M-Series Modular Femoral Stem

AcuMatch®
INTEGRATED HIP SYSTEM

AN ACCURATE MATCH EVERY TIME

Exactech®

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DESIGN RATIONALE

The AcuMatch® M-Series modular femoral stem addresses the challenges orthopaedic surgeons encounter in surgery. In situations of proximal/distal mismatch, the completely interchangeable segments of the M-Series system allows surgeons to customize a femoral stem to meet the patient's anatomy. Limb length and offset have been uncoupled to provide more options for anatomical restoration. Neck version is independent of the placement of the distal segment. This is especially important when a curved stem is selected.

The M-Series modular femoral stem is used in both primary and revision surgeries where proximal fixation is indicated. The superior material properties of a proprietary titanium alloy provide excellent strength while accommodating the flexibility needed in a press-fit stem.

NOTE: *The M-Series is designed for proximal fixation. If there is not sufficient bone present to support proximal loading, then grafting will be necessary.*

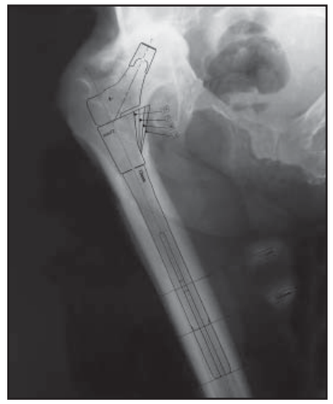


Figure 1
Primary X-ray with templates

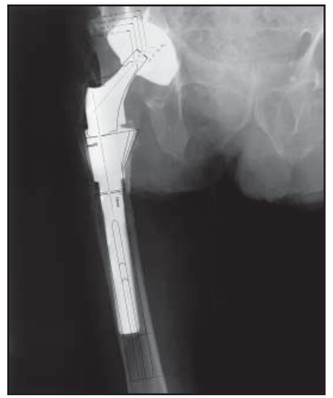


Figure 2
Revision X-ray with templates

PRE-OPERATIVE PLANNING

Radiographs
An A/P X-ray of the pelvis as well as an A/P and true lateral of the operative hip are required for proper sizing estimation of the implant based on templating.

Templating
Templating for primary *(Figure 1)* and revision *(Figure 2)* cases is performed in both the A/P and lateral views to achieve the following goals:

- Predict center of rotation of the femoral head
- Predict level of neck osteotomy
- Determine appropriate limb length adjustment and offset
- Estimate implant size

Tools:

- Anterior/posterior and medial/lateral X-ray of pelvis centered on the pubic symphysis and lateral X-ray of hip
- Pencil that will not damage X-ray
- Straight edge
- AcuMatch M-Series templates with rule corrected for magnification
- Goniometer/protractor

Step 1: Determine the limb length adjustment necessary, based on clinical and/or radiographic evaluation.

Step 2: Determine the center of rotation of the femoral head using the contralateral hip and/or undisturbed anatomical landmarks of the damaged hip.

Step 3: Place the metaphyseal template on the A/P and lateral femoral X-rays to approximate cortical fit.

Step 4: Determine the appropriate neck segment by placing the neck segment template on the A/P X-ray in proper relation to the metaphyseal segment template. Establish limb length and offset to balance the soft tissues.

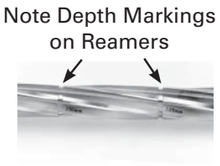
Final adjustments of limb length and offset may be made with various lengths of femoral heads.

Step 5: Determine stem length, diameter and shape (straight or curved) by placing the template over the femoral diaphysis in proper relationship to the metaphyseal segment template.

OPERATIVE TECHNIQUE OVERVIEW

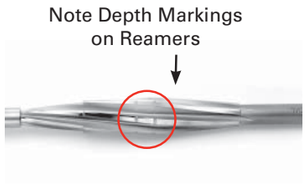
1 **90° Osteotomy**

2 **Canal Entry and Lateralization Using Round Osteotome**

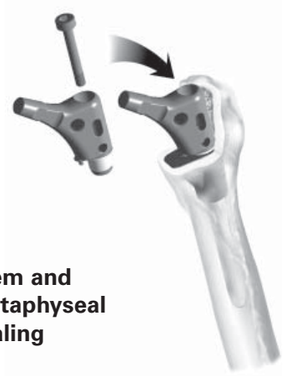


3 **Diaphyseal Reaming**

4 **Metaphyseal Reaming**



5 **Metaphyseal Milling**



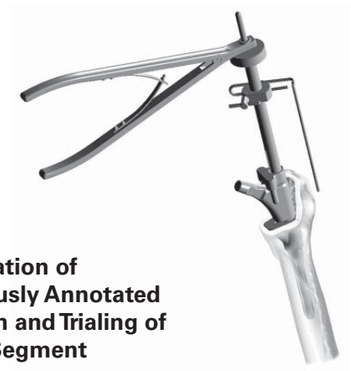
6 **Stem and Metaphyseal Trialing**

7 **Placement of Neck Trial**

8 **Lock Trial In Place**

9 **Version Adjustment (if necessary) and Reference**

10 **Insertion of Final Stem and Metaphyseal**



11 **Replication of Previously Annotated Version and Trialing of Neck Segment**

12 **Implantation and Final Locking of Neck Segment**

13 **Insertion of Locking Screw**

14 **Separation of Neck Segment Utilizing Wedge**

DETAILED OPERATIVE TECHNIQUE

APPROACH AND EXPOSURE

The AcuMatch M-Series system is compatible with any standard surgical exposure. In this surgical technique, the posterolateral approach in a primary total hip is described.

Step 1: Place the patient in the lateral position with hips and knees slightly flexed. The pelvis should be stabilized with a holding device.

Step 2: The patellae can be palpated to observe the relative limb length. Any limb lengthening anticipated from pre-operative templating is compared to the palpated difference in limb length at the knee.

Step 3: Make a posterolateral incision across the involved hip *(Figure 3)*. The deep incision is made through the fascia lata in line with the skin incision. Divide and sweep the greater trochanter bursa posteriorly, exposing the short external rotators.

Step 4: Place a retractor superior to the piriformis tendon in order to retract the hip abductors and separate them from the superior capsule. When present, the piriformis and conjoint tendons are divided close to their femoral attachments and tagged for later reattachment *(Figure 4)*.

Step 5: Release the quadratus femoris muscle from the femur with electrocautery, as needed.

Step 6: Divide the posterior capsule *(Figure 5)*.

