



Surgical Technique



TRI·LOCK[®]
BONE PRESERVATION STEM

never stop moving™

FEATURING **GRIPION**[®] TECHNOLOGY



Optimum implant geometry

Extending the proven Tri-Lock® heritage

The original Tri-Lock® was introduced in 1981. This implant was the first proximally coated tapered-wedge hip stem available to orthopaedic surgeons and their patients. Since its introduction, Tri-Lock has demonstrated 98% survivorship.¹

Preserving the natural anatomy

The reduced lateral shoulder, thin geometry and optimized length of the Tri-Lock Bone Preservation Stem minimize the amount of bone removed from the patient. These same features, along with approach enabling instrumentation, allow the surgeon to perform minimally invasive techniques.

Delivering stable, predictable performance

The Tri-Lock Bone Preservation Stem incorporates Gription™ fixation technology. Gription is designed to help provide consistent implant seating height and additional initial stability that helps maximize the potential for long-term bony ingrowth.

Restoring high level function

The Tri-Lock Bone Preservation Stem neck geometry has been optimized to improve range-of-motion. Progressive dual offsets with direct lateralization provide the ability to optimize soft tissue tension. An extensive size range and consistent intervals between sizes help achieve proper fit and aid in recreating leg length.

Providing advanced bearing options

The Tri-Lock Bone Preservation Stem's 12/14 Articul/eze® taper enables the use of the most advanced bearing options available today. The Pinnacle® Acetabular Cup System gives the surgeon a choice of bearing materials, and the option for screw fixation. The DePuy ASR™ XL metal-on-metal system maximizes the head-to-shell ratio, providing an exceptional range-of-motion and outstanding hip stability.

Enabling a simple, reproducible technique

Today's total hip surgeon demands proven performance, OR efficiency, and surgical approach flexibility. The new Tri-Lock Bone Preservation Stem delivers on all fronts. The broach-only technique and wide range of instrumentation enable both traditional and less-invasive surgical approaches.

