



ReachTM

Revision Hip System

The Reach Revision System is part of the Alliance[®] Family.



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The unparalleled surgical latitude and clinical results of the Alliance® Family provide the basis from which the Reach™ Revision System was perfected. The Reach Revision System incorporates the proven bi-planar taper with an extensively porous-coated cylindrical distal stem. This combination provides proximal off-loading while obtaining excellent fit and increased potential for initial fixation in the most difficult revision cases. The Reach Revision System presents an integral complement to the highly successful performance of the Alliance Family.

Forged Titanium Alloy

- Provides high fatigue strength, biocompatibility and a low modulus of elasticity.

Bi-Planar Taper to 100mm Distally

- Promotes proximal off-loading vs. a completely cylindrical stem design.

Cylindrical Distal Stem Design

- Facilitates a scratch fit distally to increase the potential for initial fixation.

Extensively Coated Titanium Porous Plasma Spray

- Provides initial stability for potential long-term fixation.

Stem Lengths in 200mm Straight & Bowed and 250mm Bowed

- Provide fixation solutions for deficient femurs.

Duckbill Collar

- Helps to provide rotational stability and facilitates load transfer to the medial calcar.

Extended Neck Length

- Provides additional 6mm of length for revision cases where proximal bone stock is deficient.



The Reach Revision System is cleared for press-fit applications for the following indications: non-inflammatory osteoarthritis, avascular necrosis, rheumatoid arthritis, revisions of hip replacement components, treatment of non-union, femoral neck and trochanteric fractures of the proximal femur with head involvement.

Preoperative Planning

Preoperative planning can easily be performed with the Reach templates. It is recommended that a radiographic marker be used to assess X-ray magnification on an individual basis so that the proper templates can be selected.

In preoperative planning for a revision total hip replacement it is necessary to have good quality X-rays demonstrating an AP view of the entire femur, and a lateral X-ray of the entire femur. The femoral component for a revision total hip replacement must be stable and have host bone support for predictable success. It is desirable with the Reach Revision System to obtain

accurate fit and fill with both the proximal and distal portions of the prosthesis. By utilizing the X-rays and Reach templates a plan can be coordinated to ensure this takes place. The appropriate stem length can be made utilizing the X-ray with regard to bone loss and bone quality. A minimum of 5cm of diaphyseal bone is recommended to provide torsional stability when massive proximal bone loss is present. Restoration of the patient's leg length and offset should be addressed prior to the surgical procedure.

Case History



Preoperative

The patient is a 72-year old female who 18 years ago underwent a cemented THA. She had progressive groin and thigh pain and the bone scan confirmed acetabular and femoral component loosening. Preoperative planning called for a large cementless socket and an extended trochanteric osteotomy to facilitate cement removal, followed by an extensively porous-coated Reach femoral component to gain distal fixation.



Postoperative Evaluation

The postoperative radiographs show a cementless hemispherical socket in good position, fixed with screws. A 15mm x 200mm Reach stem has gained good distal fixation 8–10cm below the extended trochanteric osteotomy, which after being fixed with cables has gone on to unite uneventfully.

Exposure of the Femur

Surgical Approach

In general, the femur should be approached via one of the three different methods described below:

- Standard posterolateral approach
- Trochanteric slide osteotomy
- Extended trochanteric osteotomy

Standard Posterolateral Approach

In most revision situations, the posterolateral approach provides optimum exposure of the femur while minimizing the risk of complications arising from a trochanteric osteotomy. The main indications for the posterolateral approach is removal of loose cemented and cementless devices. The approach can be converted to a trochanteric slide or extended trochanteric osteotomy if difficulty extracting the prosthesis and/or cement is encountered.

The skin incision should parallel the femoral shaft for a distance of 10–15cm below the vastus lateralis ridge and angle posterior at a 45° angle approximately 1cm above the tip of the greater trochanter for a distance of 8–12cm extending toward the posterior iliac spine (Fig. 1). Dissection is continued through the fascia lata and anterior and posterior fascial flaps are created with blunt and sharp dissection to facilitate closure at the conclusion of the operation.

After insertion of the Charnley style retractor, the posterior proximal femoral skeletization is carried out by dissecting the remnants of the short external rotators and quadratus femoris off the bone (Fig. 2). The proximal interval between the gluteus medius and piriformis is identified and, if present, the piriformis is tagged and retracted posteriorly. Pseudo capsule and debris are then completely excised from the posterior, superior and inferior hip joint prior to dislocating the hip. The hip is dislocated. If the femoral component is loose, it is removed and the femur is retracted for preparation of the acetabulum. Femoral cement is left in place until the acetabular preparation is completed to facilitate hemostasis.

