DePuy Synthes
PART OF THE Johnson & Johnson FAMILY OF COMPANIES

ACTIS™ TOTAL HIP SYSTEM: SURGICAL TIPS AND PEARLS

William G. Hamilton, MD | *Anderson Orthopaedic Clinic*

The ACTIS™ Total Hip System (DePuy Synthes, Warsaw, IN.) was conceived to provide a femoral system specifically designed to optimize today's tissue sparing approaches while providing stability under the high-demand conditions created by early patient function. By leveraging design features judged to be critical to the success of existing DePuy Synthes systems with strong documented clinical performance,[1,2] as well as adding features to encourage ease of insertion while sparing critical musculature, this system was designed to bring solid clinical performance to the evolving surgical theater.

This paper touches on the design rationale while focusing on surgical tips and pearls from the design surgeon team for preparation and implantation of the ACTIS Total Hip System with the Anterior Approach. Please see the ACTIS Total Hip System Surgical Technique (DSUS/JRC/0615/0896(3)) for full surgical workflow.

Full HA Coating

Proximal DUOFIX™ Coating

Inspired by Clinical Heritage

The ACTIS Total Hip System continues DePuy Synthes clinical heritage of cementless titanium total hip arthroplasty (THA) prostheses.[1] The ACTIS Total Hip System is a 'fit-and-fill' style hip prosthesis, with a trapezoidal cross-section and triple taper geometry meant to encourage optimal fill and stability within the metaphyseal femoral canal. The ACTIS Total Hip System also has proximal DUOFIX™ Coating. DUOFIX HA Coating combines POROCOAT™ Porous Coating, which allows for biological fixation to bone, with the addition of a 35 micron layer of HA coating.[14]

The ACTIS Total Hip System has a medial collar and Hydroxyapatite (HA) coating on the entirety of the endosteal region. This combination has demonstrated excellent long term survivorship with other DePuy Synthes products.[2] These features are designed to encourage primary stability and bone formation soon after implantation. The ACTIS Total Hip System is designed to preserve the features important to the success of existing systems while incorporating design modifications to facilitate optimized implantation through tissue-sparing approaches such as the Anterior Approach. The Anterior Approach has been shown to improve outcomes,[3-13] optimize the patient experience[3-8,11] and reduce the cost of care.[3-5,10-13]

Designed to Enable Muscle Sparing Approaches
The ACTIS Total Hip System is designed to provide a system optimized to enable muscle sparing approaches. The lateral shoulder was reduced to aid in stem insertion by helping avoid the Obturator Externus and other muscle tissue on the medial aspect of the greater trochanter. The ACTIS Total Hip System was also designed to avoid soft tissue and bony structures encountered with the Anterior Approach, with a patented 12-degree insertion feature to facilitate instrument access (Figure 1).

The ACTIS Total Hip System offers implant specific options and techniques for broaching, implant positioning, and sizing.

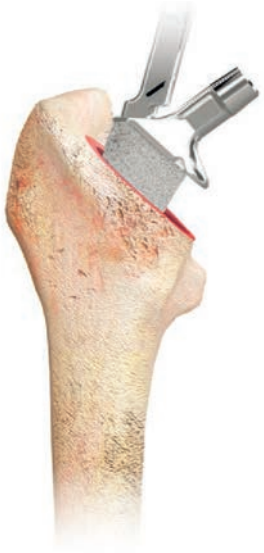

Figure 1. ACTIS Total Hip System Insertion Feature.
When the etch line on the Insertion Tip is parallel to the neck of the ACTIS Stem, the inserter is properly aligned to the 12-degree angle.

Broaching Technique
Many stems emphasize the removal of bone lateral to the stem and force the broach handle laterally during broaching to avoid varus positioning of the stem. In broaching for the ACTIS Total Hip System, it is preferable to broach starting in slight varus, allowing the stem to gain neutral positioning as the broach size increases. Overemphasizing a valgus force during broaching can cause a scenario where the broach is axially stable but rotationally not stable. Influencing the broach into varus can help remedy this circumstance. The broach can be firmly impacted with the mallet to obtain the appropriate size, stop impaction when axial and rotational stability is obtained.

