



Spine

Trauma

BioMaterials

Cement

Joint Replacement

Bi-Metric™ Operative Technique

The Bi-Metric primary femoral component range was initially developed in 1984 and has been one of Biomet's most successful implants. Based on the tapered stem geometry principle that implant longevity is reliant on optimum stress distribution into the proximal femur, the Biomet range of femoral components has delivered over 21 years of clinical success.

Available for both cementless and cemented applications in a wide range of diameters, the Bi-Metric femoral components can be combined with all of the Biomet articulation and acetabular systems making it one of the most versatile systems available today.



Disclaimer

Biomet UK Ltd, as the manufacturer of this device, does not practice medicine and does not recommend any particular surgical technique for use on a specific patient. The surgeon who performs any implant procedure is responsible for determining and utilising the appropriate techniques for implanting the prosthesis in each particular patient. Biomet UK Ltd is not responsible for selection of the appropriate surgical technique to be utilised for an individual patient.

Bi-Metric® Hip System - Operative technique

1. Pre-operative planning

Selection of the correct femoral component is attained through careful pre-operative planning. This can be achieved manually by means of x-ray templates, or digitally by means of a PACS system.

Manual pre-operative planning

The Bi-Metric® Hip System provides a comprehensive selection of femoral x-ray templates in 110%, 115% and 120% magnification.

These templates are positioned over the AP and Lateral x-rays to best decide the correct implant size, modular head neck length and whether a standard or lateralised Bi-Metric® stem is required to restore the patient's natural anatomy.



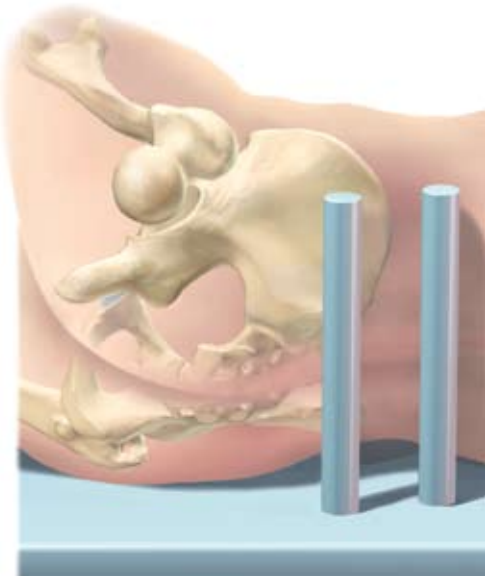
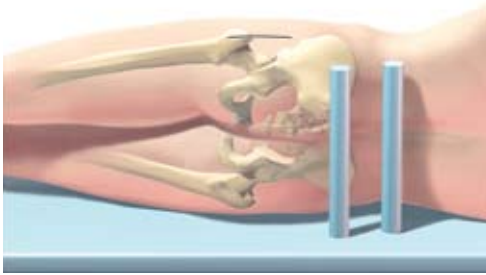
Digital pre-operative planning

The Bi-Metric® Hip System digital templates are available through various digital template providers. When using digital templating for a primary THR, it is necessary to use a magnification marker with a known dimension. This is required in order for the system to calculate the correct magnification. As soon as the correct magnification has been determined, the system can be used to best decide the correct implant size, modular head neck length and whether a standard or lateralised Bi-Metric® stem is required to restore the patient's natural anatomy.



2. Surgical exposure

The Bi-Metric® femoral component can be implanted using any of the standard approaches for total hip replacement. The aim of the approach selected is to provide adequate visualisation of both the acetabulum and proximal femur.



3. Femoral neck osteotomy

Once the femoral head has been dislocated from the acetabulum, the femoral neck resection can be completed by: a) using the appropriate femoral resection templates (figure 3); or b) using the femoral resection guide in conjunction with the intramedullary reamer (figure 4).

figure 3



figure 5



figure 4



4. Preparation of the acetabulum and insertion of component

When complete visualization of the acetabulum is achieved preparation of the acetabulum and component insertion must be carried out as instructed in appropriate operative technique.

