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Poster
JISRF Joint Implant Surgery & Research Foundation

Short Stems in Total Hip Arthroplasty

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Over the past 10 years, the orthopaedic community has witnessed an increased interest in more conservative surgical techniques for hip arthroplasty. During this time, second-generation hip resurfacing and minimally invasive surgery (MIS) enjoyed extensive marketing attention. After a decade of this renewed interest, both of these methods for THA have met with serious concerns. As hip resurfacing numbers decline, both patients and surgeons are looking for other potentially successful conservative treatments to THA. This search has recently focused surgeon interest toward short-stem designs.

Fig. 1. Direct Anterior Approach

Fig. 2. A Variety of Short Stems are Available

Potential Advantages of Short Stems

Short stems offer numerous advantages. First, with some short stem designs, a majority of the femoral neck is preserved. Surgically, this requires less surgical dissection and mitigates soft tissue and bone damage. Ultimately, preservation of the femoral neck provides a more natural barrier to migration of particulate debris, is associated with less blood loss and less time and energy to rehabilitate the hip, reduces stress shielding of the proximal femur (i.e., load redistribution and subsequent loss of proximal femoral bone mass), and reduces end-of-stem thigh pain. In consideration of all these aforementioned advantages, the use of a short stem can make patient rehabilitation faster and less painful. Because of its smaller size, the short stem is easier to insert, and this facilitates a more minimally invasive surgical approach. The novel design feature inherent in short-stem implants—namely, preservation of proximal native bone and tissue—theoretically affords easier revision surgery if or when it becomes necessary. For these reasons, short-stem procedures also have broader indications compared with hip resurfacing. Finally, many short stem designs do not require many stem sizes. This translates to simplified instrumentation and reductions in requisite surgical inventory (e.g., instruments and implants). This can provide a significant net savings to health care facilities.

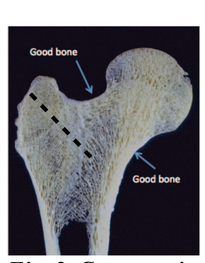


Fig. 3. Cross section of proximal femur showing neck resection line (5-8 mm sub cap)

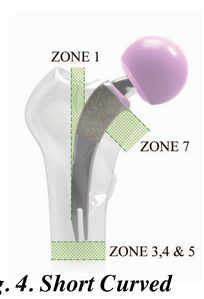
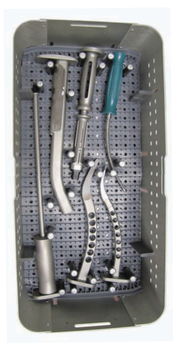


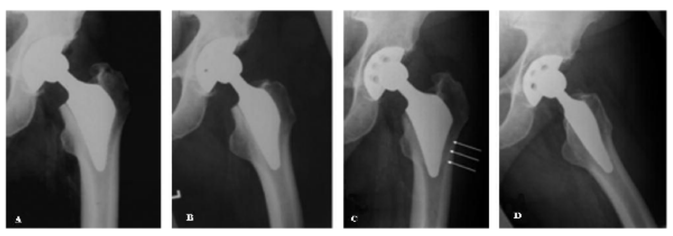
Fig. 4. Short Curved Neck Preserving Style Stem

Fig. 5. Five Stem Sizes requiring less instruments and implant inventory.
ARC™ Stem, OMNI Life Science, East Tauton, MA



The international experience precedes that of the United States (U.S.) by at least a decade. The initial response in the U.S. market was simply to modify certain current standard cementless stems by truncating the diaphyseal portion of the stem. Short and mid-term follow up studies of a number of these stems suggest that stable, durable fixation and excellent clinical outcomes can be achieved. Today, a variety of short-stem implants are available with very little clarification of design rationale, fixation features, surgical technique, and clinical outcomes. Virtually every major implant company now offers a "short stem," and now there are a plethora of different designs. It is important to note, however, that not all short stems achieve initial fixation at the same bone interface region. Furthermore, surgical techniques vary greatly, and postoperative radiographic interpretation of short stem position and fixation need to be carefully scrutinized. Lastly, the surgeon who is new to short stem technology is often unaware of the surgical preparation difference for a short metaphyseal-style stem versus a neck-persevering style stem.

Fig. 6. Examples of truncated stems. Zone 3. A & B. Metaphyseal Style Stems



Figs. 7. Zone 2 B / Post-op of Proxima Stem (Lateral engaging)

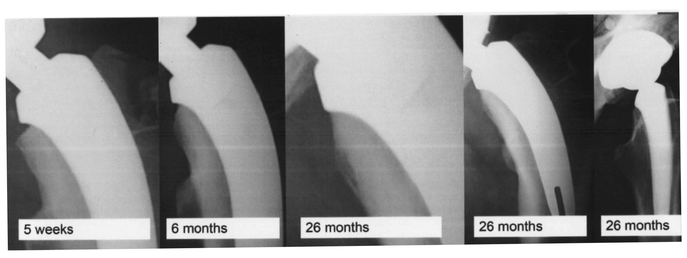


Fig. 8. Zone 2 A / Post-op Short Curved Neck Preserving Stem demonstrating increased bone density along medial calcar.
Adrian van der Rijt

JISRF Stem Classification System

The Joint Implant Surgery and Research Foundation (JISRF) has developed and advocated a stem classification system by primary stabilization contact regions to help identify, differentiate, and catalog stems for total hip replacements.

Fig. 9. Stabilized Zones

Zones

1. Head Stabilized
A. Hip Resurfacing
B. Mid-Head Stem

2. Neck Stabilized
A. Short Curved Stems
B. Short Lateral Engaging Stem
C. Neck Plugs or Neck Only

3. Metaphyseal Stabilized
A. Taper Stems
B. Bulky/Fit and Fill Stems

4. Conventional Metaphyseal/Diaphyseal Stabilized

It is of interest to note most European experience with short stems is in the area of neck preserving styles compared to the United States that prefers metaphyseal style stems.

Fig. 10. Examples of Short neck Stabilized Stem Styles 2.A Short Curved & 2. C. Neck Plugs

Our surgeon co-authors have extensive experience with both short curved neck stabilized and metaphyseal stabilized stems. All results with both styles have been rewarding.

The short curved neck stabilized stems have demonstrated excellent clinical results with over 98.6% survivorship (USA). For a first generation new design concept with new developmental instrumentation has provided a safe, effective and reliable construct for our younger more active patients. Improved bone remodeling has been impressive. Retaining the femoral neck has significant mechanical advantages in reducing both axial and torsional loads. Note: We have had two pseudo tumors (since 2007 AU /2010 USA) one in Australia and one in the United States both had MoM bearings. There is a short learning curve but definitive.
We are encouraged and continue to use and evaluate these devices.

Fig. 11. Post-op Zone 2 A. Short Curved Neck Stabilized Stem

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