Implant Sizing
Intra-operative fluoroscopy: Fluoro can help to assess the sizing of the femoral implant. With the ACTIS Total Hip System, the most critical factor to determine the appropriate stem size comes with placement of the broach, and assessment of the axial and rotational stability.

While the fluoro can act as secondary confirmation of size and position of the stem, it is important not to use the A/P X-Ray alone to assess size. The ACTIS Stem may appear slightly undersized on select A/P X-Rays because it can obtain good stability in the A/P plane before it makes contact with the medial/lateral bone. A/P and lateral X-rays should be used to assess stem size (Figure 2).

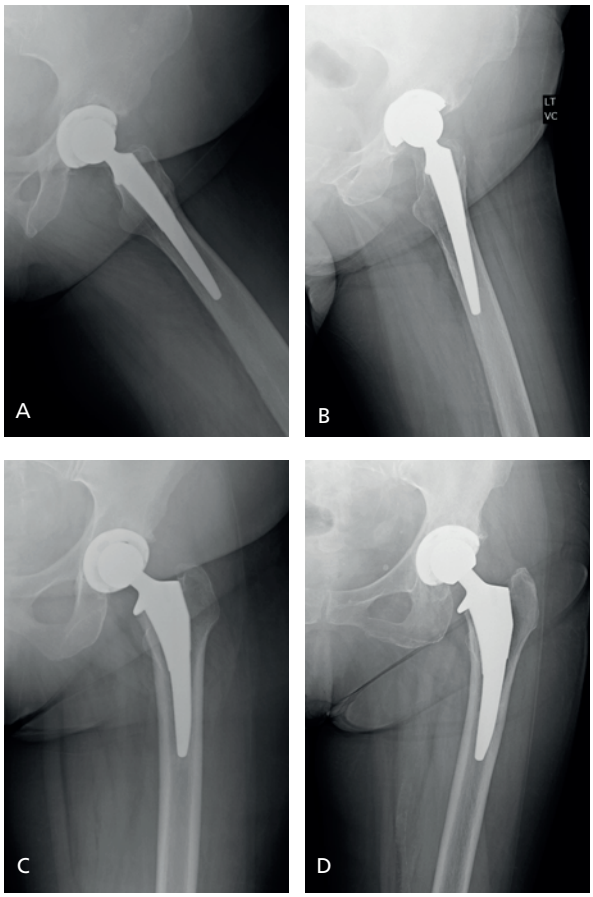

Figure 2. A/P and lateral X-Rays of different patients at four week and four month follow up. In some situations, the ACTIS Total Hip System may appear undersized in the A/P plane (Figures B,D). In these situations, use a lateral X-Ray to confirm size (Figures A,C).

A. Patient 1 Lateral Hip 4 Weeks Post-Op
B. Patient 1 AP Hip 4 Weeks Post-Op
C. Patient 2 Lateral Hip 4 Months Post-Op
D. Patient 2 AP Hip 4 Months Post-Op

Implant Placement
The use of fluoro can also help to properly position the implants and confirm appropriate restoration of leg lengths and offset. The ACTIS Total Hip System and Instrumentation are designed with a 12-degree angle of insertion. The stem should follow insertion into the broach envelope. Occasionally the stem will stop advancing prior to the collar seating on the calcar despite firm mallet blows. Like any cementless stem, this indicates the stem has reached its stable position and can be left with the collar proud.

Restoring Leg Length
The ACTIS Total Hip System provides standard and high offset options. High offset provides direct lateralization, increasing offset without affecting leg length. When performing range of motion testing, it is important to be mindful of restoring appropriate leg length and offset, and selecting standard or high offset ACTIS Total Hip Systems as appropriate.

POST-OPERATIVE PROTOCOL

Post-operative protocols are an important factor for patient recovery. The rise of outpatient THA combined with changing patient expectations have put a demand on THA prostheses to promote a quick return to activities of daily living. These demands and expectations should be respected. The features of the ACTIS Total Hip System are designed to address these changing expectations. The ACTIS Total Hip System allows for biologic fixation, promotes early return to weight bearing, and is optimized for modern tissue sparing approaches. In the experience of the designing surgeons and early evaluators, the ACTIS Total Hip System has provided patients with good early clinical results and a return to previous activities.