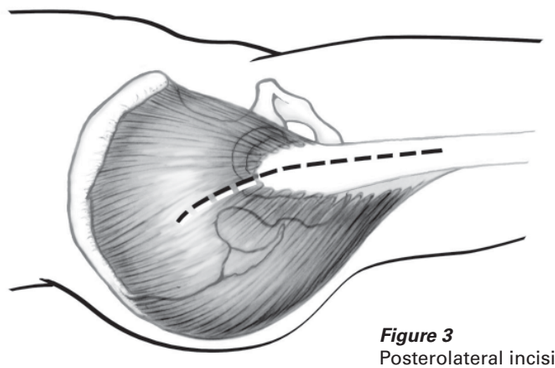


Figure 3
Posterolateral incision

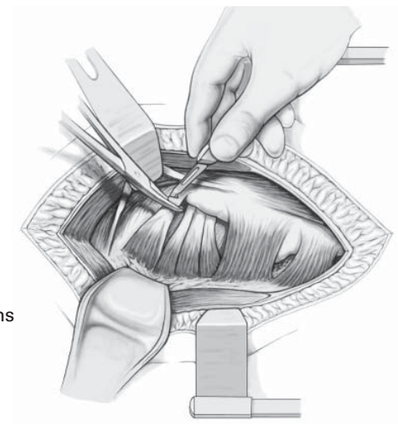


Figure 4
Conjoint tendons are divided

Figure 5
Posterior capsule is divided

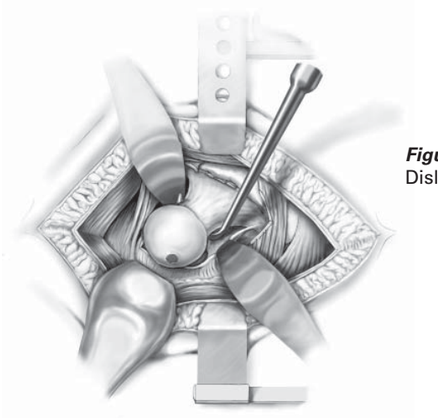


Figure 6
Dislocation of hip

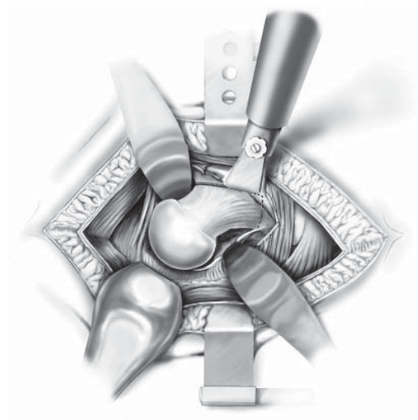


Figure 7
Resection should be made in two cuts, one horizontal and one vertical

Figure 8
Portal made using the Round Osteotome

DISLOCATION

Step 1: The hip should be dislocated by flexion, adduction, and internal rotation. Placing a bone hook around the femoral neck may help in difficult cases *(Figure 6)*.

Step 2: Clear soft tissues along the intertrochanteric line to the proximal border of the lesser trochanter.

Step 3: When tight, the gluteus maximus tendon may be released to improve exposure. The limb should be positioned at 90 degrees of internal rotation of the hip.

OSTEOTOMY

In primary hip surgery, a 90-degree osteotomy is performed at the level as determined during pre-operative planning *(Figure 7)*.

In revision surgery, the existing osteotomy should be converted to the right angle osteotomy to facilitate proper seating of the femoral component.

FEMORAL PREPARATION

The femoral canal can be accessed by using the **Round Osteotome** to open the canal and the **T-Handle** tapered reamer to gain access to the diaphysis *(Figure 8)*.

The AcuMatch M-Series surgical technique consists of three steps to prepare the femur:

1. Diaphyseal reaming
2. Metaphyseal reaming
3. Metaphyseal milling (unless preparing for calcar-replacing segment)

DIAPHYSEAL REAMING

Straight Stems
The AcuMatch M-Series offers straight stems in 135mm (11mm diameter only), 165mm and 200mm. Diaphyseal reaming determines the diameter and length of the final stem segment. Reaming is accomplished using the non-end cutting **Straight Reamers** ranging in diameter from 9mm to 21.5mm in 0.5mm increments. The reference marks on each reamer indicate the appropriate reaming depth for the corresponding stem length in relation to the femoral osteotomy *(Figure 9).* Pre-operative templating should assist in determining the appropriate depth to ream.

Ream sequentially, beginning with the smallest diameter reamer, until cortical contact is achieved *(Figure 10).* In order to prevent varus placement of the prosthesis, care should be taken to lateralize the reamers proximally.

The flutes on the stem segments add 1.25mm to the diameter of the stem *(example: 13mm stem major diameter is 14.25mm)*, so it is recommended to over-ream the canal by 0.5mm relative to the nominal diameter of the stem. This will allow for 0.75mm of interference fit.

When appropriate cortical contact has been achieved, the color-coded band on the shaft of the reamer should be noted. The color of this band corresponds to the diameters of the definitive stem segments as well as the diaphyseal instrumentation to be used throughout the procedure. If the final reamer used does not have a colored band and therefore does not correspond with a stem diameter offering, it will be necessary to ream up to the next stopping point annotated by a colored band *(Figure 11).*

Note: *When using a straight stem segment, the last reamer used should be one with a color-coded band.*

Curved Stems
The AcuMatch M-Series offers curved stems in 200mm, 250mm, and 300mm lengths. If a curved stem is going to be implanted, it is necessary to prepare the diaphysis with flexible reamers, over-reaming the canal by 1.0-1.5mm *(Figure 12).*

CONICAL REAMING

Upon completion of diaphyseal preparation, take note of the diameter of the final reamer and color-coded band. Select a **Conical Pilot Shaft** that corresponds to the diaphyseal diameter and attach it to the 19mm starter **Conical Reamer** (Figure 13). Conical reaming determines the diameter of the metaphyseal cone of the definitive implant.

There are depth markers on each Conical Reamer *(Figure 14).* The most distal mark should be referenced when using the calcar replacing metaphyseal segments. The proximal mark is referenced when preparing the femur for a standard metaphyseal segment. Reaming to the appropriate mark provides for a maximum of 0.6mm per side of interference fit.

Metaphyseal reaming is conducted in 2mm increments, based on the available reamers, until cortical contact is achieved *(Figure 15).* The surgeon may determine appropriate bony contact by referencing pre-operative templating and through intra-operative judgment.

The Conical Reamers are designed with trailing flutes to lateralize the reamer in the area of the greater trochanter. While maintaining axial alignment within the femoral canal, continue to run the reamer while withdrawing it to remove bone laterally.

CALCAR REPLACEMENT

When using the calcar replacing metaphyseal segment, it is necessary to prepare the calcar region of the femur for the placement of the shelf of the prosthesis. This is accomplished by ensuring the transverse osteotomy allows the prosthesis to sit flush within the bone. Metaphyseal reaming is not required when using the calcar replacing segment.

METAPHYSEAL MILLING

Metaphyseal Mill Guide Assembly
The **Metaphyseal Mill Guide**, **Metaphyseal Mill Guide Pilot Shaft** (corresponding to the final diaphyseal diameter), **Sizing Pin**, **Stabilizing Handle**, and **Orientation Pin** are assembled as shown in *Figure 16*.

