Complications are rare if the technical aspects of a total hip replacement procedure are perfectly executed and there is compliance during postoperative care. The following is an accumulation of useful technique details identified while performing the first 225 consecutive titanium EBM collared femoral stems by the same surgeon.

1. Subsidence of the BFX collarless femoral stem can occur in dogs receiving a THR. Some breeds, such as the German Shepherd, have a low femoral Canal Flare Index (CFI) of ≤1.8 that is indicative of a “stove pipe geometry”. This geometry with THRs has been recognized as a higher risk for stem subsidence in a cementless application.¹ An option used in the past to prevent subsidence in these cases is to use a hybrid THR with a BFX cup and a cemented femoral stem.²

2. The instrumentation and basic surgical technique for the BFX collarless and the BFX collared femoral stem are basically the same.³
3. The outer geometry of the Collared Stem is the same the collarless stem with exception of the medial collar.

4. Do not automatically assume that just because you have implanted the BFX collarless stem many times that there is not another learning curve for implantation of the Collared Stem. The learning curve, however, is short for the surgeon with BFX cementless stem implantation experience.

5. “Press fit” technique is the basic principle to follow. The presence of a collar does not mean the surgeon can be less attentive during implant size selection, femoral canal bed preparation, and stem implantation. Some minor technique differences do exist.
6. A femoral stem will have osteointegration, or bone in-growth and on-growth, regardless of the type of stem used if the stem is stable at the time of implantation and the stem remains stable during the first 6-8 weeks after implantation.

7. Conversely, a stem will not have osteointegration, regardless of the type of stem used, if it is not stable at the time of implantation, or if it becomes unstable during the first 6 weeks +/- after implantation.

8. A stem is at greater risk of inadequate osteointegration and remaining aseptically loose if:
   A. It is implanted in soft cancellous bone and does not have a good secure press fit at the end of impaction.
   B. The bed preparation is over-broached.
   C. The bed preparation has excessive cancellous bone remaining due to stem under-sizing.
   This is not exclusive to the EBM stem - it applies to any cementless stem.
Stem subsidence would likely occur if a stem would be implanted at this broaching stage.

9. 85% canal fill is not easy to measure without proper software, and it is only one parameter to assess sizing and technique. The important paradigm shift is from “fill” to “fit”.

10. The coefficient of friction (CF) for the EBM Ti stem is about double (1.93x) that of the coefficient of friction of a beaded stem.

11. While inserting the stem, evaluate the “pre-drive distance” by carefully ”manipulating” it into the bed preparation. In most cases, the stem can be removed by hand when there is a long pre-drive distance and additional broaching is needed. However, the stem can become “stuck” in the bed preparation if it is pressed into place too firmly due to the high coefficient of friction of the porous surface. In this case, a stem extractor is needed to remove the stem. A stem extractor should be available at all times for this purpose, but preferably the surgeon does not have to resort to stem extractor usage. Warning: Routine use of the stem extractor can create post-manufacture defects on the trunion that potentially increase the risk of corrosion.

12. The pre-drive distance for the EBM Ti collared stems is generally 4–4.5 mm. This distance may vary slightly among surgeons depending on the surgical technique preferences used in the preparation of the femoral canal, the density and firmness of the cancellous bone, and if there is final broaching on endosteum or cortical bone contact.

13. EBM Ti collared stems “drive” on average ~3.2 mm. This may vary slightly among surgeons’, slightly varied techniques, and depth of pre-drive stem manipulation into the bed preparation. Each surgeon should use a caliper during their learning curve to measure the pre-drive distance, the drive, and the “collar-bone gap” remaining to establish accuracy and precision for future cases.

14. It is desirable if there is a collar-bone gap of 0.5 – 1.5 mm between collar and calcar cortical bone at the osteotomy line at the moment when secure “press fit” is achieved. Stop stem impaction when “press fit” is achieved even if a small collar-bone gap exists. Do not continue impaction just to close the gap and risk creating a fissure – or fracture – in doing so.

15. Like all press-fit BFX femoral stems, the EBM Ti Collared stems will “settle” 0 – 2 mm in their bed preparation with loading when ambulation begins. Some amount of settle occurs in ~80% of the implanted stems. Settling is desirable for an ultimately more secure press-fit fixation, greater stability, and improved load to failure of the femur according to human literature reports.
The pre-drive distance was 4.5 mm with a 2.5 mm drive in this case (left). The 2.0 mm gap is closed (settle) in 5 weeks with stable osteointegration (right).

16. A collar-bone gap at impaction termination is preferably 0.5 – 1.5 mm, and not greater than 3 mm. If the gap is wide, impaction began with a pre-drive distance that was too long. Excessive gaps increase the cantilever effect of the stem on the medial cortex at and below the calcar. This could potentially increase the risk of fracture of the calcar. A full cerclage wire placed just distal to the osteotomy line can be used if calcar fissure / fracture risk is perceived.

17. The collar’s function is to provide resistance to subsidence. The collar is positioned on the BFX stem just proximal to the most proximal aspect of the porosity of the collarless stem. The collar will resist subsidence – but the collar is not a substitute for good technique.

18. The collar should rest over calcar cortical bone at the neck resection. The width of the cancellous bone between the calcar cortical endosteum and the implant just distal to the collar should not be wider than the collar itself, i.e. the entire collar preferably does not rest entirely over cancellous bone. If the collar is resting entirely on cancellous bone, the possibility exists that the collar could subside a short distance (less than 1 mm) into cancellous bone. This is particularly true if the cancellous bone is soft and spongy. If the collar is resting completely on cancellous bone, consider whether or not the stem should be 1 size larger.

19. The EBM porous surface creates greater resistance to impaction if it contacts cortical bone along the endosteum compared to cancellous bone. This will decrease the distance the stem will drive.

20. Cortical bone in the caudal aspect of the proximal bed preparation may be encountered around the perimeter and depth of the trochanteric fossa. A small ridge of cortical bone can be leveled with a rasp. Warning: Broaches will not remove cortical bone.

21. Cortical bone (or sclerotic bone) is difficult to remove safely with a broach. Sclerotic bone, like cortical bone, will decrease the distance the stem will drive and settle.
22. A rasp can be used carefully to level areas of cortical bone that increase the pre-drive distance and/or prevent stem seating. Do not use of the rasp excessively, but also do not risk fissure or fracture during stem seating.

23. This stem can be used when the CFI is high and the medullary canal is tapered even though the EBM Ti collared stem was originally custom made for implantation in dogs with a low canal flare index (CFI) of ≤1.8.

Canal Flare Index = 2.6

Intracortical width (a) at lesser trochanter / Intracortical width (b) at isthmus