Pre-operative planning

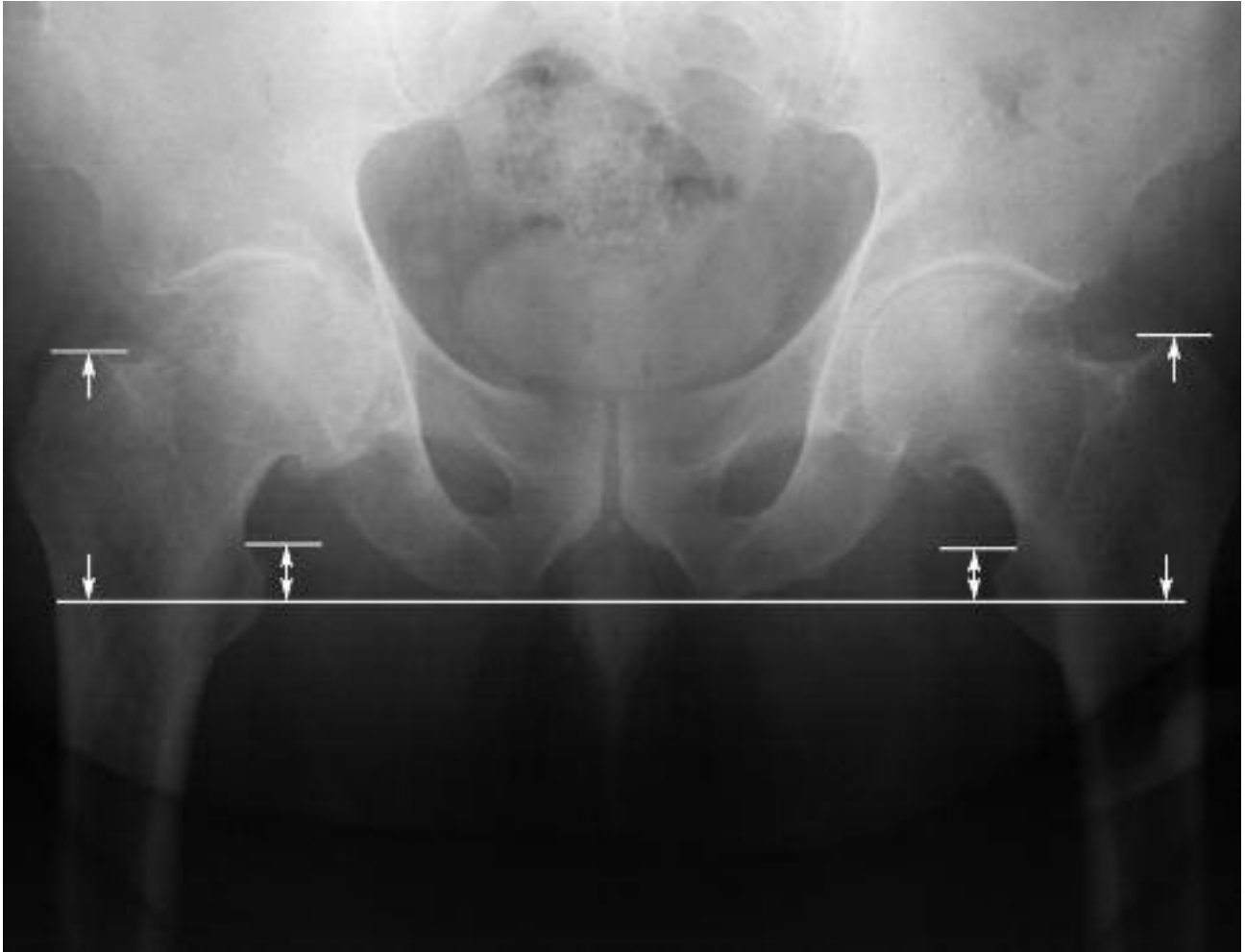


Figure 1

Determination of leg length discrepancy

Perform a clinical evaluation in conjunction with a radiographic analysis to determine preoperative leg length discrepancy and use both to determine intraoperative leg length management. To estimate leg length discrepancy radiographically, draw a reference line across the bottom of the ischium. Measure the distance from the lesser trochanter (or greater trochanter) landmark to the reference line on each side. The difference between the two is the radiographic leg length discrepancy. Clinical examination should help determine the actual leg length irregularity.