Metaphyseal Milling
Metaphyseal milling determines the flare size of the final implant.The Metaphyseal Segments are available in flare sizes x-small (21mm, 23mm, and 25mm only), small, medium, and large.

The Mill Guide is selected to correspond with the diameter of the last Conical Reamer used.

The Orientation Pin on the Mill Guide is used to reference rotational alignment within the metaphysis in order to place the flare of the metaphyseal segment within the best quality bone stock. Mark the position of the orientation pin with electrocautery as a reference, should the Mill Guide need to be reinserted.

Figure 9
Straight Reamer depth markers

Figure 10
Insertion of
Straight Reamer

Figure 11
Straight Reamer color-coded bands
Full size band indicated full size (11mm), half size band indicates full size plus .5mm (11.5mm)

Figure 12
Flexible reaming

Figure 13
Assembly of the Conical Pilot to the Conical Reamer

Figure 14
Conical Reamer depth markings

Figure 15
Ream until good bony contact is achieved

Figure 16
Metaphyseal Mill Guide assembly

Gently impact the milling device until the scored mark on the guide is at the level of resection *(Figure 17)*. Proper rotational orientation should be established prior to impaction.

NOTE: *The rail of the guide should not be struck as this could cause instrument deformation.*

Position the **Mill Guide Reamer** in the guide. It is recommended to "walk" the reamer around the perimeter of the metaphysis without power to determine the optimal rotational placement of the Mill Guide. This provides a good visualization of the amount of bone that will be removed during the milling process.

The stabilizing handle is used to help prevent the construct from rotating during the milling process. It is important that the surgeon performing the milling (rather than an assistant) hold the stabilizing handle to prevent rotation of the guide during the milling process. It is recommended that counterforce be applied in an upward direction *(Figure 18)*, to prevent reaming in varus.

At this point the surgeon should determine the desired flare size of the metaphyseal implant: x-small (21mm, 23mm, and 25mm only), small, medium, or large. Begin by inserting the sizing pin into the x-small hole (closest to the Mill Guide Shaft).

Proceed with milling the metaphyseal portion of the femur by "walking" the reamer around the rail of the **Mill Guide**, repositioning the pin until 1mm of cancellous bone remains. Note that each successive size advancement of the sizing pin removes 4mm of bone in the flare. Careful attention should be made to achieve contact with all corners of the Mill Guide rail. It is important that 1mm of cancellous bone remain in the metaphyseal region to allow for bone elasticity when inserting the final metaphyseal implant.

If additional bone must be removed from the medial aspect of the metaphyseal region, the pin is moved from the original position to the next pin hole ("x-small" position to the "small" position and so on), until appropriate bone preparation is achieved. When no pin is used, milling prepares the bone for a "large" metaphyseal component *(Figure 19)*. Once milling is complete, note the flare size and remove the Mill Guide using the **Slap Hammer** and **Small Hook**. For removal, place the **Small Hook** into the metaphyseal Mill Guide extraction hole and extract from the femoral canal *(Figure 20)*.

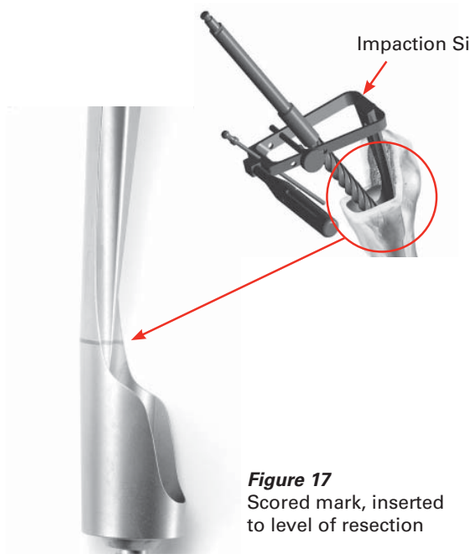


Figure 17
Scored mark, inserted to level of resection

Figure 18
Apply counterforce in an upward direction to prevent reaming in varus

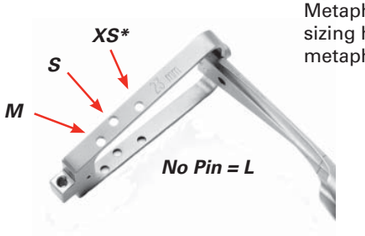


Figure 19
Metaphyseal Mill Guide sizing holes to prepare metaphyseal flare

**Available only in 21mm, 23mm and 25mm metaphyseal segments*

Figure 20
Metaphyseal Mill Guide extraction method

Figure 21
Free rotation between stem and metaphyseal trials

Handle button should read **META & TRIAL**

Figure 22
Impact trials until flush with the level of resection

TRIALING

Trial Insertion
Selection of the appropriate **Stem Trial** diameter is achieved by matching the color-coded instruments used throughout the surgical procedure. Special attention should be given to selecting the appropriate length Stem Trial by referring to the depth-reference point utilized on the last Straight Reamer used.

The Stem Trial is mated with the appropriate size **Metaphyseal Trial** by firmly pressing the two components together. The two trials should spin freely after they have been mated *(Figure 21)*. This allows the stem trials, specifically the curved stem trials, to find their natural orientation within the femoral canal.

To place the mated trials onto the **Combined Impactor**, select the appropriate size **Combined Impactor Shaft**. The size of the shaft corresponds to the metaphyseal or calcar size (i.e., a 21mm Metaphyseal Trial would require a 21mm shaft while a 31mm Metaphyseal Trial will require a 31mm shaft). Slide the end of the shaft through the Metaphyseal Trial and thread into the Stem Trial *(Figure 22)*. Set the Combined Impactor handle button to the metaphyseal trials mode (i.e., the black marking on the proximal surface of the button should read **META & TRIAL**). Verify that the small peg protruding from the impactor handle face engages in the small hole on the top of the Metaphyseal Trial. This peg provides rotational control over the Metaphyseal Trial, while allowing the captured Stem Trial to rotate freely. Impact the stem and metaphyseal trials until the proximal surface of the Metaphyseal Trial segment is flush with the level of resection. When removing the Combined Impactor, it is recommended to stabilize the metaphyseal segment with a finger to prevent the trial from moving while disengaging the handle. Once the handle is removed, unthread the shaft from the Stem Trial.

Trials may also be placed by hand into the canal and impacted utilizing the Combined Impactor handle.

Neck Segment Trialing
The appropriate **Neck Trial** is determined using pre-operative templating and clinical judgment. The desired anteversion is set and the appropriate **Trial Screw**, specific to the metaphyseal diameter, is selected, inserted and tightened. In order to prevent rotation of the neck segment during trial reduction, the trial screw should be tightened using the **Torque-Limiting Adapter** on the **T-Handle Driver** in conjunction with the **Neck Stabilizer** *(Figure 23)*. The Torque-Limiting Adapter may be omitted if additional rotational resistance is required. A **Head Trial** is selected and trial reductions are performed.

