"Intra-operative Techniques in using Proximal Modular Stems"

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Preoperative Planning

Preoperative planning, which requires templating, of the patients x-rays and provides important communications of the potential needs to the operating room with additional notification to implant companies can and does save valuable time, improve efficiencies and outcomes for each individual case.

The proper staging of surgical procedures is often neglected or taken for granted resulting in added OR time and risk for the patient. Example: will allograft or autograft be needed? Will intraoperative x-rays be needed? Will certain non-standardize instruments (Explant) be needed? Will additional personal be needed and will there be a change of personnel if the case drags on? All of these and more can affect the flow and outcome of the surgical procedure.

Templating

Work from Accurate Radiographs. Ensure that the pelvis is centred over the pubic symphysis for the A/P Pelvis radiograph. For the lateral radiograph use a Lauenstein technique (frog leg lateral). It is recommended to use a radiographic marker or scale.

Note: In standard A/P x-rays often the patient is placed in neutral or external rotation resulting in less than ideal position for measuring femoral offset. When possible try to get 20° of internal rotation. You might have to consider templating from the contralateral side.

If the OA hip can't rotate in and you see the Lesser Trochanter, templating from the non effective hip allows internal rotation and more accurate measurement of femoral offset.

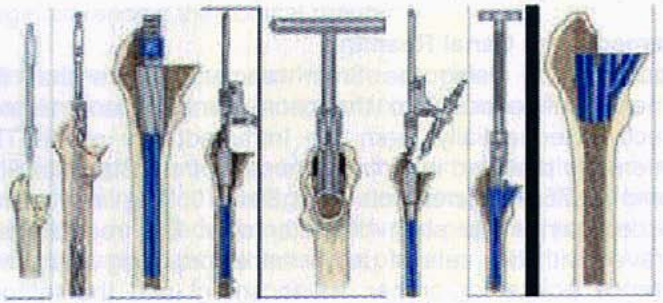
Determine Hip Centre of Rotation. Size the acetabular component using the porous shell Templates. If medializing the acetabular shell, the native centre of rotation may be slightly different from the centre of rotation for the templated porous shell. Place a small mark on the radiograph at the centre of rotation of the selected porous shell. **Determine Preoperative Leg Length Correction.**
Using the A/P Pelvis radiograph determine the leg length discrepancy from the contra-lateral hip or other clinical methods. Select a stem size that fits the intramedullary canal and fills \ the proximal metaphysis. Position the selected templated size on the A/P pelvis radiograph and select a modular neck size that places the "0" neutral femoral head at a position to correct the leg length discrepancy. In some cases a larger proximal body may be needed if large length discrepancies are presented.
Determine Neck Resection. Note the distance from the shoulder of the selected femoral stem to the lesser trochanter. Templates are printed with graduated markings for reference.
Surgical Technique should be simple and reproducible.

Femoral head resection
Measure proximally from the lesser trochanter and mark the distance, which corresponds to the proper resection, level from pre-operative planning. Resect the neck. The resection

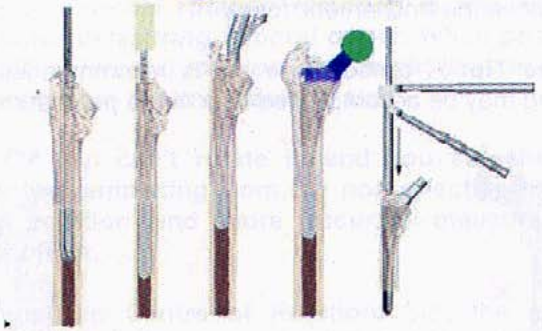
should be directed obliquely and medially from the level marked above the trochanteric fossa.

Technique Tip: A conservative cut is recommended here. Fine-tuning may be accomplished later in the procedure.

The surgical technique for proximal fit and fill stems comes out of the historical technique of the successful S-Rom ™ stem system. The technique for a proximal modular shoulder / neck junction is very similar.



Surgical Technique



One of the most important steps in using a straight stem regardless of specific design features
(monoblock, modular) is the femoral canal entry.

- As Charley Engh is fond of saying: **"If you are not struggling to be lateral you probably are not lateral enough.**

Intramedullary Canal Reaming
Begin reaming using the 8mm reamer. Assure that the reamers are passed into the canal centrally and aligned correctly. Sequentially ream the intramedullary canal. The reamers are provided in .5mm increments from Size 8 to Size 10 and in .75mm increments from Size 10. The final reamer size determines the stem diameter size. The reamers are engraved with two sets of depth marks providing alternative reference points for proper advancement into the femoral canal.