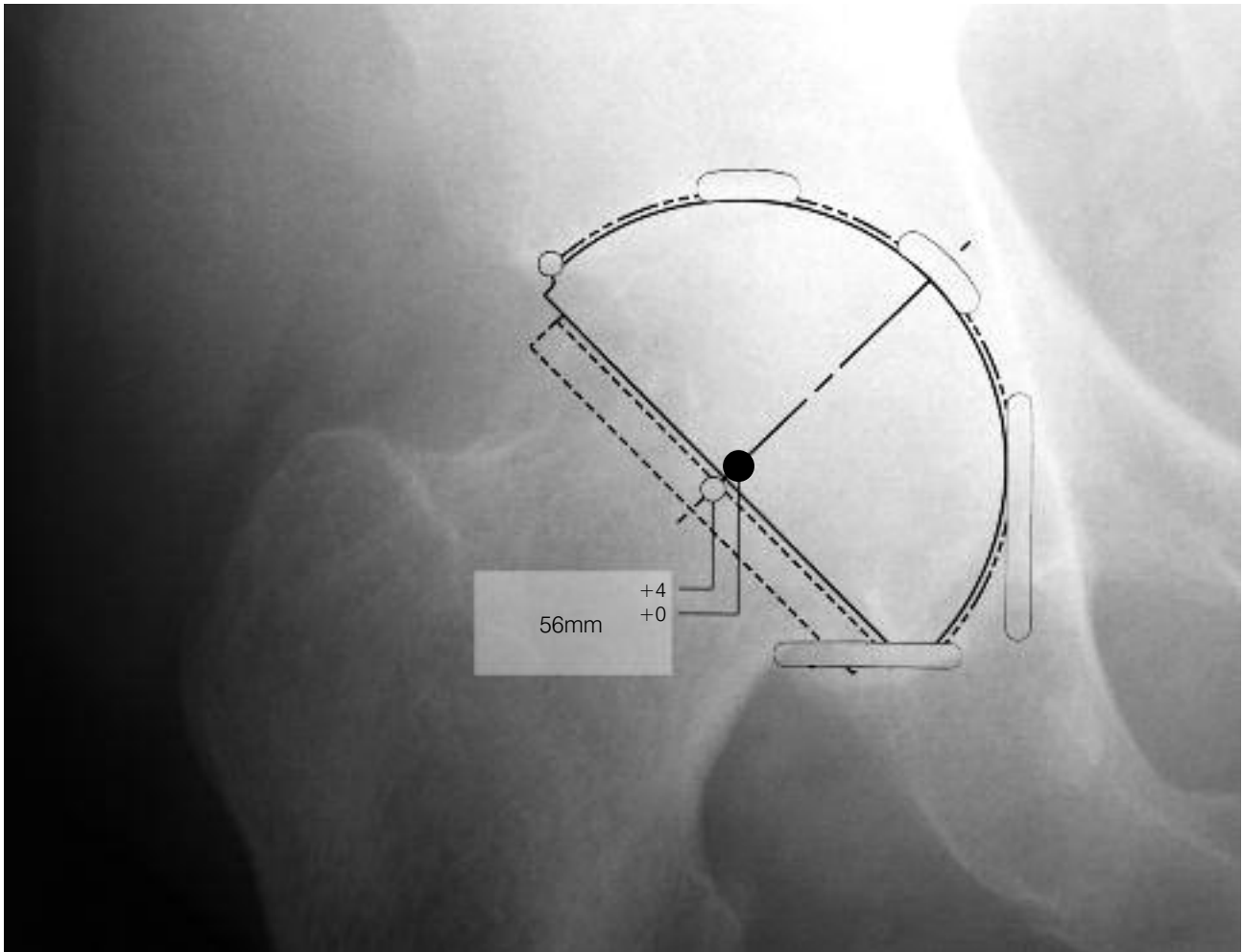


Figure 2

Acetabular cup sizing and position

Most sizing determinations are made using the A/P radiograph of the hip. Determine the optimal position for the acetabular component and estimate the size using the Pinnacle Acetabular Cup System template overlays. The acetabular teardrop can be referenced as the interior margin of the acetabular reconstruction. The goal in cementless acetabular fixation is to optimize position and bone contact. Once this is determined, mark the intended center of rotation of the bearing surface on the A/P radiograph.