The **Neck Version Guide** on the **Implant Assembler Body** can be used to help replicate the neck version on the final implant. After the desired neck version has been determined, insert the assembler body into the neck trial. Ensure the angled pegs firmly contact the neck on both sides. With the assembler in place and in axial alignment with the femur, rotate and lock the version pin in relation to a landmark on the greater trochanter *(Figure 24)*. Make a mark on the greater trochanter with a marking pen or electrocautery as a reference once the final implant is inserted.

Intra-operative Radiographs
In order to confirm fit and overall alignment, it may be necessary to take an X-ray once the trials are in place. If using a long curved stem, a lateral view of the femur should be taken to ensure the proper placement of the stem in the diaphysis.

Trial Removal
Remove the trials by threading the **Large Hook** onto the **Slap Hammer** and inserting the hook through the hole on the neck trial *(Figure 25a)*. Removal can also be achieved by using the Slap Hammer and **Small Hook**. In this situation, remove the Trial Screw and Neck Trial. Then insert the Small Hook into the extraction hole in the Metaphyseal Trial and extract. This process is recommended for curved stems *(Figure 25b)*.

IMPLANT INSERTION

Implantation of Stem and Metaphyseal Implant Segments
Select the final metaphyseal and stem implants.

NOTE: *The locking screw is packaged with the metaphyseal segment. Care should be taken not to misplace it.*

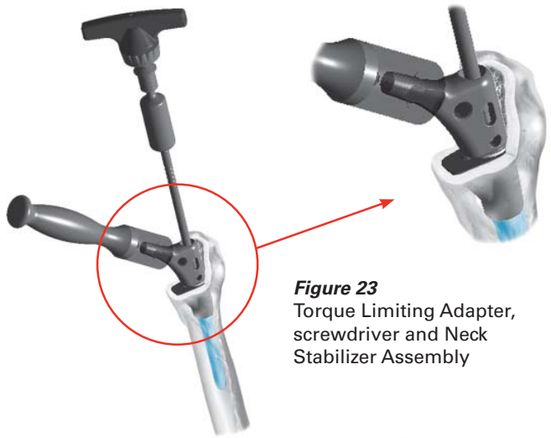


Figure 23
Torque Limiting Adapter, screwdriver and Neck Stabilizer Assembly

Figure 24
Neck Version Guide on the Implant Assembler Body

Figure 25a
Straight Trial removal

Figure 25b
Long, Curved trial removal

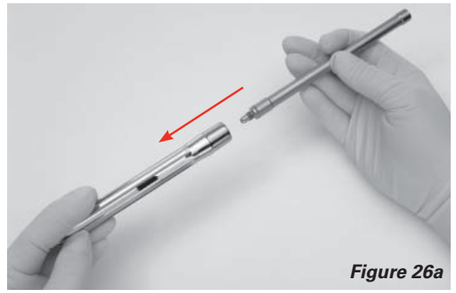


Figure 26a

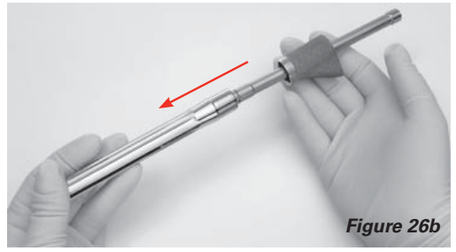


Figure 26b

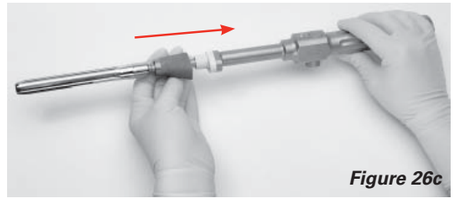


Figure 26c

Handle button should read **META & TRIAL**

Figure 27
Insertion to the distal rim of the stem segment taper

Set the Combined Impactor Handle button to the stem mode (i.e., the black marking on the proximal surface should read **STEM**). According to the diameter of the definitive metaphyseal segment, select the proper Combined Impactor shaft. Thread the shaft into the final stem segment, ensuring that the shoulder above the threads on the shaft tip is fully seated on the stem surface *(Figure 26a)*. The threads should be snug, but not over-tightened. Clean and dry the tapers of any fluid or debris. Slide the metaphyseal segment over the top of the shaft *(Figure 26b)*.

The metaphyseal segment should be allowed to rotate around the taper of the stem segment so that the stem and metaphyseal components may independently seek appropriate placement in the prepared femur. Push the top of the shaft into the Combined Impactor handle until the shaft slides past the capture detent *(Figure 26c)*.

Ensure the stem longitudinal slot is positioned properly in the coronal plane. Maneuver the implant distally into the canal by gently impacting the handle. Insert the implant until the stem-metaphyseal interface is at the horizontal level of resection *(Figure 27)*. At this point, the taper of the metaphyseal segment is not locked with the stem segment taper. Position the metaphyseal segment to fit the bony metaphysis precisely. Slide the button on the impactor shaft to place the instrument into metaphyseal impaction mode (i.e., the black marking on the top surface of the button should read **META & TRIAL**). After the button is pressed, the shaft may slide slightly proximal, or the handle may move slightly distal. After proper alignment of the metaphyseal segment is established, the surgeon should administer a sharp mallet blow to the handle. The surgeon should continue to impact the handle until the implant is fully seated flush with the horizontal level of resection. The handle is removed from the metaphyseal segment, and the shaft unthreaded from the stem.

Trial Reduction with Trial Neck on Implanted Stem/Metaphyseal Segments
Once the stem and metaphyseal implants are seated, final trial reductions can be performed. The trial neck is designed with a protective covering over the male taper for use with the final metaphyseal segment. This covering protects the metaphyseal taper from damage during trial reduction.

Select the same Neck Trial that was used during the previous trial reductions. Placement of the Neck Trial can follow the surgical technique described above.

NOTE: *It is recommended to trial again, as the final implants may seat differently than the trials.*

To re-establish the desired neck version, use the cauterized mark on the bone as a reference. Insert the Implant Assembler Body with Neck Version Guide into the Neck Trial. Make sure the angled pegs firmly contact the neck on both sides. With the Implant Assembler Body coaxial with the neck, replicate the version using the Neck Version Guide on the assembler *(Figure 28).* Insert the appropriate Trial Screw and tighten. As before, the Locking Screw should be adequately tightened using the Torque-Limiting Adapter on the T-Handle Driver and Neck Stabilizer to prevent any rotation of the neck segment during trial reduction. The Head Trial may now be selected and trial reductions performed. If version needs to be adjusted, it is important to adjust Neck Version Guide so it may be used as a reference for the final implant.

