BFX® Lateral Bolt System Surgical Technique
**Surgical Technique - Pictorial Summary**

1. Bolt Alignment Drill (Page 4)
2. Trial Head & 0.062” K-wire (Page 4)
3. Cannulated Drill Bit (Power) (Page 5)
4. Awl (by hand) (Page 5)
5. Bolt Gauge (Page 6)
6. Bolt Insertion w/ Hex (Page 6)
Usage

The stem is placed using the standard BFX technique and seated to its desired location with optimal hip reduction.

Placement of the lateral bolt occurs as a final step in stem fixation once press fit is achieved. The lateral bolt should not be used to stabilize a stem that is not properly press fit.

Clinical Indications

The lateral bolt is used to increase the stability of BFX stems against subsidence and rotation while early implant stabilization and bone ingrowth is occurring. *The lateral bolt will not guarantee against stem implant position changes in cases where press fit has not been achieved, or in cases with poor bone quality, such as thin cortices or where insufficient medullary bone resistance to broaching is encountered.*

Patients to Consider For Use of a Lateral Bolt

- Cases with stove-pipe femoral morphology
- Cases involving heavier patient body weights (>40kg)
- Cases where calcar bone is absent and use of a collared BFX stem is not possible but additional immediate stem stability is desired
- Cases where there may be an increased risk or concern for stem position changes postoperatively despite perceiving adequate press fit conditions during femoral broaching
Pre-operative Radiographic Planning

1. Standard VD Pelvis
2. Standard Lateral Pelvis
3. A. PA femur: 15-20 degrees internal rotation at stifle joint (to account for anteversion of the stem), horizontal femur, calibration ball or marker at the level of the hip. (Figure 1.1 and 1.2)

OR

B. Standard Craniocaudal horizontal beam of femur. Patella central, horizontal femur, calibration ball or marker at the level of the hip.

Pre-operative Determination of Bolt Length

Template for an appropriate sized standard BFX stem. Along the centerline of the stem neck, measure the distance from the lateral side of the femoral stem template to the periosteal surface of the lateral cortex (Figure 2.1). Add 2mm to this measurement to estimate bolt length. The additional two millimeters will account for the portion of the bolt that should extend beyond the lateral cortex. Keep in mind that this is just an approximation. Final stem position in the femur may vary and will define the necessary bolt length. Accurate templating is also very important.

NOTE: The length of the bolt (ie: 8mm, 10mm, 12mm etc.) does not refer to the actual length of the bolt. This dimension refers to the distance that the bolt extends out of the lateral aspect of the stem. The stem and bolt pictured to the bottom right is an example of a 14mm bolt (Figure 2.2).
BFX Stem - Lateral Bolt Technique

Equipment Needed:
- Lateral Bolt instrument set
- Double action pin cutter
- #2 curette

Follow the Universal Hip surgical protocol for implanting a BFX stem. Trial reduce the hip to ensure that the stem is exactly at the level you desire before preparing to place the lateral bolt. Note that lateral bolt stem sizes 10, 11, and 12 have a shorter neck length than the standard BFX stem. They are the same neck length as the BFX collared stems. Disarticulate the hip once you are ready to prepare for bolt placement.

1. With the femur externally rotated, drill through the pilot hole in the implant neck with the bolt alignment drill and out of the lateral cortex (Figure 4.1). Use light pressure to initiate a hole in the endosteal surface, then increase pressure to advance the drill through the cortex. Use pulsatile drilling if necessary.

2. Remove the drill and replace with a 1/16” diameter (0.062) k-wire that protrudes out the lateral cortex by approximately 2cm (Figure 4.2). Protect the soft tissues with an army-navy retractor. Cut the k-wire at the end of the neck and place the trial head onto the neck to protect soft tissues (Figure 4.3). While protecting the lateral soft tissues with the army-navy, internally rotate the femur to expose the k-wire and lateral cortex. You can reduce the hip to make internal rotation easier if necessary. Make sure that the lateral cortex is exposed and tissue and/or musculature is not deflecting the k-wire.
3. With a power drill, direct the cannulated drill bit over the k-wire to open the lateral cortex while being careful not to drill down to the implant (Figure 5).

4. After the drill has gone through the cortex proceed to remove the remainder of the bone down to the level of the lateral aspect of the implant, by hand, with the awl.

At this point, check that your lateral hole is concentric with your implant (Figure 6.1). If your hole is eccentric (Figure 6.2), and you proceed to finish the preparation in a misaligned condition, you may come across several difficulties. The misalignment may lead to the pilot of the bolt breaking or you may roll the lead thread of the bolt. If this happens you will not be able to engage the bolt into the stem. If you find your hole to be eccentric, remove the k-wire and open the hole up in the direction the drill was biased towards (Figure 6.3). Place the k-wire back to confirm alignment of the hole to the stem (Figure 6.4).
5. Flush the hole in the lateral cortex and implant to remove any bone debris (Figure 7.1). A #2 curette may be used to remove debris (Figure 7.2).

6. Use the bolt gauge for an intraoperative determination of bolt length. Insert the bolt gauge into the lateral cortex and into the stem. The bolt gauge will bottom out inside the stem before it reaches the threads. Push the sleeve until it touches the periosteal surface of the lateral cortex and note the depth on the bolt gauge to determine the appropriate size bolt (Figure 8). If the bolt gauge does not bottom out on the stem you will get a shorter reading than the bolt should be. This is also a good indication that the hole in the lateral cortex is not aligned with the stem or that the hole has not been cleared of all debris. Knowing the pre-operative bolt length estimation will assist in this step.

7. Insert the bolt through the lateral cortex and into the implant (Figure 9). Push the bolt into the implant before beginning to engage. Tighten in the same manner as a cortical bone screw with the appropriate hex size (see below). This step should not require force or tapping of the bolt to engage the threads. If the bolt does not engage initially, check to ensure the hole is clear of debris and that the hole is properly aligned by checking the concentricity with a k-wire. The bolt should protrude 2-4mm beyond the lateral cortex. The bolt will come to a definitive stop when it is completely tight. If the bolt continues to spin, remove the bolt and inspect the threads for damage.

**Bolts for stem sizes 5-6 use a 2mm Hex**
**Bolts for stem sizes 7-12 use a 2.5mm Hex**
Bolt will not go in or will not stop turning

Check bolt - are the threads damaged?

- no
- yes → Get a new bolt

Place k-wire into stem and out the lateral cortex.
Is it concentric with the hole?

- no
- yes

Open the hole so that the k-wire is centered and re-measure bolt length with bolt gauge.

Make sure that the path into the stem is clear. Use a #2 curette and a flush to remove debris. Take the bolt gauge without the sleeve and be certain that you can insert it into the stem.

Re-measure bolt length

Attempt to insert bolt

TIPS

- Make sure that the drill bits are sharp
- Do not bend the bolt when inserting it into the stem
- Place the bolt gently into the stem, force is not necessary
- The bolt should always protrude out of the lateral cortex. If the bolt starts to seat inside of the hole before it is tight, remove the bolt and re-measure. If the bolt gauge gets caught up on bone or does not seat fully into the stem, the measurement will be shorter than what is needed. If the bolt seats inside of the hole and will not back out, unthread the bolt and push it out using a 0.062” k-wire down the neck of the stem.