Pre-operative planning

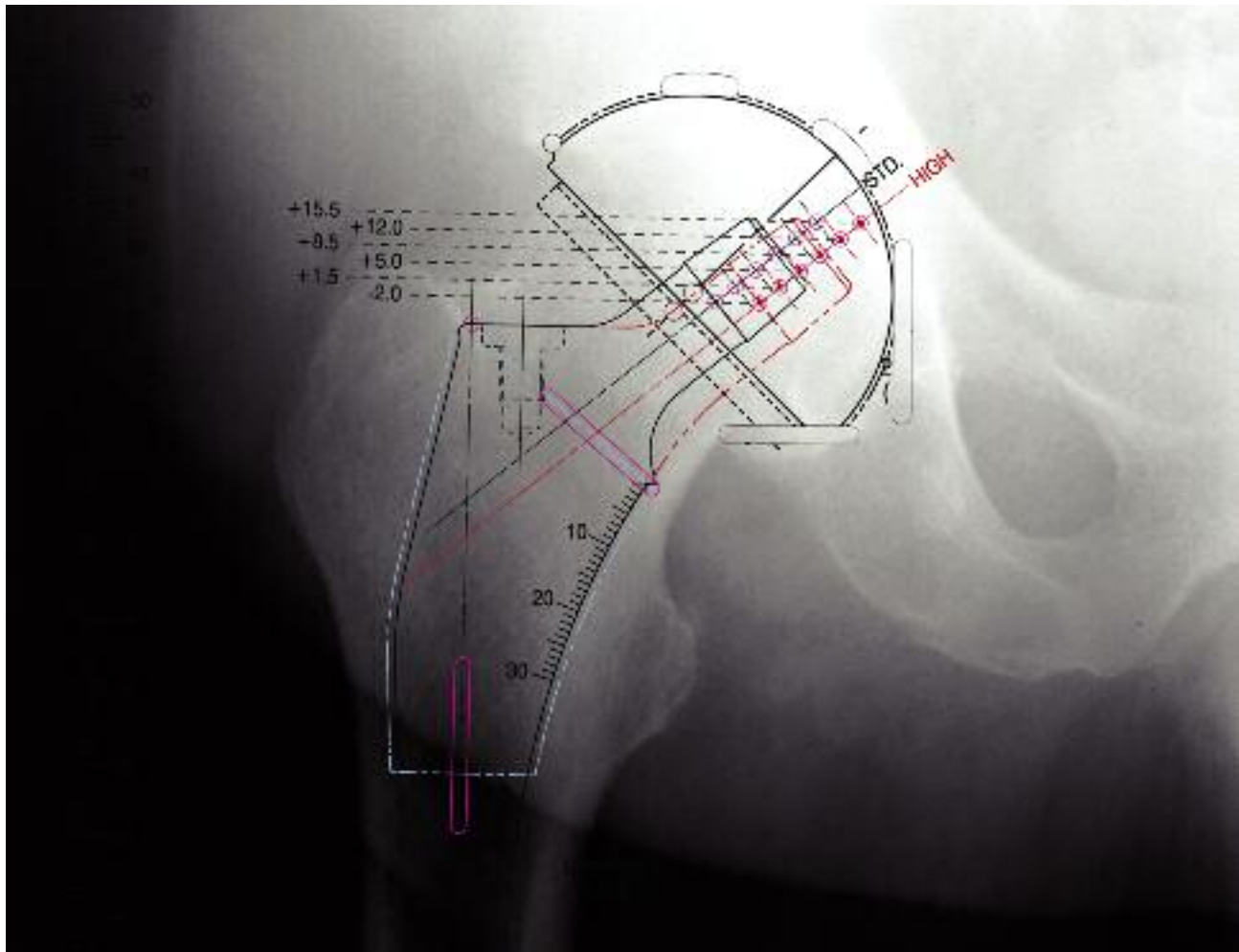


Figure 3

Femoral stem selection

The Tri-Lock Bone Preservation Stem is designed to achieve intimate cortical contact proximally at the medial and lateral endosteal cortices. Select the template size that fits the proximal femur and equalizes leg lengths. The femoral template should be in line with the long axis of the femur, and the neck resection line drawn at the point where the selected stem provides the desired amount of leg length. The vertical distance between the planned center of rotation of the acetabular component and the center of rotation of the femoral head constitutes the distance the leg length will be adjusted.

The Tri-Lock Bone Preservation Stem is available with standard and high offset options for all stem sizes. The high offset option provides direct lateralization, increasing offset without sacrificing leg length. Through templating and trialing, determine which option restores proper offset by matching the cup's center of rotation with the desired head center of rotation.

Neck osteotomy



Figure 4

Align the neck resection guide with the long axis of the femur. This establishes the angle of resection at a proper 50° from the femoral axis. Determine the resection level by aligning the top of the guide with the tip of the greater trochanter or by measuring a pre-operatively determined distance above the lesser trochanter. Mark the resection line using electrocautery or methylene blue. Resect the femoral head.

Femoral canal initiation



Figure 5

Utilize the modular box osteotome to enter the femoral canal and to establish version. If needed the box osteotome can be used to clear bone laterally.