After preparation of the acetabular component, the femur is exposed by flexion and internal rotation of the leg and generally two retractors are placed beneath the lesser trochanter and greater trochanter. Cement and debris are removed from the femoral canal with either the Ultra-Drive® or cement removal instruments of the surgeon's choice. An effort should be made to remove as much anterior scar/debris as possible to prevent later impingement and dislocation. Large curettes are utilized to remove adherent endosteal membranes until host bone is encountered in the proximal and distal femur. The femur is now ready for preparation and implantation with the Reach Revision System.

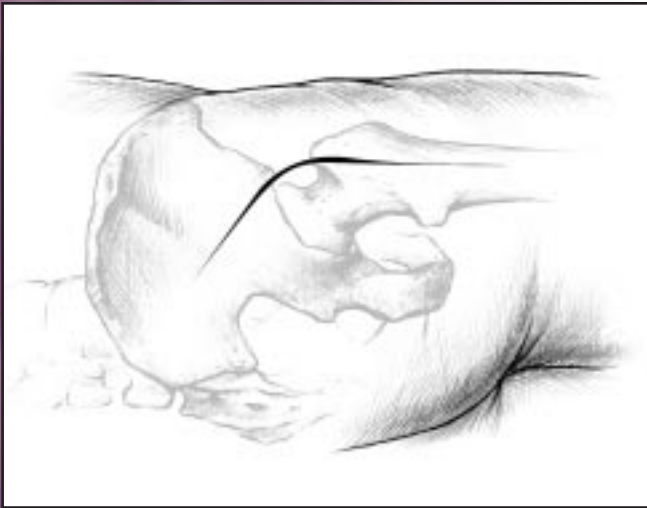


Figure 1

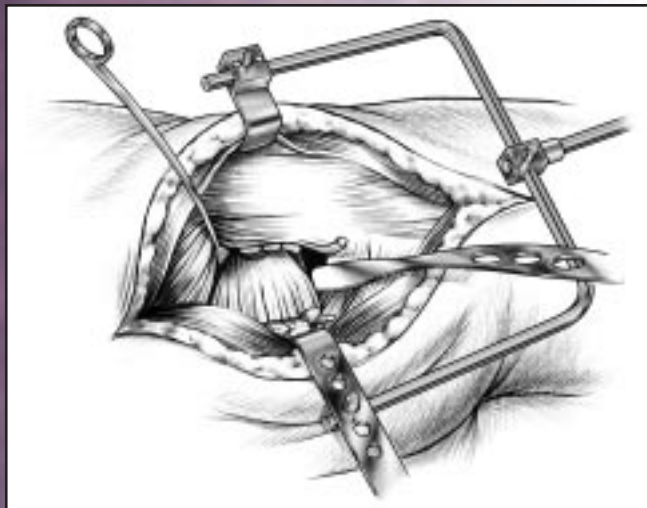


Figure 2

Trochanteric Slide Osteotomy

If a preexisting trochanteric nonunion is present or the greater trochanter alone is fractured during a posterolateral approach, the approach can be converted to a trochanteric slide osteotomy. Essentially the trochanter is kept in continuity with the gluteus medius proximally and the vastus lateralis distally and the entire musculosleeve can be retracted anterior or posterior independent of the remaining proximal femur to facilitate cement, debris and implant removal (Fig. 3 & 4). The approach is especially helpful in facilitating removal of anterior scar/debris. Reattachment of the trochanteric fragment is performed with use of standard techniques.

Extended Trochanteric Osteotomy

The extended trochanteric osteotomy is indicated for revision of partially or well-fixed cemented implants, cementless implants and for removal of distal cement. The technique is similar to that described above for the trochanteric slide osteotomy approach with the following additions:

After the femur is exposed, an oscillating saw or high-speed pencil-tipped tool is used to make a longitudinal osteotomy extending transversely through the greater trochanter and down the posterior proximal femur at a distance of 10–14cm below the tip of the greater trochanter. The osteotomy will encompass approximately one-third the circumference of the femur. A saw or pencil-tipped burr is then used to perforate the anterior cortex of the osteotomy. The distal osteotomy is then performed to connect the two longitudinal cuts and the entire fragment is elevated using several broad, flat osteotomes (Fig. 5). Care should be taken to ensure the fragment remains in one piece. In general, the osteotomy fragment is retracted anteriorly and the femur posterior for preparation of the femoral shaft.

