Bone Conserving Hip Replacement
Surgical technique

Corin
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Bone conserving hip replacement
Operative summary

a. Curved awl
b. Broaching
c. Trial reduction
d. Implantation
Overview

The MiniHip bone preserving, physiological hip replacement has been specifically designed to address the clinical needs of active men and women of all ages who would usually be appropriate for a standard uncemented hip replacement.

Anatomic restoration can be achieved by utilizing an optimal neck resection (Figure 1). The dedicated short stem design of the MiniHip combines the bone preserving benefits of hip resurfacing with the stability of traditional total hip replacement, providing a solution for uncemented patients.

Designed to ‘fit and fill’ the proximal neck, the MiniHip may promote immediate and long-term proximal stability, which is further enhanced with a hydroxyapatite coating for stable cementless fixation (Bi-coat™). The initial press fit coating may facilitate primary stability to help promote bone integration.

The specialized instrumentation designed for all approaches, including minimally invasive, combined with a practical operative technique, assists in facilitating:

- Bone preservation
- Natural physiological load transfer
- Proven Bi-coat fixation
- Reproducible anatomical restoration
- Efficient three stage procedure

Note: MiniHip is suitable for Dorr type A and B bone quality. MiniHip is not suitable for type C, osteoporotic stove femurs.
Pre-operative templating

When using the MiniHip system, pre-operative planning is critical to determine the optimal size, neck angle and offset of the implant. Templating will help determine the level of neck resection and optimal cup position. The MiniHip X-ray templates are available in four different magnifications (100%, 110%, 115% and 120%). The 115% magnification is provided as standard.

A/P and M/L X-rays should be used in combination with the templates to determine the correct size and positioning of the implant. The resection guide line or demarcation line is defined by using a medium length head (0mm) on the template overlaid onto the center of rotation. The template is then rotated to achieve fit and fill of the neck superiorly and laterally whilst also maximizing coverage of the medial calcar and having contact with the distal lateral cortices. When using the M/L X-ray, proximal contact should be achieved posteriorly and anteriorly, and distal contact should be achieved posteriorly.

⚠️ The demarcation line is where the cementless coating ends proximally.

To achieve anatomical restoration the following four key stages need to be implemented:

- Define center of rotation
- Fit and fill in the neck
- Maximal medial calcar contact
- Distal lateral contact/fill (posterior, anterior, posterior- PAP)

⚠️ The neck resection/demarcation line of the stem should always be parallel to the head-neck junction as shown by the red line in Figure 2.
**Operative technique**

**Step 1. Neck resection**
When defining the neck resection *in situ*, use the piriformis fossa as a constant landmark to determine the level of resection.

**Step 2. Curved starter awl**
The entry point of the starter awl should be 3-4mm superior to the center of the neck to create a pathway into the top of the diaphysis. This will help prevent both undersizing of the stem and misalignment of the broaches.

The curved starter awl is used for further femoral preparation accommodating the natural curvature of the proximal femur allowing the compaction broaches to follow a sequential pathway.

**Step 3. Femoral canal preparation**
The stem is designed to be supported by compacted cancellous bone thereby gaining mechanical stability and fixation in the neck and metaphysis. Always start with the smallest broach, progressively using larger broaches until the pre-templated size is achieved.
A stable fit is achieved when the broach fits and fills the proximal femur and the face of the final broach sits flush with the resection line, as detailed in the pre-operative templating on page 6.

\[\text{\textbullet} \text{ In order to ensure that the femur will accommodate the planned size of implant, a 1mm cancellous ring should be maintained around the broach for sizes 3-4 and a 2mm ring for sizes 5-9. Usually a 2-4mm ring of cancellous bone around the medial calcar is also observed.}\]

**Step 4. Trial reduction**
A trial reduction may then be performed using a trial head and the broach.

**Intraoperative X-ray**
To assess the trial orientation and sizing, it is recommended that an intraoperative X-ray using a C-arm be taken whilst the broach, trial neck and head are in still *in situ* prior to implantation of the definitive implants.