The proximal grooves correspond to the minimum depth to advance the reamer if using the tip of the greater trochanter as reference. Advance the straight reamer until the appropriate depth mark (from preoperative planning) is even with the tip of the greater trochanter.

The distal grooves correspond to the minimum depth to advance the reamer if using the resection plane as reference.

Flute Engagement
Flutes extend only to the mid-stem region of the **of this** MODULAR™ stem. This design prevents premature cortical engagement when aligning the stem within the canal. **Technique Tip:** If it is preferred that the flutes do not engage endosteal bone, use the next sequentially sized straight reamer and advance only to the distal reference point marked "Flutes."

Conical Reaming
Once the distal canal diameter is established, the proximal femur is prepared with a conical reamer followed by a broach to prepare for the medial spout.

Start proximal canal preparation with conical reamer one or two sizes smaller than the templated proximal body size. Attach a stem pilot that matches the distal stem diameter, and begin advancing the conical reamer.

Alternative reference marks are provided on the conical reamers for proper advancement into the femoral canal.

The distal groove corresponds to the correct depth to advance the conical reamer if using the resection plane as reference. Take care not to advance the enlarged proximal portion of the conical reamer past the resection plane.

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Technique Tip: Exercise care to direct the conical reamer centrally in the prepared canal.
Carefully ream the medial aspect of the greater trochanter to minimize the chance for varus positioning

Broaching
Start with the broach that is one or two sizes smaller than the last conical reamer. Attach the selected broach to the broach handle and then attach the appropriate stem pilot. Advance the broach to the depth established by the conical reamer and the neck resection plane. As with the conical reamers, reference marks to the greater trochanter are also provided on the broach handle. Once the final broach is used it should be seated into the final implant position.
Assess the stability of the broach. When satisfactory purchase has been achieved, detach the broach handle and leave the broach and stem pilot in place to serve as the femoral trial. Trim the neck resection using an oscillating saw or Rongeur as needed for proper seating of the neck trial. Mark the medial calcar even with the midline of the broach to aid prosthesis alignment during insertion.

TROCHANTER CLEARANCE

Trochanteric Reamer
A trochanteric reamer is provided in the instrument set to facilitate the placement of modular neck trials and neck implants. The distal face of the reamer body contains a cavity that accepts the stud on the broach. To use the trochanteric reamer, attach it to a driver and slide this cavity over the stud with the reamer's shaft angled medially as shown. Gradually apply power and lever the handle laterally until the appropriate amount of relief has been attained.

TROCHANTERIC REAMER

Gradually advance laterally until relief is achieved

TRIAL REDUCTION
The modular neck trials slide onto the stud on the proximal end of the broach. Select the neck trial based on preoperative planning and on the previous intraoperative assessments. Slide the neck trial onto the broach, taking care to establish the proper version (0 or ±13 degrees anteversion).
Affix a modular head trial onto the neck trial and reduce the hip. Assess leg length, range of motion, and stability.

Adjust as necessary by choosing a different neck / head combination, or by anteverting, or both.

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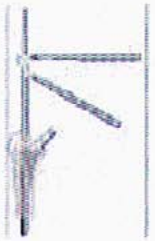
Colour Neck Trial Head Trial
Black or Brown Long - 3.5
Gray Short + 0
Blue Medium 3.5
Green Short 7
Leg length and offset may be finetuned by changing the neck and/or head. Often stability can be enhanced by choosing an anteverted neck (±13°)

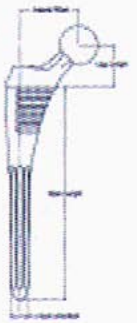
Implant Assembly
Device may be assembled on the back table or *in situ* depending on surgeon preference or surgical indication. The important feature to remember is that the surgeon has last minute opportunity to fine-tune joint mechanics without disruption of implant-bone interface. If assembled on the back table selection of appropriate proximal shoulder / neck (neutral or version 13°) is then assembled and inserted on the stem as a monoblock stem would be. If necessary, proximal modular neck can be removed and any adjustments made prior-to closure.

Important! Care must be taken to ensure that the mating surfaces of the stem and neck are clean prior-to and during assembly. Entrapped bone or soft tissue may result in incomplete seating of the neck.



Independent selection of femoral offset and vertical height is possible and we feel that restoration of joint mechanics is more reproducible with the use of proximal modular devices as compared to monoblock stems.

The use of proximal modular stems has in our clinical practice reduced dislocations as compared to monoblock stems and in the rare occasion post-operatively has allowed us to disengage the proximal modular junction for improved access to the hip joint. We find this device to be safe and effective and believe proximal modular junctions will become available by all manufactures' as has modular heads.



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