Insertion of Neck Segment Implant
After the stem and metaphyseal segments have been implanted, thread the **Assembler Rod** into the stem segment *(Figure 29)*. The threads should be snug but not over-tightened. Clean and dry the tapers. Place the definitive neck segment over the rod, taking care not to lock the tapers. Insert the **Assembler Body** over the Assembler Rod and into the neck, ensuring the Neck Version Guide is pointing to the cauterized mark on the bone *(Figure 30)* and the angled pegs firmly contact the neck on both sides. As the tapers are engaging, verify that the version pin remains pointed to the mark on the bone.

Place the **Assembler Pliers** over the rod, flush against the proximal surface of the Assembler Body *(Figure 31)*. Squeeze the pliers until there is about an inch of clearance between the handle tips. The neck taper is now tight within the metaphyseal taper. Verify that the neck version is correct. If final version adjustments are needed at this point, the neck can be easily removed with the **Separating Wedge**.

With the pliers engaged, place the **Impact Adapter** over the rod and the Neck Assembler Body and impact with sharp mallet blows *(Figure 32)*. Engaging the pliers will avoid the possibility of disengaging the stem segment while impacting.

NOTE: *If the Assembler Rod cannot be removed by hand, it can be removed with the assembler pliers. Place the assembler pliers over the rod, squeeze, and rotate counter-clockwise.*

Insertion of Modular Stem Screw
To provide counter-torque while tightening the screw, the Neck Stabilizer instrument is placed over the neck segment taper *(Figure 33)*.

Figure 28
Trialing neck version on final stem and metaphyseal implants using implant assembler body with Neck Version Guide

Figure 29
Final neck segment placed over Assembler Rod

Figure 30
Implant assembler body with neck version guide placed through Assembler Rod

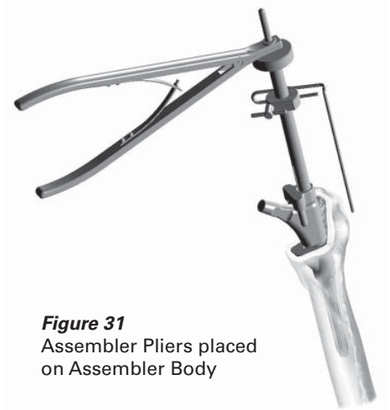


Figure 31
Assembler Pliers placed on Assembler Body

Impact Adapter

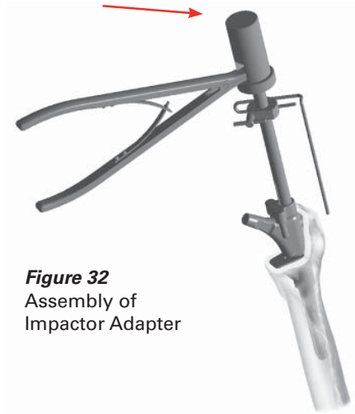


Figure 32
Assembly of Impactor Adapter

Figure 33
Screw is tightened using the Neck Stabilizer

Figure 34
Neck Segment Separating Wedge placement

Insert the implant locking screw with care to exclude any foreign material. Tighten the screw with the Torque-Limiting Driver until the adapter creates an audible confirmation. At this point, further trial reductions can be performed using trial heads to determine the appropriate femoral head length.

The final femoral head may now be assembled and the hip reduced.

SEPARATION OF NECK/METAPHYSEAL SEGMENTS

If version adjustments are needed after the implants have been assembled, a removal wedge is provided.

The Separating Wedge can separate impacted and/or physiologically loaded necks, but the procedure may require considerably more impact force.

Place the wedge tip into the gap between the neck and metaphyseal segments *(Figure 34)*. Do not point the wedge tip at the taper junction. Impacting the wedge towards the taper junction could result in damage to the neck taper area and may stop forward travel of the instrument, which will likely prevent the wedge from separating the neck. Do not pry on the instrument when it is in the neck/metaphyseal gap. Prying may cause the wedge tip to fracture.

With the wedge oriented in the position previously described, tap the end of the wedge using small, sharp impacts until the neck separates from the metaphyseal segment. Sharp impacts are recommended to minimize trauma to the femur and facilitate successful taper separation.

If needed, verify correct neck version using the Neck Trial, Trial Screw and Assembler Body. If the neck was removed prior to impaction and tightening of the locking screw, reassemble the neck in the correct version. If the neck taper has been damaged, a new neck must be used. An impacted and/or physiologically loaded neck must always be replaced with a new neck and assembly screw.

NOTE: *Disassembly and reassembly may cause damage to the neck segment and/or metaphyseal segment tapers. If any taper damage occurs during neck separation, new implants must be used.*

Other Suggestions
In revision cases or in complex primary cases with poor bone stock, the surgeon may elect to place one or more cerclage wires around the proximal femur to reduce risk of femoral fractures.

SYSTEM SPECIFICATIONS

Neck Segment
The anterior/posterior (A/P) dimension of the neck, with its neck flat design, has an 8mm cross-section that allows for 147 degrees of mechanical range of motion with a 28mm head in flexion and extension.

The charts illustrate the actual values* of vertical height and offset for each neck segment.

VERTICAL HEIGHTS* (mm)

Femoral Head	Segments				
	-5	+0	+10	+20**	+30**
-3.5	31	36	46	56	66
+0	33	38	48	58	68
+3.5	35	40	50	60	70
+7	38	43	53	63	73
+10	40	45	55	65	75

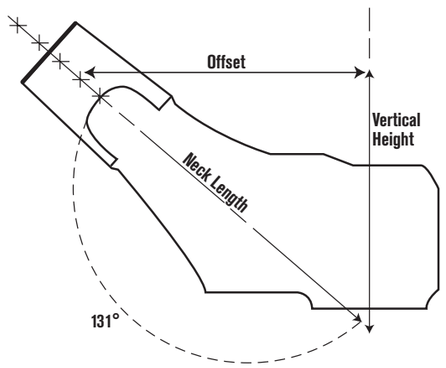
NECK LENGTHS* (mm)

-3.5 Head		+0 Head		+3.5 Head		+7 Head		+10 Head	
LO	HO	LO	HO	LO	HO	LO	HO	LO	HO
45	51	48	55	52	58	55	62	58	65

OFFSETS* (mm)

-3.5 Head		+0 Head		+3.5 Head		+7 Head		+10 Head	
LO	HO	LO	HO	LO	HO	LO	HO	LO	HO
34	39	36	41	39	44	42	47	44	49

**Values are rounded up to the next whole number.*
***Available in high offset only.*



Metaphyseal Segment
The metaphyseal segments are measured in two dimensions, diameter and flare size. The trapezoidal shape and 5 degree proximal-to-distal taper provide for initial fixation. Circumferential plasma spray provides a scratch-fit for stable long-term fixation.

Stem Segment
AcuMatch M-Series stems are available in diameters and lengths to meet fixation requirements of both primary and revision hip arthroplasty. All stems feature longitudinal flutes that add 1.25mm (0.625mm per side) of diameter.