References

1. Australian Orthopaedic Association National Joint Replacement Registry Annual Report. (2017). Table HT12. Retrieved from: https://aoanjrr.sahmri.com/annual-reports-2017

Table HT12 Cumulative Percent Revision of Primary Total Conventional Hip Replacement with Cementless Fixation

Femoral Component	Acetabular Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	16 Yrs
Summit	Pinnacle	97	4377	1.2 (0.9, 1.6)	1.9 (1.5, 2.3)	2.1 (1.7, 2.6)	3.1 (2.4, 4.0)		

2. National Joint Registry for England, Wales, Northern Ireland and the Isle of Man, 13th Annual Report. (2017). Table 3.8. Available from: www.njrreports.org.uk
3. Barrett WP, et al. "Prospective Randomized Study of Direct Anterior vs Postero-Lateral Approach for Total Hip Arthroplasty." The Journal of Arthroplasty 2013; (28): 1634-1638.
4. Zawadsky MW, et al. "Early Outcome Comparison Between the Direct Anterior Approach and the Mini-Incision Posterior Approach for Primary Total Hip Arthroplasty: 150 Consecutive Cases." The Journal of Arthroplasty 2014; (29): 1256-1260.
5. Christensen CP, et al. "Comparison of Patient Function during the First Six Weeks after Direct Anterior or Posterior Total Hip Arthroplasty (THA): A Randomized Study." The Journal of Arthroplasty 2015; (30): 94-97.
6. Petis SM, et al. "In Hospital Cost Analysis of THA: Does Surgical Approach Matter?" The Journal of Arthroplasty 2016; (31)" 53-58.
7. Martin CT, et al. "A Comparison of Hospital Length of Stay and Short-term Morbidity Between the Anterior and the Posterior Approaches to Total Hip Arthroplasty." The Journal of Arthroplasty 2013; (28): 849-854.
8. Alecci V, et al. "Comparison of primary total hip replacements performed with a direct anterior approach versus the standard lateral approach: perioperative findings" J Orthopaed Traumatol 2010.7.
9. Higgins BT, et al. 2015. JOA. "Anterior vs. posterior approach for THA, a systematic review and meta-analysis." The Journal of Arthroplasty 2015; (30): 419–434.
10. Restrepo C, et al. "Prospective Randomized Study of Two Surgical Approaches for Total Hip Arthroplasty." The Journal of Arthroplasty 2010; (25(5)): 671-679.
11. Rodriguez JA, et al. "Does the Direct Anterior Approach in THA Offer Faster Rehabilitation and Comparable Safety to the Posterior Approach?" Clin Orthop Relat Res 2013.
12. Vail TP, et al. "Approaches in Primary THA." The Journal of Bone and Joint Surgery 2009; (91): 10-12.
13. Bourne MH, et al. "A comparison between direct anterior surgery of the hip (DASH) and the anterolateral (AL) surgical approach to THA: Postoperative outcomes." 2010 AAOS New Orleans, LA, Poster #014
14. Pilliar RM. Powder metal-made orthopaedic implants with porous surface for fixation by tissue ingrowth. Clin Orthop. 1983; 176: 42-51.

DePuy Synthes *People inspired*™

PART OF THE Johnson&Johnson FAMILY OF COMPANIES

Johnson & Johnson Medical Limited PO BOX 1988, Simpson Parkway, Livingston, West Lothian, EH54 0AB, United Kingdom. Incorporated and registered in Scotland under company number SC132162.

DePuy Orthopaedics, Inc.
700 Orthopaedic Drive
Warsaw, IN 46582
USA
Tel: +1 (800) 366 8143
Fax: +1 (800) 669 2530

DePuy International Ltd
St Anthony's Road
Leeds LS11 8DT
England
Tel: +44 (0)113 270 0461

DePuy (Ireland)
Loughbeg
Ringaskiddy
Co. Cork
Ireland
Tel: +353 21 4914 000
Fax: +353 21 4914 199

depuysynthes.com

DSUS/JRC/1217/2393