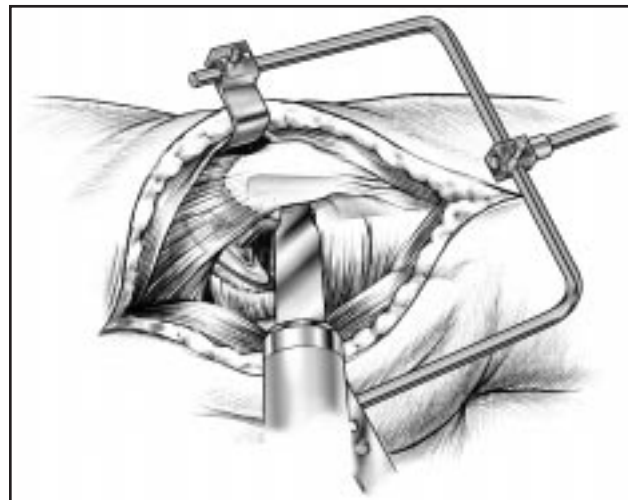


Figure 3



Figure 4

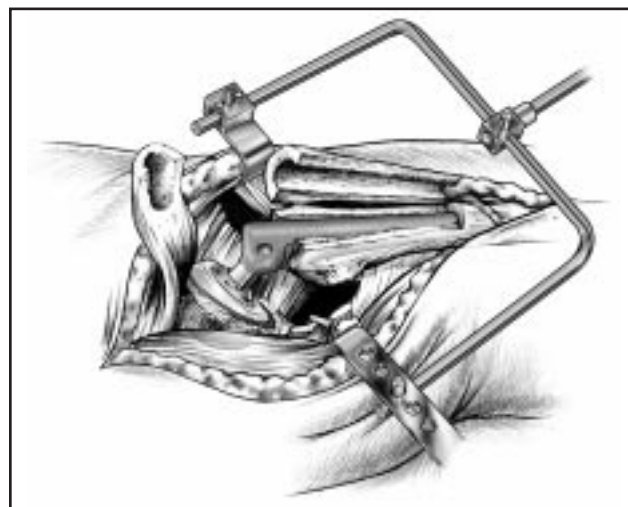


Figure 5

This brochure is presented to demonstrate the surgical technique utilized by Christopher Peters, M.D., University of Utah School of Medicine. Biomet, as the manufacturer of this device, does not practice medicine and does not recommend this or any other surgical technique for use on a specific patient. The surgeon who performs any implant procedure is responsible for determining and using the appropriate techniques for implanting the prosthesis in each individual patient. Biomet is not responsible for selection of the appropriate surgical technique to be used for an individual patient.