Femoral canal preparation

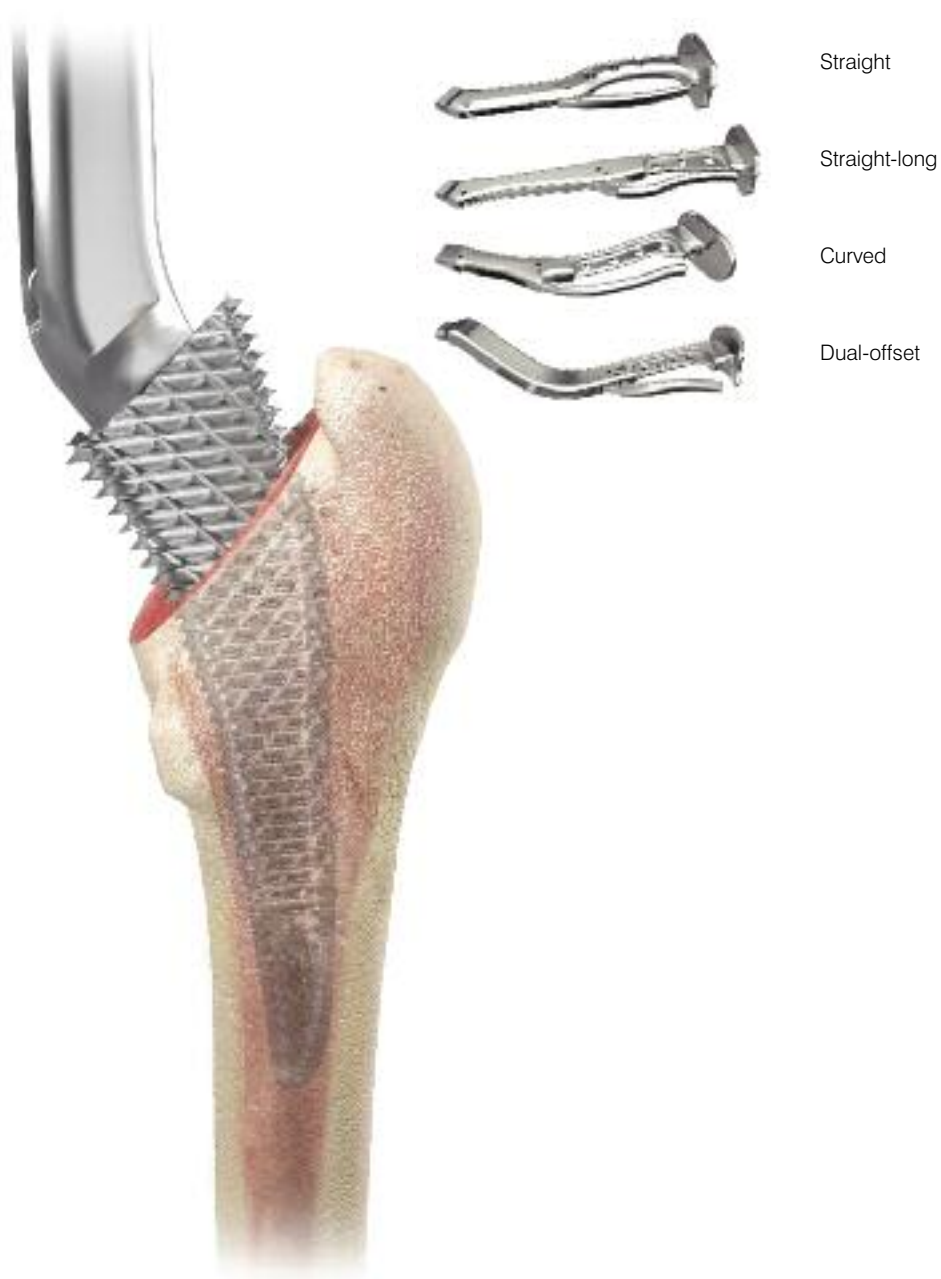


Figure 6

The Tri-Lock Bone Preservation Stem offers several broach handles that enable the many surgical approaches for hip replacement. Select the handle that best suits the needs of the performed approach. Begin using a broach at least two sizes smaller than the preoperatively templated stem size. The starter broach can be used when needed for small femoral geometries, or for clearing bone laterally. While taking care to maintain proper alignment and version, sequentially advance the broaches down the femoral canal. Continue to increase broach size until intimate contact is made between the broach and the medial and lateral cortices. The final size is achieved when the broach maintains axial and rotational stability, and is at a seating level that recreates proper leg length.

Calcar preparation



Figure 7

Calcar planing is optional, as the Tri-Lock Bone Preservation Stem is a collarless design. With the final broach fully seated, place the planer over the broach stud. Apply power prior to engaging the calcar to prevent the planer from binding. Mill the calcar to the level of the broach face.

Trial reduction



Figure 8

Trial neck segments and trial heads are available to assess proper component position, joint stability, range-of-motion and leg length. Standard and high offset options are available for each stem size. Offset increases 6-8 mm (depending on stem size) from the standard to the high offset option, via direct lateralization. With the final broach in-situ, attach the appropriate trial neck and trial head. Reduce the hip and assess what adjustments, if any, are required to ensure stability through a full range of motion. When stability is achieved, note the broach size and head/neck offset.