There is a longitudinal slot in all stems (perpendicular to the plane of curvature in a curved stem) to aid in the reduction of thigh pain and to accommodate variability in the bow of the femur. A beneficial feature of the AcuMatch M-Series design is the ability to place the stem in the femur in any rotational orientation relative to the neck version.

SYSTEM COMPONENTS

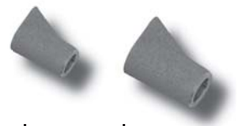
Neck Segments

Vertical Height	High Offset	Low Offset
-5	158-02-95	158-02-05
+0	158-02-01	158-02-06
+10	158-02-02	158-02-07
+20	158-02-03	N/A
+30	158-02-04	N/A

Calcar Replacing Segments

Diameter	Catalog No.	Diameter	Catalog No.
21mm	150-32-21	27mm	150-32-27
23mm	150-32-23	29mm	150-32-29
25mm	150-32-25	31mm	150-32-31

SYSTEM COMPONENTS (cont)



Metaphyseal Segments

Diameter	Flare	Catalog No.	Diameter	Flare	Catalog No.
21mm	X-Small	150-21-00			
21mm	Small	150-21-01	27mm	Small	150-27-01
21mm	Medium	150-21-02	27mm	Medium	150-27-02
21mm	Large	150-21-03	27mm	Large	150-27-03
23mm	X-Small	150-23-00			
23mm	Small	150-23-01	29mm	Small	150-29-01
23mm	Medium	150-23-02	29mm	Medium	150-29-02
23mm	Large	150-23-03	29mm	Large	150-29-03
25mm	X-Small	150-25-00			
25mm	Small	150-25-01	31mm	Small	150-31-01
25mm	Medium	150-25-02	31mm	Medium	150-31-02
25mm	Large	150-25-03	31mm	Large	150-31-03

Femoral Heads

**skirted*

		Cobalt Chrome	Biolox® Forte Alumina Ceramic	Ziramic® Zirconia Ceramic
28mm	-3.5mm	142-28-93	140-28-93	148-28-93
	+0mm	142-28-00	140-28-00	148-28-00
	+3.5mm	142-28-03	140-28-03	148-28-03
	+7mm	142-28-07	N/A	148-28-07*
	+10mm	142-28-10*	N/A	148-28-10*
32mm	-3.5mm	142-32-93	140-32-93	148-32-93
	+0mm	142-32-00	140-32-00	148-32-00
	+3.5mm	142-32-03	140-32-03	148-32-03
	+7mm	142-32-07	N/A	148-32-07*
	+10mm	142-32-10*	N/A	148-32-10*
36mm	-3.5mm	142-36-93	142-36-93	148-36-93
	+0mm	142-36-00	142-36-00	148-36-00
	+3.5mm	142-36-03	142-36-03	148-36-03
	+7mm	142-36-07	N/A	148-36-07*
	+10mm	142-36-10	N/A	148-36-10*

Stem Segments

Straight Stem Diameter	Straight Stem Length	Catalog No.
11mm	135mm	150-07-13
11mm	165mm	150-07-14
11mm	200mm	150-07-15
13mm	165mm	150-07-16
13mm	200mm	150-07-17
15mm	165mm	150-07-18
15mm	200mm	150-07-19
17mm	165mm	150-07-20
17mm	200mm	150-07-21
19mm	165mm	150-07-22
19mm	200mm	150-07-23
21mm	165mm	150-07-24
21mm	200mm	150-07-25
Curved Stem Diameter	**Curved Stem Length**	**Catalog No.**
11mm	200mm	150-07-29
11mm	250mm	150-07-30
11mm	300mm	150-07-31
13mm	200mm	150-07-32
13mm	250mm	150-07-33
13mm	300mm	150-07-34
15mm	200mm	150-07-35
15mm	250mm	150-07-36
15mm	300mm	150-07-37
17mm	200mm	150-07-38
17mm	250mm	150-07-39
17mm	300mm	150-07-40
19mm	200mm	150-07-41
19mm	250mm	150-07-42
19mm	300mm	150-07-43
21mm	200mm	150-07-44
21mm	250mm	150-07-45
21mm	300mm	150-07-46

151-51-00	Straight Reamers 9mm-17.5 - Case 1
151-51-02	Straight Reamers 18mm-21.5 - Case 2
151-51-02	Conical Reamers, Mill Guides & Pilots - Case 3
151-51-03	Metaphyseal and Calcar Trials - Case 4
151-51-04	Stem Trials - Case 5
151-51-05	Head, Neck Trials & Misc. Instruments - Case 6

151-00-01 Round Osteotome

113-03-04 T-Handle Starter Reamer

101-14-00 Quick Release Hudson T-Handle

151-10-01 Straight End Cutting Reamer - 8mm

151-10-02	Straight Reamer, 9mm
151-10-03	Straight Reamer, 9.5mm
151-10-04	Straight Reamer, 10mm
151-10-21	Straight Reamer, 10.5mm
151-10-05	Straight Reamer, 11mm
151-10-06	Straight Reamer, 11.5mm
151-10-07	Straight Reamer, 12mm
151-10-22	Straight Reamer, 12.5mm
151-10-08	Straight Reamer, 13mm
151-10-09	Straight Reamer, 13.5mm
151-10-10	Straight Reamer, 14mm
151-10-23	Straight Reamer, 14.5mm
151-10-11	Straight Reamer, 15mm
151-10-12	Straight Reamer, 15.5mm
151-10-13	Straight Reamer, 16mm
151-10-24	Straight Reamer, 16.5mm
151-10-14	Straight Reamer, 17mm
151-10-15	Straight Reamer, 17.5mm
151-10-16	Straight Reamer, 18mm
151-10-25	Straight Reamer, 18.5mm
151-10-17	Straight Reamer, 19mm
151-10-18	Straight Reamer, 19.5mm
151-10-19	Straight Reamer, 20mm
151-10-26	Straight Reamer, 20.5mm
151-10-20	Straight Reamer, 21mm
151-10-27	Straight Reamer, 21.5mm

151-05-19	Conical Reamer, 19mm
151-05-21	Conical Reamer, 21mm
151-05-23	Conical Reamer, 23mm
151-05-25	Conical Reamer, 25mm
151-05-27	Conical Reamer, 27mm
151-05-29	Conical Reamer, 29mm
151-05-31	Conical Reamer, 31mm

151-06-11	Conical Reamer Pilot Shaft, 11x135mm
151-06-12	Conical Reamer Pilot Shaft, 11x165mm
151-06-13	Conical Reamer Pilot Shaft, 13x165mm
151-06-15	Conical Reamer Pilot Shaft, 15x165mm
151-06-17	Conical Reamer Pilot Shaft, 17x165mm
151-06-19	Conical Reamer Pilot Shaft, 19x165mm
151-06-21	Conical Reamer Pilot Shaft, 21x165mm