Cemented Femoral Component Removal

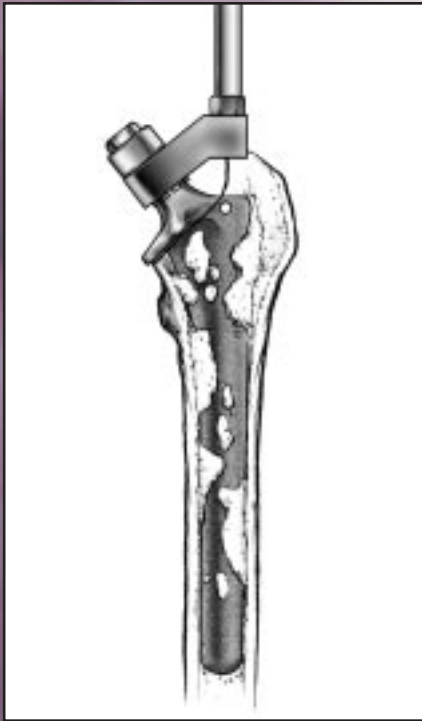


Figure 6

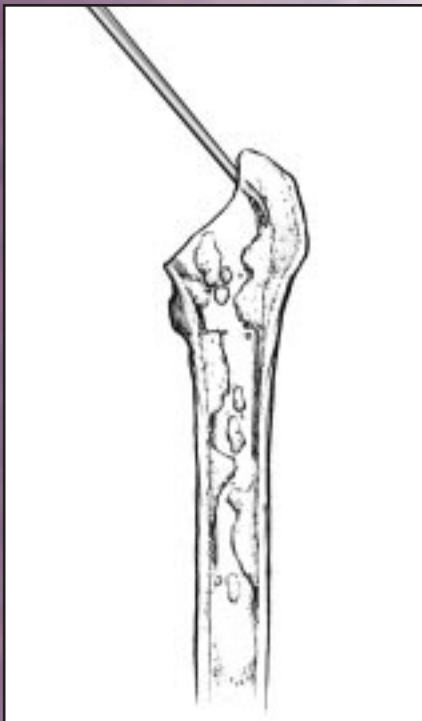


Figure 7

After one of the surgical exposures described before has sufficiently exposed the proximal portion of the femur, a determination should be made as to whether the cemented femoral component and cement can be removed through the proximal exposed portion of the femur or whether a more extensive approach (i.e., an extended trochanteric osteotomy) should be performed. In general, most first and second generation cemented stems that do not have a roughened or precoated surface are easily removed with a variety of extraction devices. If the component is mono-block, a looped-type of an extraction device with a slap-hammer easily extracts the component. If the component is modular, the femoral head should be disimpacted and a modular stem extractor, such as the Bohn™ (Fig. 6) or possibly a vicegrip, should be used on the Morse taper.

Once the femoral component itself has been removed, the cement mantle should be investigated. Cement should be removed from the top of the femur without sacrificing proximal bone stock. This can be accomplished with cement removal hand-tools (i.e., Moorland type instruments). The cement should be removed in piecemeal fashion from the proximal femur (Fig. 7). Care should be taken to preserve the distal diaphyseal portion of the femur under all circumstances. In general, if perforations in the proximal femur begin to occur because of well-fixed cement, it is probably appropriate to convert exposure to an extended trochanteric osteotomy and directly visualize the bone cement interface.

If most of the proximal cement has been removed without damaging proximal host bone stock and a well-fixed cement plug is the only thing that remains distally, ultrasonic cement removal instrumentation can prove helpful. In general, small windows to remove distal cement should be avoided with the use of a distally-fixed stem. An extended trochanteric osteotomy usually will facilitate removal of such distal cement with either ultrasonic instrumentation or with hand-tools. Continuity will be maintained of the distal diaphysis of the femur into which the fully porous-coated stem will be implanted.

Dependent upon proximal bone loss, at least 5cm of diaphyseal cortical contact with the cylindrical portion of the fully porous-coated stem will be necessary to ensure adequate fixation of the implant. Thus, the distal extent of any cortical perforation or the distal extent of an extended trochanteric osteotomy should be planned such that 5cm of bone implant contact is ensured.

Proximally Porous-Coated Devices

Loose proximally porous-coated devices are generally easily removed from the exposed proximal portion of the femur without the use of trochanteric osteotomy. Ingrown proximally porous-coated devices are most easily removed with the use of an extended trochanteric osteotomy (Fig. 8). Care should be taken to preserve the integrity of the trochanteric osteotomy fragment. High-speed power tools should be used to disrupt the areas of bone ingrowth anteriorly and posteriorly as well as medially. Occasionally, bone ingrowth directly underlying a collar will necessitate removal of some host bone in this area or possibly require the removal of the prosthetic collar with a metallic high-speed cutting instrument.

Extensively Coated Devices

Removal of extensively coated devices is substantially more difficult. The use of an extended trochanteric osteotomy is nearly always mandatory. Disruption of proximal fixation is as described above. Frequently, the stem must be cut at the junction between the proximal flare and the distal cylindrical portion with a high-speed metallic cutting instrument (Fig. 9). After removal of the proximal portion of the stem, trephine reamers should be utilized to ream over the top of the well-fixed distal portion of the stem in an attempt to remove as little diaphyseal bone as possible (Fig. 10).