Femoral component insertion

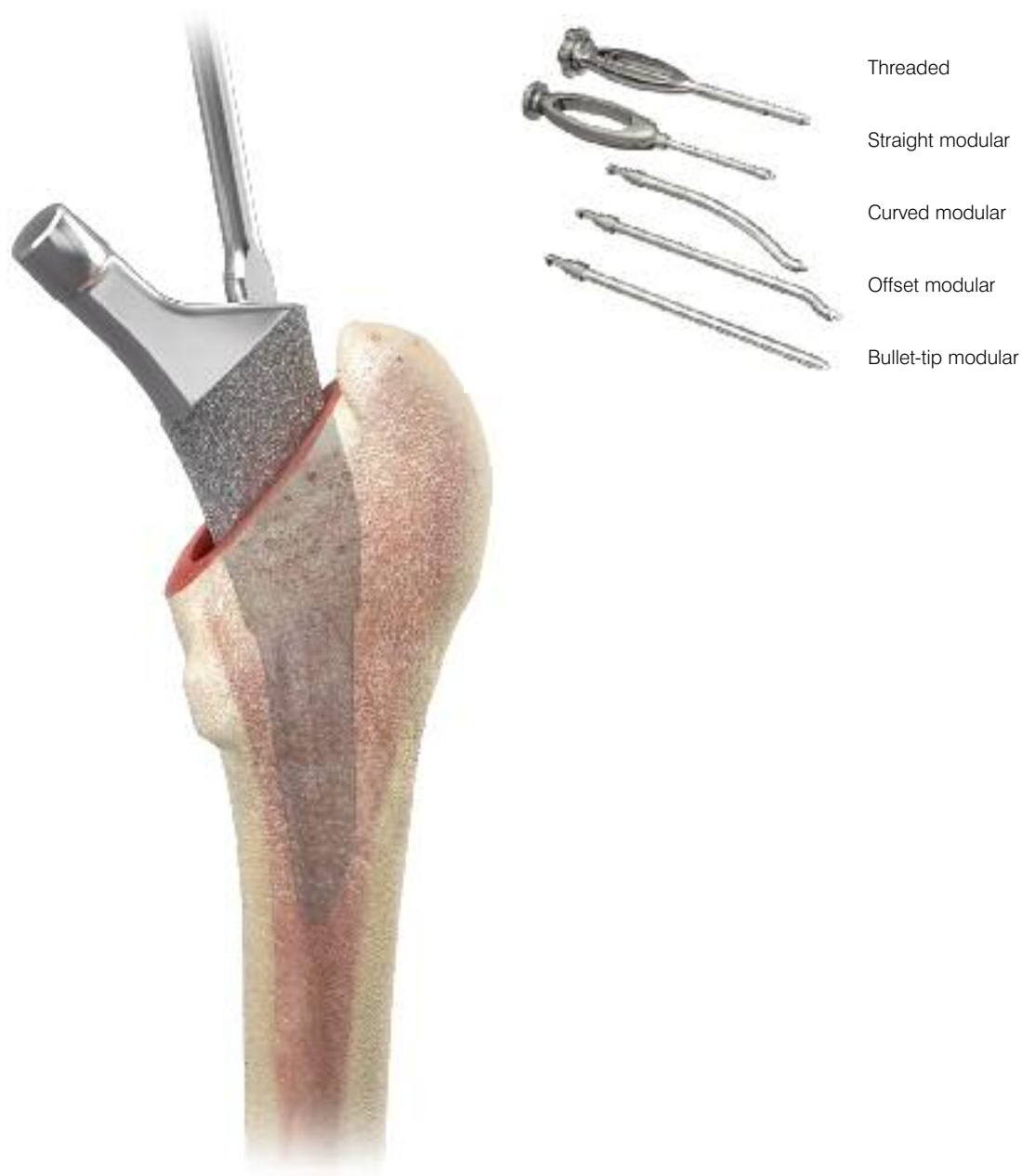


Figure 9

Stem inserters with various geometries are available to enable the many surgical approaches for hip replacement. The retaining stem inserter can be used if a positive connection between the implant and instrument is required. Select the stem size that corresponds to the final broach. In the area of Gription coating, the implant is oversized by 0.25 mm per side relative to the broach. Introduce the implant into the femoral canal by hand. Take care to orient the implant with proper alignment and version. Using moderate mallet blows, advance the stem into position. The implant is fully seated when the top of the Gription coating reaches the level where the face of the broach previously sat and the implant is stable. Excessive force should not be needed to seat the stem.

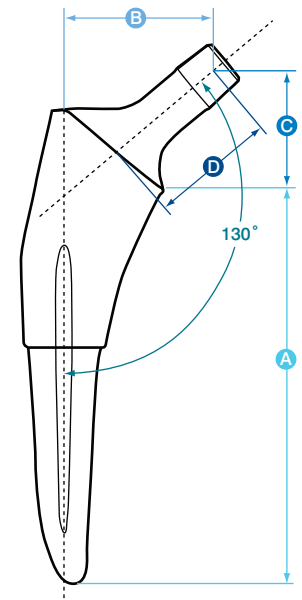
Femoral head impaction



Figure 10

Following the final trial reduction, clean and dry the taper to ensure it is free of debris. Place the appropriate femoral head onto the taper. Using the head impactor, engage the head with light taps. Clean the bearing surfaces, and reduce the hip.