**Step 5. Implantation of the stem**
The final broach indicates the size of the definitive implant, which is inserted by hand.

\[\text{\textbullet} \text{ If the definitive stem seats by more than 10mm proud above the resection line, remove the stem and re-broach with the finishing broach 2-4mm below the resection line.}\]
Once the stem is seated by hand, the stem impactor can be used to fully seat the implant until the edge of the Bi-coat (demarcation line) is flush with the resection line.

**Step 6. Final reduction**

Once the acetabular cup is implanted, a full trial reduction can be performed allowing for fine tuning of the head offset. The definitive head is impacted onto the stem ensuring the trunnion is free from debris. The hip can then be reduced and closure performed.

**Stem extraction**

In the unlikely event that the stem needs to be removed, the stem extractor set can be used. The extractor device is placed over the 12/14 trunnion and the slap hammer is rotated until the trunnion is securely clamped. **Do not implant the stem with this instrument.**

Note: Do not overtighten the thread as this will cause damage to the plastic collar on the extractor. It should be tight enough to form an interference fit around the base of the neck to aid removal. The stem can then be extracted in conjunction with revision ancillary instruments.

⚠️ If the stem extractor is required, it should be ordered separately prior to the operation.
## Sizing guide

<table>
<thead>
<tr>
<th>Size</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tr>
<td>Offset (mm)</td>
<td>34.5</td>
<td>35.6</td>
<td>36.8</td>
<td>37.9</td>
<td>39.1</td>
<td>40.2</td>
<td>41.4</td>
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<td>Neck length (mm)</td>
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<td>32.5</td>
<td>33.5</td>
<td>34.5</td>
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<tr>
<td>Stem length (mm)</td>
<td>89.0</td>
<td>93.8</td>
<td>98.5</td>
<td>103.3</td>
<td>108.0</td>
<td>112.8</td>
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Description
The MiniHip is a titanium femoral stem (Ti-6Al-4V) coated with a layer of hydroxyapatite applied over a layer of pure titanium. The distal section of the stem is polished. The device is available in a range of seven sizes each providing a 130° CCD neck angle. The device is intended to be used with 12/14 modular taper heads.

The MiniHip is intended to provide increased patient mobility and reduce pain by replacing the damaged hip joint articulation in patients where there is evidence of sufficient sound bone to seat and support the components.

Indications
The indications for the MiniHip stem as a total hip arthroplasty include:
- Non-inflammatory degenerative joint disease including osteoarthritis and avascular necrosis
- Rheumatoid arthritis
- Correction of functional deformity
- Developmental dysplasia/congenital dislocation of the hip

The MiniHip stem is indicated for cementless use only.

Contraindications
- Infection
- Osteomyelitis
- Sepsis
- Osteomalacia
- Distant foci of infections
- Osteoporosis
- Marked bone loss or bone resorption
- Metabolic disorders which may impair bone formation
- Vascular insufficiency
- Muscular atrophy or neuromuscular disease
- Allergy to implant material
- Severe deformity

Due to components not yet available in the USA, the MiniHip stem should not be used with modular head components which result in an effective offset of greater than +4mm. Stem sizes 1 and 2 are not currently available for use in the United States.

Ordering information

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<th>Implants</th>
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References:


2. Short stems are less likely to lead to bone resorption; bone remodeling following THR. Yeoman M, Cizinauskas A, Lowry C, Vincent G, Collins SN, Simpson DJ, Continuum Blue, UK; 2 – Corin Ltd, UK; 3 – Imorphics, UK. Data held on file at Corin

3. Short stem total hip replacement: are you being conservative enough? Simpson DJ, Lowry C, Yeoman M, Cizinauskas A, Vincent G, Collins SN, Corin, UK; 2 - Continuum Blue, UK; 3 - Imorphics, UK. Data held on file at Corin