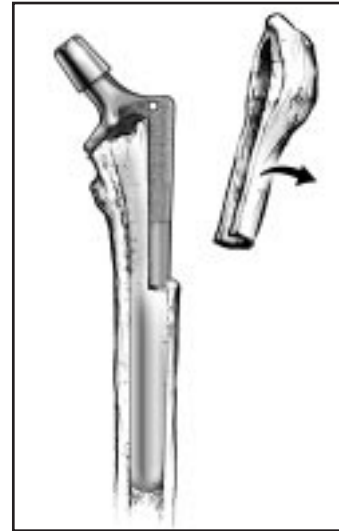


Figure 8



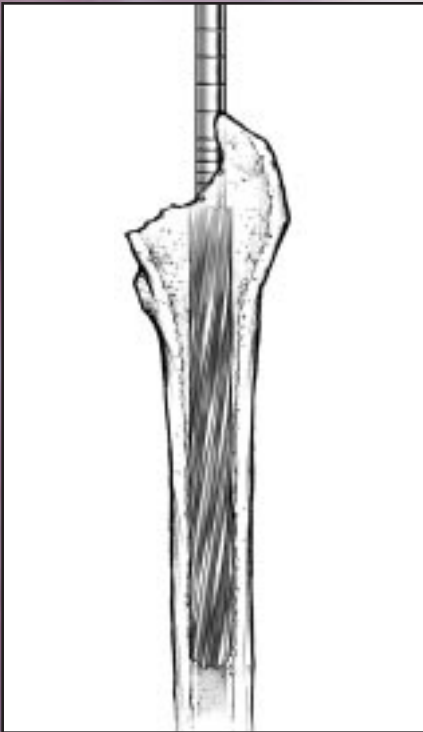
Figure 9



Figure 10

Implantation Technique for the Reach Revision Femoral Components

Reaming for the Reach 200mm Straight Component

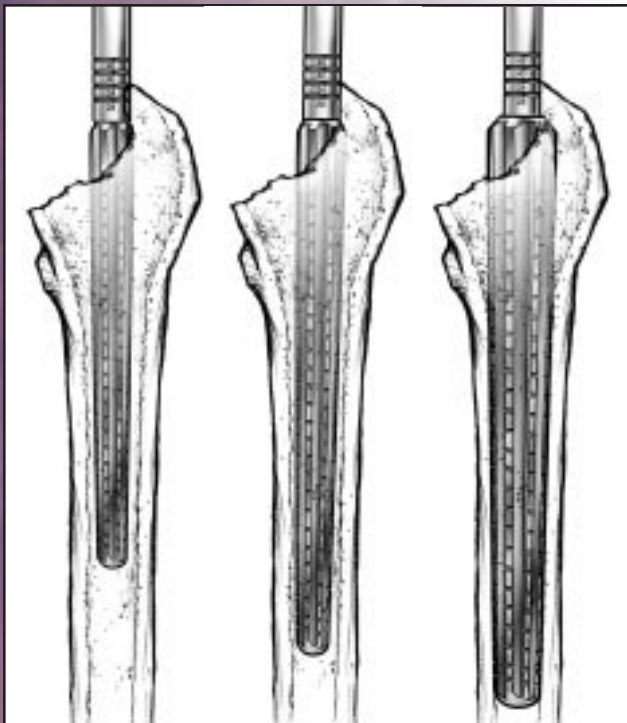


Cylindrical reaming
Figure 11

After removal of cement and fibrous debris from the femoral canal, it is frequently helpful to pass a flexible reamer down the entire length of the femoral canal to ensure complete removal of membrane and debris and to obtain an idea of the degree of anterior bow of the host femur. Cylindrical reamers are then advanced into the canal in 0.5mm increments until cortical chatter is obtained in the diaphyseal portion of the femur. Reaming should proceed until at least 5cm of good diaphyseal reamer contact is achieved (Fig. 11). However, over-reaming and removal of healthy cortical bone should be avoided. Depth of reaming should be carefully controlled, in order to avoid a perforation of the anterior cortex. Perforation of the anterior femoral cortex with the straight 200mm stem is the most common error when implanting this particular stem. If there is uncertainty about whether an anterior perforation has occurred, usually manual palpation with the surgeon's left index finger can palpate the anterior femoral cortex directly through the vastus musculature and determine whether a perforation has occurred.

Once cylindrical reaming is completed, the Alliance[®] tapered reamer corresponding to a size two to three sizes smaller than the last cylindrical reamer utilized is chosen. The tapered reamers are advanced in 1mm increments until the gold nitrided portion of the reamer is at the level of the calcar or the appropriate depth groove on the reamer shank is to the level of the top of the greater trochanter (Fig. 12).

Tapered reaming should proceed until the same size as the last cylindrical reamer used has been reached.



Tapered reaming
Figure 12

Note: Over reaming may not be necessary when implanting the 200mm straight component. However, in a virgin-like femur, cylindrical reaming should proceed to 0.5mm over the anticipated final stem size. For example, for implantation of a size 15mm Reach stem, reaming with the cylindrical reamers should proceed to 15.5mm.