Technical specifications



Size	A Stem Length (mm)	B Offset w/ Head (mm)						C Leg Adjustment Length w/ Head (mm)						D Neck Length w/ Head (mm)					
		-2	+1.5	+5	+8.5	+12	+15.5	-2	+1.5	+5	+8.5	+12	+15.5	-2	+1.5	+5	+8.5	+12	+15.5
0 Standard	95	31	34	36	39	42	44	23	25	27	30	32	34	23	27	30	34	37	41
0 High	95	37	40	42	45	48	50	23	25	27	30	32	34	27	31	34	38	41	45
1 Standard	97	31	34	36	39	42	44	23	25	27	30	32	34	23	27	30	34	37	41
1 High	97	37	40	42	45	48	50	23	25	27	30	32	34	27	31	34	38	41	45
2 Standard	99	33	36	38	41	44	46	24	26	28	31	33	35	25	28	32	35	39	42
2 High	99	39	42	44	47	50	52	24	26	28	31	33	35	29	32	36	39	43	46
3 Standard	101	33	36	38	41	44	46	25	27	29	32	34	36	25	28	32	35	39	42
3 High	101	39	42	44	47	50	52	25	27	29	32	34	36	29	32	36	39	43	46
4 Standard	103	34	37	40	42	45	48	26	28	30	33	35	37	26	30	33	37	40	44
4 High	103	42	45	48	50	53	56	26	28	30	33	35	37	32	35	39	42	46	49
5 Standard	105	34	37	40	42	45	48	26	29	31	33	35	38	26	30	33	37	40	44
5 High	105	42	45	48	50	53	56	26	29	31	33	35	38	32	35	39	42	46	49
6 Standard	107	36	39	42	44	47	50	28	30	32	34	37	39	28	32	35	39	42	46
6 High	107	44	47	50	52	55	58	28	30	32	34	37	39	33	37	40	44	47	51
7 Standard	109	36	39	42	44	47	50	28	31	33	35	37	40	28	32	35	39	42	46
7 High	109	44	47	50	52	55	58	28	31	33	35	37	40	33	37	40	44	47	51
8 Standard	111	38	41	44	46	49	52	30	32	34	36	39	41	30	34	37	41	44	48
8 High	111	46	49	52	54	57	60	30	32	34	36	39	41	36	39	43	46	50	53
9 Standard	113	38	41	44	46	49	52	30	33	35	37	39	42	30	34	37	41	44	48
9 High	113	46	49	52	54	57	60	30	33	35	37	39	42	36	39	43	46	50	53
10 Standard	115	40	43	46	48	51	54	32	34	36	38	41	43	32	35	39	42	46	49
10 High	115	48	51	54	56	59	62	32	34	36	38	41	43	37	41	44	48	51	55
11 Standard	117	40	43	46	48	51	54	32	34	36	38	41	43	32	35	39	42	46	49
11 High	117	48	51	54	56	59	62	32	34	36	38	41	43	37	41	44	48	51	55
12 Standard	119	40	43	46	48	51	54	32	34	36	38	41	43	32	35	39	42	46	49
12 High	119	48	51	54	56	59	62	32	34	36	38	41	43	37	41	44	48	51	55

Ordering information

IMPLANTS

Standard Offset	Size	High Offset	Size
1012-04-005	0	1012-14-005	0
1012-04-010	1	1012-14-010	1
1012-04-020	2	1012-14-020	2
1012-04-030	3	1012-14-030	3
1012-04-040	4	1012-14-040	4
1012-04-050	5	1012-14-050	5
1012-04-060	6	1012-14-060	6
1012-04-070	7	1012-14-070	7
1012-04-080	8	1012-14-080	8
1012-04-090	9	1012-14-090	9
1012-04-100	10	1012-14-100	10
1012-04-110	11	1012-14-110	11
1012-04-120	12	1012-14-120	12

INSTRUMENTS

Tri-Lock Bone Preservation Stem Case

Broaches	Size
2012-03-003	starter
2012-03-005	0
2012-03-010	1
2012-03-020	2
2012-03-030	3
2012-03-040	4
2012-03-050	5
2012-03-060	6
2012-03-070	7
2012-03-080	8
2012-03-090	9
2012-03-100	10
2012-03-110	11
2012-03-120	12
2012-06-100	Neck resection guide
2012-06-300	Tri-Lock Bone Preservation Stem case

Neck Segments

Standard Offset	Size
2012-05-000	0/1
2012-05-100	2/3
2012-05-200	4/5
2012-05-300	6/7
2012-05-400	8/9
2012-05-500	10/11/12

Neck Segments

High Offset	Size
2012-05-050	0/1
2012-05-150	2/3
2012-05-250	4/5
2012-05-350	6/7
2012-05-450	8/9
2012-05-550	10/11/12