151-13-00 Mill Guide Sizing Pin

151-13-01 Mill Guide Handle

151-13-02	Mill Guide Orientation Pin

151-13-21	Metaphyseal Mill Guide, 21mm
151-13-23	Metaphyseal Mill Guide, 23mm
151-13-25	Metaphyseal Mill Guide, 25mm
151-13-27	Metaphyseal Mill Guide, 27mm
151-13-29	Metaphyseal Mill Guide, 29mm
151-13-31	Metaphyseal Mill Guide, 31mm

151-14-11	Metaphyseal Mill Guide Pilot Shaft, 11x135mm
151-14-12	Metaphyseal Mill Guide Pilot Shaft, 11x165mm
151-14-13	Metaphyseal Mill Guide Pilot Shaft, 13x165mm
151-14-15	Metaphyseal Mill Guide Pilot Shaft, 15x165mm
151-14-17	Metaphyseal Mill Guide Pilot Shaft, 17x165mm
151-14-19	Metaphyseal Mill Guide Pilot Shaft, 19x165mm
151-14-21	Metaphyseal Mill Guide Pilot Shaft, 21x165mm

151-15-00	Mill Guide Reamer

151-21-00	Metaphyseal Trial, 21mm, XS
151-21-01	Metaphyseal Trial, 21mm, S
151-21-02	Metaphyseal Trial, 21mm, M
151-21-03	Metaphyseal Trial, 21mm, L
151-23-00	Metaphyseal Trial, 23mm, XS
151-23-01	Metaphyseal Trial, 23mm, S
151-23-02	Metaphyseal Trial, 23mm, M
151-23-03	Metaphyseal Trial, 23mm, L
151-25-00	Metaphyseal Trial, 25mm, XS
151-25-01	Metaphyseal Trial, 25mm, S
151-25-02	Metaphyseal Trial, 25mm, M
151-25-03	Metaphyseal Trial, 25mm, L
151-27-01	Metaphyseal Trial, 27mm, S
151-27-02	Metaphyseal Trial, 27mm, M
151-27-03	Metaphyseal Trial, 27mm, L
151-29-01	Metaphyseal Trial, 29mm, S
151-29-02	Metaphyseal Trial, 29mm, M
151-29-03	Metaphyseal Trial, 29mm, L
151-31-01	Metaphyseal Trial, 31mm, S
151-31-02	Metaphyseal Trial, 31mm, M
151-31-03	Metaphyseal Trial, 31mm, L

151-32-21	Calcar Replacement Trial, 21mm
151-32-23	Calcar Replacement Trial, 23mm
151-32-25	Calcar Replacement Trial, 25mm
151-32-27	Calcar Replacement Trial, 27mm
151-32-29	Calcar Replacement Trial, 29mm
151-32-31	Calcar Replacement Trial, 31mm

151-50-00	Combined Impactor

151-50-21	Combined Impactor Shaft, 21mm
151-50-23	Combined Impactor Shaft, 23mm
151-50-25	Combined Impactor Shaft, 25mm
151-50-27	Combined Impactor Shaft, 27mm
151-50-29	Combined Impactor Shaft, 29mm
151-50-31	Combined Impactor Shaft, 31mm

151-00-07	Large Extractor Hook

151-00-18	Small Extractor Hook

151-00-16	Slaphammer Adapter

INSTRUMENT LISTING (cont)

151-00-04	Slaphammer

151-50-04	Implant Assembler Body with Neck Version Guide

151-07-13	Straight Stem Trial, 11x135mm
151-07-14	Straight Stem Trial, 11x165mm
151-07-15	Straight Stem Trial, 11x200mm
151-07-16	Straight Stem Trial, 13x165mm
151-07-17	Straight Stem Trial, 13x200mm
151-07-18	Straight Stem Trial, 15x165mm
151-07-19	Straight Stem Trial, 15x200mm
151-07-20	Straight Stem Trial, 17x165mm
151-07-21	Straight Stem Trial, 17x200mm
151-07-22	Straight Stem Trial, 19x165mm
151-07-23	Straight Stem Trial, 19x200mm
151-07-24	Straight Stem Trial, 21x165mm
151-07-25	Straight Stem Trial, 21x200mm

151-07-29	Curved Stem Trial, 11x200mm
151-07-30	Curved Stem Trial, 11x250mm
151-07-31	Curved Stem Trial, 11x300mm
151-07-32	Curved Stem Trial, 13x200mm
151-07-33	Curved Stem Trial, 13x250mm
151-07-34	Curved Stem Trial, 13x300mm
151-07-35	Curved Stem Trial, 15x200mm
151-07-36	Curved Stem Trial, 15x250mm
151-07-37	Curved Stem Trial, 15x300mm
151-07-38	Curved Stem Trial, 17x200mm
151-07-39	Curved Stem Trial, 17x250mm
151-07-40	Curved Stem Trial, 17x300mm
151-07-41	Curved Stem Trial, 19x200mm
151-07-42	Curved Stem Trial, 19x250mm
151-07-43	Curved Stem Trial, 19x300mm
151-07-44	Curved Stem Trial, 21x200mm
151-07-45	Curved Stem Trial, 21x250mm
151-07-46	Curved Stem Trial, 21x300mm

153-01-95	12/14 Neck Trial, -5mm, High Offset
153-01-01	12/14 Neck Trial, +0mm, High Offset
153-01-02	12/14 Neck Trial, +10mm, High Offset
153-01-03	12/14 Neck Trial, +20mm, High Offset
153-01-04	12/14 Neck Trial, +30mm, High Offset
153-01-05	12/14 Neck Trial, -5mm, Low Offset
153-01-06	12/14 Neck Trial, +0mm, Low Offset
153-01-07	12/14 Neck Trial, +10mm, Low Offset

151-50-01	Neck Separating Wedge

151-50-02	Assembler Rod

151-50-03	Assembly Pliers

151-50-05	Assembler Impact Adapter Block

151-00-09	Torque Limiting Adapter

INSTRUMENT LISTING (cont)

113-10-05 Stem Extractor

151-00-23 1/4" Hex Driver Shaft, Long

101-31-06 Ratcheting Screwdriver Handle (T-Handle)

151-01-15 Modular Trial Screw, 21mm/23mm
151-01-16 Modular Trial Screw, 25mm/27mm
151-01-17 Modular Trial Screw, 29mm/31mm

141-28-93 12/14 Femoral Head Trial, 28mm, -3.5mm
141-28-00 12/14 Femoral Head Trial, 28mm, +0mm
141-28-03 12/14 Femoral Head Trial, 28mm, +3.5mm
141-28-07 12/14 Femoral Head Trial, 28mm, +7mm
141-28-10 12/14 Femoral Head Trial, 28mm, +10mm

141-32-93 12/14 Femoral Head Trial, 32mm, -3.5mm
141-32-00 12/14 Femoral Head Trial, 32mm, +0mm
141-32-03 12/14 Femoral Head Trial, 32mm, +3.5mm
141-32-07 12/14 Femoral Head Trial, 32mm, +7mm
141-32-10 12/14 Femoral Head Trial, 32mm, +10mm

153-00-02 Neck Stabilizer/Head Impactor

DESCRIPTION

The AcuMatch® M-Series is a modular femoral stem system that includes four components: 1) high and low offset proximal neck segments; 2) standard and calcar replacing metaphyseal segments with plasma spray coating; 3) curved or straight distal stem segments, and; 4) screws. All components are manufactured from Titanium 6Al-4V alloy and assembled through tapered junctions supplemented with a machine screw to secure the assembly.