Reaming the Femur for the Reach 200mm Bowed or 250mm Bowed Components

Distal femoral reaming for the 200mm bowed and 250mm bowed femoral components should be initiated with flexible wire reamers over a guide wire to avoid distal canal perforations (Fig. 13).

Flexible reamers are advanced into the canal in 0.5mm increments until cortical chatter is obtained in the diaphyseal portion of the femur. Reaming should proceed until 5cm of good diaphyseal reamer contact is achieved.

Note: Flexible reaming should proceed to 1mm over the anticipated final stem size. For example, for implantation of a 15mm Reach stem, reaming with the flexible reamers should proceed to 16mm. After flexible reaming to the 200mm or 250mm depth, select the Alliance tapered reamer that is two to three sizes smaller than the last flexible reamer. The tapered reamer is advanced slowly within the canal until the gold, nitrided portion of the reamer is at the level of the calcar or the appropriate depth groove on the reamer shank is to the level of the top of the greater trochanter (Fig. 12). Tapered reaming should proceed until the same size as the last flexible reamer used has been reached.

Broaching the Proximal Femur for the Reach Revision Femoral Component

Once the appropriate reamers have been passed, broaching can be initiated. If a 15mm tapered reamer was the last size used, begin broaching with a 13mm Alliance broach. It is important that the broach be oriented so that the mediolateral axis of the broach is parallel to the anatomic mediolateral axis of the femoral neck (Fig. 14). This will help to ensure maximum proximal canal fill. The broach is impacted until it is at the medial bone level if present, or preoperatively templated position. Sequentially larger broaches are used until the final broach size that corresponds to the final tapered reamer size is selected (Fig. 15). With the proper size broach in place, the calcar, if present, is planed flush by using the calcar trimmer (Fig. 16). If a question arises as to whether appropriate fill has been obtained, an intraoperative X-ray is taken to assure proper fill. If trouble is encountered in fully seating the appropriate broach, the corresponding tapered reamer can be passed with an increase in the amount of lateral reaming. This will allow the broach to be fully seated.



Figure 13

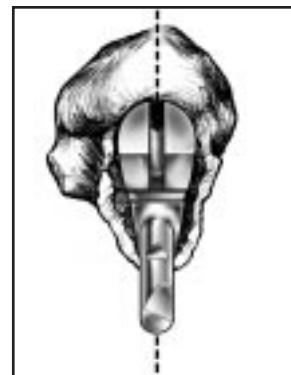


Figure 14

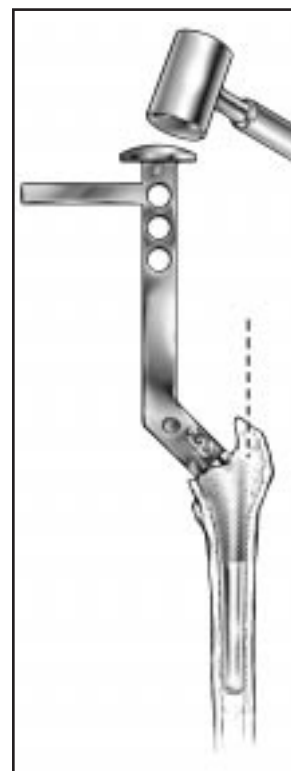


Figure 15

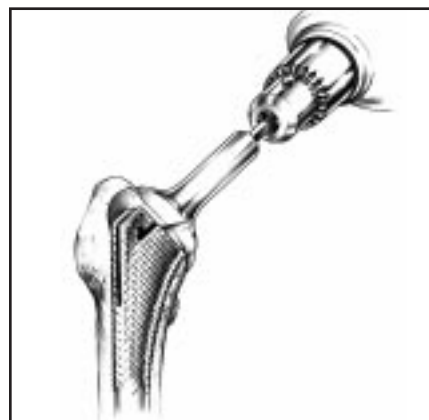


Figure 16

Trial Reduction for the Reach

The Reach Revision System provides titanium implant trials that match the implant's dimensions minus the proximal porous coating. This allows seating of the trial prosthesis without the worry of the trial becoming fixed in the femur. The trials also incorporate an extended 6mm neck length which match the final implants. After extracting the final broach from the femur, select the corresponding size trial prosthesis and insert with a threaded inserter/extractor (Fig. 17).

