The PLR™ splined revision stem is designed to recreate the natural stresses in the revised femur, where proximal bone may be compromised.
The Proximal Loading Revision (PLR™) splined stem is designed to bridge proximal defects, while achieving a precise distal fit in the revision femoral bone.

**Materials**

The choice of titanium in a press fit application allows for greater biocompatibility, and a modulus of elasticity closer to that of bone compared to other implant materials. The surface of the implant is roughened by a 30 grit-blast along the entire stem length to create an opportunity for potential long term stability through bone on-growth.1,2

**Advanced Stem Geometry**

The PLR™ stem is gradually tapered 1.5° proximal to distal. The metal core exhibits a slightly different taper than the outer (spline) dimension to gradually reduce the stiffness of the implant from proximal to distal. The splines are deeper at the distal end (2–2.5mm) and slightly shallower proximally (1.5–2mm). The advanced spline geometry of the PLR™ stem allows for an increased “bite” into the distal bone, while using less metal than a solid stem. This provides approximately twice the rotational stability of fully porous cylindrical stems, while making the stem considerably less stiff.3 This unique spline geometry also provides resistance to subsidence. As an added benefit, the surface area of the stem is increased due to its splined geometry providing more contact with the host bone, thus maximizing the opportunity for bone on-growth. The distal tip of the long stems—270mm—is tapered to reduce the possibility of spline cutout through the anterior cortex of the femur (Figure A).

**Recreation of Anatomic Offset**

The neck shaft angle of the PLR™ splined revision stem is 135°, allowing the surgeon to recreate the patient’s normal anatomic offset, which reduces the chance for dislocation and subluxation. The surgeon has added flexibility in recreating normal hip biomechanics through the use of 28mm and 32mm modular heads in 7 neck lengths ranging from 28–46mm. A wide variety of Biomet acetabular shells and RingLoc® cup liners are used to achieve correct leg length and physiological abductor muscle tension.

**Lateral Soft Tissue Reattachment**

A three hole flange placed on the proximal lateral portion of the PLR™ revision stem allows the surgeon to create additional stability by sutureing soft tissue to the stem.

**Precise, Simple Instrumentation and Sizing**

The PLR™ splined revision stem is available in 270mm length measured from the medial resection level to the stem tip. Each stem length is available in 1mm increments from 14mm to 24mm.

Instrumentation for the PLR™ stem provides simple, reproducible, and accurate placement of the stem. The flow from templating to accurate implant insertion is facilitated by well-marked, simple instrumentation. Size specific reamers and trials are used to implant the PLR™ revision stem. Each reamer and trial is sized 1mm smaller than the outer diameter of the corresponding prosthesis, allowing each spline to cut 1/2mm into virgin bone. Each template, reamer and corresponding trial are etched with depth markings to assure precise positioning. Implants are marked and correspond to the trial to allow for precise recreation of femoral anteversion.

![Figure A](image)

![Preoperative X-ray](image)

![Postoperative X-ray](image)
The goal of the PLR™ splined revision stem is to create stable long-term fixation in hip reconstructive situations where proximal bone is missing or cavitated due to the presence of osteolytic lesions or stress shielding.

Surgical Technique

X-ray Templating

X-ray templating is crucial to operative sizing, reaming, trialing, and final implant position. Templates (Figure 1) are placed such that the center of the head is recreated with the template overlay. The correct implant size is chosen by the template that fills the metaphysis and diaphysis best on both A/P and lateral views. Once this is accomplished the appropriate template is placed over the x-ray, an easily accessible bony landmark is identified (possibly the lesser trochanter or a bony proximal landmark that can be found intraoperatively). The depth line on the template corresponding to the bony landmark chosen is identified and noted by the surgical team or on the x-ray (Figure 2). Note: This is important because reamer and trial markings corresponding to this line will be used in surgery.

Step One: Removal of Implant

Removal of implant, cement and soft tissue is performed, while maintaining intact cortical walls and preserving as much host bone as possible. Care should be taken to remove all cement, soft tissue and debris.

Step Two: Reaming

Reaming is initiated with the smaller sized PLR™ tapered reamers to create a channel for subsequent reamers. Reaming is sequentially accomplished in 1mm increments to the templated diameter or until “cortical chatter” of the reamer is felt and heard. Each reamer should be positioned with the templated depth mark located at the bony landmark. This represents the appropriate diameter trial and prostheses to use (Figure 3).

The PLR™ System was designed in conjunction with Chris Peters, M.D. 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.
**Step Three: Trial**

The correct size trial is placed into the canal and lightly tapped into position noting that the trial depth marking is placed at the bony landmark as was identified in templating, and in the reaming process (Figure 4). Care should also be taken to place the trial stem in the correct amount of anteversion as required to make the hip stable and allow for proper range of motion (note the anteversion marking on the trial—vertical line anteriorly and posteriorly) (Figure 5). A trial head may be placed on the trial and a trial reduction completed at this time. If a change in version is required, the trial may be changed and reset at this point. Once trial reduction is completed, the trial head is removed and a mark (surgical marker or Bovie) is made on the bone at the location of the anteversion control line running vertically along the length of the trial (Figure 6). This line will reference the anteversion of the prosthesis.

**Step Four: Prosthesis Implantation**

Make a mark on the implant correlating to the depth marking from the trial as to the depth to drive the implant. The implant is placed into the canal such that the anteversion control line on bone is placed in the groove between the two splines on the anterior portion of the prosthesis (the centerline—Figure 7a) (Figure 7b). The prosthesis is then lightly tapped into place. A snug fit is expected as the splines are allowed to cut into the bone. The prosthesis is driven into the canal to the correct level as noted on the template, the reamer, and the trial. The head trial can be placed onto the neck of the prosthesis and another trial reduction can be completed to recheck stability, range of motion, and leg length. The appropriate head is then placed onto the trunion of the prosthesis and lightly tapped to secure the taper junction.

Limb length can be adjusted using trials and implants one size over or under the reamed diameter. This will change leg length by approximately 3cm longer or shorter. It is also possible to change leg length in small increments by driving the implant deeper or letting the implant sit slightly proud.
The PLR™ splined revision stem is a one piece, fully tapered stem with an anatomical offset to resist subluxation.
## Ordering Information

### Implants

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<tr>
<th>PLR™ Revision Stems</th>
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### References


3. Data on file at Biomet

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RingLoc® is a registered trademark of Biomet, Inc.

PLR™ is a trademark of Biomet, Inc.