Tissue Sparing Solutions Femoral Core Case 1

Case accommodates two sets of Pinnacle trial heads

Case accommodates any two broach handles

2570-00-000	Standard straight broach handle
2598-07-540	Long straight broach handle
2598-07-550*	Curved broach handle
2598-07-350*	Dual-Offset broach handle (left)
2598-07-360*	Dual-Offset broach handle (right)
2598-07-530	Modular box osteotome
2598-07-460	Universal inserter handle
2598-07-430	Standard straight inserter shaft
2598-07-470	Long offset inserter shaft (Corail/Tri-Lock)
2598-07-480	Long offset inserter shaft (Summit)
2598-07-440	Curved inserter shaft (Corail/Tri-Lock)
2598-07-450	Curved inserter shaft (Summit)
2598-07-435	Bullet tip inserter shaft
2598-07-570	Retaining stem inserter
2598-07-390	TSS femoral core case 1

* Broach handles well suited for the Anterior Approach

Tissue Sparing Solutions Femoral Core Case 2

9400-80-001	Canal finder
2001-42-000	T-handle
2001-80-501	IM initiator
2354-10-000	Canal probe
85-3927	Femoral rasp
9400-80-007	Shielded calcar planer
2001-65-000	Femoral head impactor
2598-07-420	TSS femoral core case 2

Templates

2012-06-000	X-ray Templates
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Total Hip Prostheses, Self-Centering™ Hip Prostheses and Hemi-Hip Prostheses

IMPORTANT

This Essential Product Information sheet does not include all of the information necessary for selection and use of a device. Please see full labeling for all necessary information.

INDICATIONS

Total Hip Arthroplasty (THA) is intended to provide increased patient mobility and reduce pain by replacing the damaged hip joint articulation in patients where there is evidence of sufficient sound bone to seat and support the components.

THA is indicated for a severely painful and/or disabled joint from osteoarthritis, traumatic arthritis, rheumatoid arthritis or congenital hip dysplasia; avascular necrosis of the femoral head; acute traumatic fracture of the femoral head or neck; failed previous hip surgery; and certain cases of ankylosis. **Hemi-hip arthroplasty is indicated in these conditions** where there is evidence of a satisfactory natural acetabulum and sufficient femoral bone to seat and support the femoral stem. Hemi-hip arthroplasty is indicated in the following conditions: Acute fracture of the femoral head or neck that cannot be reduced and treated with internal fixation; fracture dislocation of the hip that cannot be appropriately reduced and treated with internal fixation; avascular necrosis of the femoral head; non-union of femoral neck fractures; certain high subcapital and femoral neck fractures in the elderly; degenerative arthritis involving only the femoral head in which the acetabulum does not require replacement; and pathology involving only the femoral head/neck and/or proximal femur that can be adequately treated by hemi-hip arthroplasty.

CONTRAINDICATIONS

THA and hemi-hip arthroplasty are contraindicated in cases of: active local or systemic infection; loss of musculature, neuromuscular compromise or vascular deficiency in the affected limb, rendering the procedure unjustifiable; poor bone quality; Charcot's or Paget's disease; for hemi-hip arthroplasty – pathological conditions of the acetabulum that preclude the use of the natural acetabulum as an appropriate articular surface. Ceramic heads are contraindicated in revision surgery when the femoral stem is not being replaced or for use with any other than a polyethylene or metal-backed polyethylene cup. In the USA, ceramic heads are not approved for use with metal cups.

WARNINGS AND PRECAUTIONS

Ceramic coated femoral stem prostheses are indicated for uncemented press fit fixation. **CAUTION: DO NOT USE BONE CEMENT FOR FIXATION OF A CERAMIC COATED PROSTHESIS.**

Components labeled for "Cemented Use Only" are to be implanted only with bone cement. The following conditions tend to adversely affect hip replacement implants: excessive patient weight, high levels of patient activity, likelihood of falls, poor bone stock, metabolic disorders, history of infections, severe deformities leading to impaired fixation or improper positioning, tumors of the supporting bone structures, allergic reactions to materials, tissue reactions, and disabilities of other joints.

ADVERSE EVENTS

The following are the most frequent adverse events after hip arthroplasty: change in position of the components, loosening of components, wear or fracture of components, dislocation, infection, peripheral neuropathies, tissue reaction.

References:

1. Burt CF et al. A Femoral Component Inserted without Cement in Total Hip Arthroplasty. A Study of the Tri-Lock Component with an Average Ten Year Duration of Follow-up. JBJS 1998 Jul 80(7) 952-60.

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