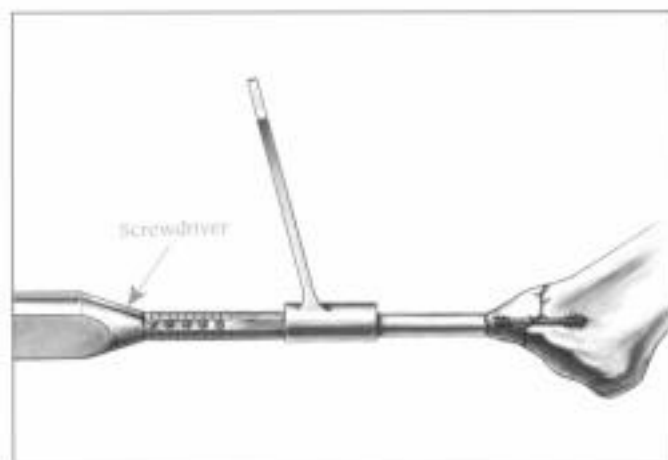


FIGURE 2-7 Implant the Herbert Bone Screw into the distal radius through the Free-Hand Guide.



**zimmer**