Exactech femoral stems are designed for use with femoral heads and endoprostheses of corresponding taper geometries. For example, 12/14 femoral stem components must only be used with 12/14 femoral heads. The femoral stems are designed to be used with any Exactech Hip System acetabular component.

A complete instrumentation and trial system is available to assist in accurate implantation of the AcuMatch® Hip System Prostheses.

INDICATIONS

The AcuMatch® M-Series is indicated for use in skeletally mature individuals undergoing primary surgery for total hip replacement due to osteoarthritis, osteonecrosis, congenital hip dysplasia, rheumatoid arthritis, ankylosing spondylitis, and/or post-traumatic degenerative problems. M-Series components are also potentially indicated for revision of failed previous reconstructions where sufficient bone stock and adequate soft tissues are present.

AcuMatch® M-Series components are intended for use in cemented and press-fit applications.

CONTRAINDICATIONS

The AcuMatch® M-Series components are contraindicated in patients with active infection, patients without sufficient bone stock to allow appropriate insertion and fixation of the prosthesis, in neuromuscular disorders that do not allow control of the hip joint, and in patients whose weight, age, or activity level would cause the surgeon to expect early failure of the system. See the following chart for further guidance:

Please note: The following chart is intended as general guidance for surgeons concerning patient weight and activity levels in the selection of the M-Series implant for a patient. This chart is not intended as a comprehensive listing of all factors a surgeon must consider when selecting the appropriate implant for an individual patient. Implant selection is exclusively at the discretion of the surgeon, in consideration of the implant characteristics and the particular needs of an individual patient.

		RISK ESTIMATION MATRIX		
Body Weight (lbs)	>250			
	150-250			
	<150			
		Sedentary	Moderate	Vigorous
		Activity Level		

Risk Estimation Legend	
	Excessive - Use is contraindicated. High probability of implant overload.
	Moderate - Use with discression. Implant may be subject to overloading.
	Expected - Use is indicated.

Examples of Activity Level	
Sedentary[1]	Walking slowly and sitting
Moderate[1]	Normal to fast walking, ascending and descending stairs
Vigorous[2]	Jogging and high impact activites

1. Bergmann, G., et al., 2001. Hip contact forces and gait patterns from routine activities. Journal of Biomechanics 34, 859-871

2. Bergmann, G., et al., 1993. Hip joint loading during walking and running, measured in two patients. Journal of Biomechanics 26, 969-990

WARNINGS AND PRECAUTIONS

Overloading may compromise the expected useful life of the AcuMatch® M-Series implant construct. The probability of overloading increases in adverse loading conditions such as may occur with large or overweight individuals, individuals with unusual gait patterns, stumbling or falling, and physically active individuals of any weight. The probability of overloading may be compounded when two or more of these adverse loading conditions occur simultaneously. Please note that other adverse loading conditions may exist that are not specifically identified.

Higher femoral head offset can reduce the endurance limit of the prosthesis. It is recommended to reconstruct the anatomic center of rotation of the hip joint with the minimal amount of femoral head offset compatible with satisfactory reconstruction.

All patients must be instructed on the limitations of the prosthesis, the potential for subsequent surgery and taught to govern their activities accordingly.

Only surgeons who have reviewed the literature regarding hip surgery and have had training in the technique should utilize these devices. Familiarity with and attention to appropriate surgical technique for hip arthroplasty and familiarity with The AcuMatch® Hip System is essential for success of the hip procedure.

The surgeon must not allow damage to polished bearing surfaces or damage and/or contamination of taper locking surfaces. Any alteration or damage to a component will reduce fatigue strength and may result in failure under load. The wear rate of prosthesis component contact surfaces is greatly accelerated if loose fragments of bone, bone cement, or other particulate debris become detached and act as an abrasive in the articular and modular interfaces.

Components should be handled with care to minimize contamination of the component surfaces with any material that would interfere with approximation of the bone cement to the component surfaces. In using cement for fixation, the surgeon should insure complete cement support on all parts of the prosthesis embedded in bone cement. Press fit components with hydroxyapatite (HA) coating should not be used with bone cement.

Implants must not be reused. Any implant, once used, should be discarded even though it may appear undamaged. Failure to adhere to these recommendations will result in increased probability of poor function, loosening, wear, fracture or premature failure.

Components of Exactech AcuMatch® Hip Systems should not be used with those of another manufacturer since dimensional compatibility cannot be assured.

Exactech screw components are not intended for screw attachment or fixation to the posterior elements (pedicles) of the cervical, thoracic, or lumbar spine.

ADVERSE EFFECTS

As with all hip systems, potential adverse effects include infection, loosening of components, fracture or bending of components, or change in position of components. There have been reports of sensitivity reactions to components of hip systems. Other potential adverse effects of hip surgery include neurovascular damage, dislocation, thromboembolic disease, osteolysis and other less common adverse effects. Failure of the prostheses due to any cause may result in the need for additional surgery.

UTILIZATION AND IMPLANTATION

Exactech manufactures various types of hip prostheses including, but not limited to, monolithic and modular femoral stems. Selection of Exactech Hip Systems components for a particular patient depends exclusively on the surgeon's judgment with respect to the requirements of the patient and the characteristics of the implant.

The surgeon shall become thoroughly familiar with the technique of implantation of the various prostheses by: (1) appropriate reading of the literature, (2) training in the operative skills and techniques required for hip arthroplasty surgery in general, and (3) reviewing information regarding use of implants and instrumentation specific to Exactech Hip Systems.

HOW SUPPLIED

Exactech implants are supplied sterile. Prior to use, all packages should be inspected for integrity. If a package is damaged, opened or contaminated in any way, it must not be used.

CAUTION

Federal law restricts this device to sale by or on the order of a physician.

INFORMATION

For further product information, please contact Customer Service, Exactech, Inc., Gainesville, Florida 32653, USA. (352) 377-1140, (800) 392-2832 or FAX (352) 378-2617.

Authorized European Representative
MediMark® Europe
11, rue Emile Zola B.P. 2332
38033 Grenoble Cedex 2
France

Some components may not be currently available. Please contact your Exactech representative for additional information.

352-377-1140
1-800-EXACTECH
www.exac.com

Exactech®

#711-06-30 Rev. C 0506

ISO 13485 CERTIFIED

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