Example: Final tapered reamer and broach size is 15mm. When inserting the 15mm trial, resistance is encountered, preventing the 15mm trial from seating. Select a 0.5mm larger cylindrical or flexible reamer than the last one used and advance it 200 or 250mm in depth. Select 15mm trial and seat again. If resistance is still encountered, select 15mm tapered reamer and advance it again down the canal, confirming proper depth and lateralization. Select 15mm trial and seat. If resistance is still encountered, select a 0.5mm larger cylindrical or flexible reamer and advance it down the canal again confirming proper depth. Seat 15mm trial. With the trial in place, provisional heads are selected to determine the appropriate neck length and lateral offset (Fig. 18).

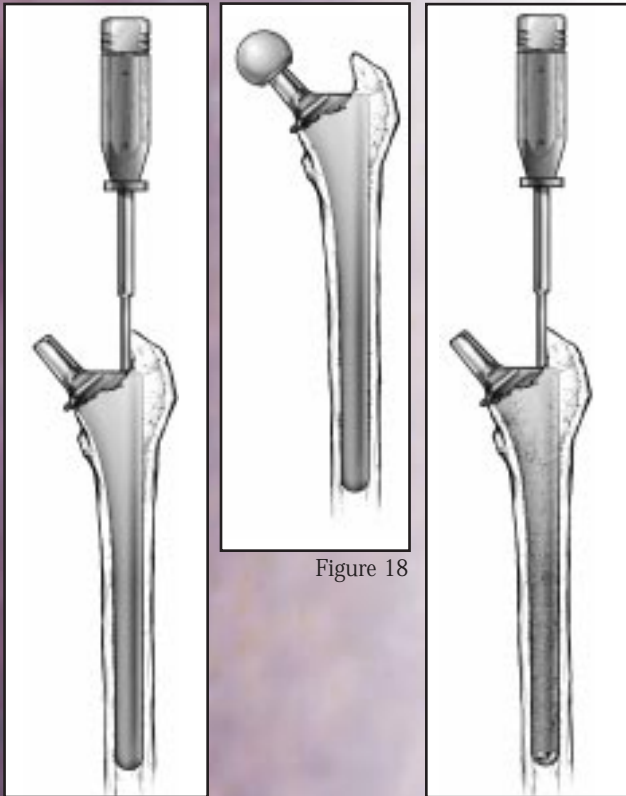


Figure 17

Figure 18

Figure 19

Inserting the Reach Porous Component

The stem corresponding to the size of the final broach used is threaded onto the stem inserter/extractor and impacted into the fully seated position (Fig. 19). The surgeon should expect to forcefully impact the stem into the prepared femoral canal due to the extensive porous coating and resultant extensive bone implant contact. The stem should advance with each moderate to vigorous blow of the mallet to the inserter/extractor to the level of final seating. If unusual resistance is met during impaction of the final stem, the surgeon should suspect that further over-reaming may be necessary. **Before the stem is locked into an unacceptably proud position, the surgeon should make the decision to remove the stem and over-ream the femur by another 0.5mm increment and then reimplant the final stem.** The collar of the stem may or may not seat flush against the medial calcar depending on the quality of host medial bone stock present. Rotational stability of the implant, however, is ensured with the extensive porous coating, and broad lateral shoulder of the prosthesis.

After fully seating the femoral component, the appropriate modular head is impacted onto the femoral neck and the hip is ready to be reduced (Fig. 20).

If desired, another trial reduction can be accomplished after implantation of the stem and prior to impacting the final modular head. Provisional heads in seven neck lengths allow trial reduction to be performed using the actual femoral component to, again, assure proper leg length and stability.

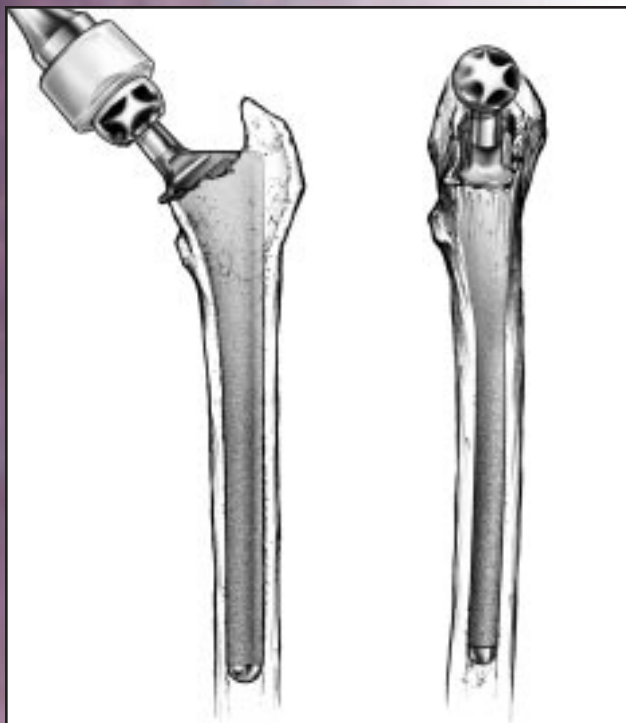


Figure 20

Ordering Information

Reach™ 200mm Straight Stems

| Implants | Provisionals | Description |
|-----------|--------------|-------------|
| 12-162113 | 31-162313 | 13X200mm |
| 12-162115 | 31-162315 | 15X200mm |
| 12-162117 | 31-162317 | 17X200mm |
| 12-162119 | 31-162319 | 19X200mm |

Reach™ 250mm Bowed Stems

| Implants | Provisionals | Description |
|-----------|--------------|-------------|
| 11-162113 | 31-162213 | 13X250 LT |
| 11-162114 | 31-162214 | 13X250 RT |
| 11-162115 | 31-162215 | 15X250 LT |
| 11-162116 | 31-162216 | 15X250 RT |
| 11-162117 | 31-162217 | 17X250 LT |
| 11-162118 | 31-162218 | 17X250 RT |
| 11-162119 | 31-162219 | 19X250 LT |
| 11-162120 | 31-162220 | 19X250 RT |

Cylindrical Reamers

| | |
|--------|--------|
| 428159 | 9.0mm |
| 428160 | 9.5mm |
| 428161 | 10.0mm |
| 428162 | 10.5mm |
| 428163 | 11.0mm |
| 428164 | 11.5mm |
| 428165 | 12.0mm |
| 428166 | 12.5mm |
| 428167 | 13.0mm |
| 428168 | 13.5mm |
| 428169 | 14.0mm |
| 428170 | 14.5mm |
| 428171 | 15.0mm |
| 428172 | 15.5mm |
| 428173 | 16.0mm |
| 428174 | 16.5mm |
| 428175 | 17.0mm |
| 428176 | 17.5mm |
| 428177 | 18.0mm |

Ball Tip Guide Wires

| | |
|--------|--------------|
| 469020 | 2.0mm X 60cm |
| 469055 | 3.2mm X 55cm |

Reach™ 200mm Bowed Stems

| Implants | Provisionals | Description |
|----------|--------------|-------------|
| 162113 | 31-162113 | 13X200 LT |
| 162114 | 31-162114 | 13X200 RT |
| 162115 | 31-162115 | 15X200 LT |
| 162116 | 31-162116 | 15X200 RT |
| 162117 | 31-162117 | 17X200 LT |
| 162118 | 31-162118 | 17X200 RT |
| 162119 | 31-162119 | 19X200 LT |
| 162120 | 31-162120 | 19X200 RT |

Flexible Reamer Heads

| | |
|--------|--------|
| 467734 | 8.0mm |
| 467736 | 8.5mm |
| 467738 | 9.0mm |
| 467740 | 9.5mm |
| 467742 | 10.0mm |
| 467744 | 10.5mm |
| 467746 | 11.0mm |
| 467748 | 11.5mm |
| 467750 | 12.0mm |
| 467752 | 12.5mm |
| 467754 | 13.0mm |
| 467756 | 13.5mm |
| 467758 | 14.0mm |
| 467760 | 14.5mm |
| 467762 | 15.0mm |
| 467764 | 15.5mm |
| 467766 | 16.0mm |
| 467768 | 16.5mm |
| 467770 | 17.0mm |
| 467772 | 17.5mm |
| 467774 | 18.0mm |
| 467776 | 18.5mm |
| 467778 | 19.0mm |
| 467780 | 19.5mm |
| 467782 | 20.0mm |

Flexible Reamer Shafts

| | |
|--------|------------------|
| 467716 | 8.0mm dia X 40cm |
| 467718 | 8.0mm dia X 52cm |

Sterilization Cases

| | |
|--------|------------------------------------|
| 595042 | 200mm Straight and Bowed Trials |
| 595043 | 250mm Bowed Trials |



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