5. Preparation of the femur

To help avoid undersizing, varus positioning and to allow for correct alignment of the reamer and broach, it may be necessary to remove a small section of the medial cortex from the greater trochanter.

This can be achieved by one of two methods. The first involves the use of the special box chisel (Figure 6), or by using the starter drill and intra-medullary reamers (Figures 7 & 8). Whatever technique is employed, the aim is to provide a lateral starting point for the intra-medullary reamers and broaches.



figure 6

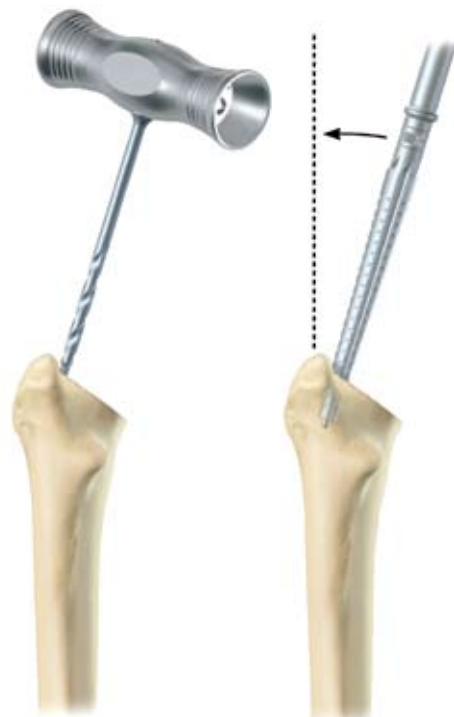


figure 7

figure 8

5a. Reaming the distal femur

Once the femoral canal has been located, begin reaming with the smallest tapered reamer. Subsequent reaming in 1mm increments is then used to enlarge the intra-medullary canal until cortical chatter is encountered. (Figure 9)

Reaming **should not** be carried out using power tools.



figure 9

5b. Broaching the proximal femur

Starting with the smallest broach available, attach the broach to the broach handle as shown (figure 10) and begin preparing the proximal femur (Figure 11). The Bi-Metric® broaches have been designed to follow the prepared distal canal. It is also important to ensure the broach is orientated so that the medial/lateral axis of the broach is parallel with that of the anatomic medial/lateral axis of the femoral neck, as this will determine the angle of anteversion for the implanted femoral component. Sequentially larger broaches are then used until either complete stability is achieved, or the stem size selected during pre-operative planning has been reached. The angled surface of the femoral broach should then be level with the resected femoral neck (figure 12). If the femoral broach has finished below the level of the resected calcar, a calcar trimmer can be used to plane the calcar flush with the angled surface of the broach. (Fig 13)



figure 10



figure 11



figure 12

figure 13

6. Trial reduction - Broach

For cementless implants the final broach used corresponds with the femoral component to be implanted. (i.e. 13mm broach = 13mm implant) However, for cemented implants the final broach used is 2mm larger than the femoral component to be implanted. (i.e. 13mm broach = 11mm implant)

With the final broach in position, the trial neck can be locked into place (Figures 14). The selected trial modular head is then attached to the trial neck and the hip joint reduced. The joint is then assessed for joint stability and leg length. Trial modular heads are available in numerous offsets to facilitate a stable joint. However, should it not be possible to attain joint stability without over increasing the leg length, the trial neck is removed and the lateralised version of the trial neck is then attached to the broach. The trial reduction procedure is repeated until joint stability and the desired leg length has been achieved (Figure 15 & 16).

Once the trial reduction has been completed, carefully remove the trial modular head and trial neck from the broach. The broach handle is then re-attached to the broach and the complete assembly carefully removed from the femur to avoid enlarging the prepared canal.

To promote the in-growth of bone into the porous coating, irrigation and drying of the femoral canal is not recommended.



figure 14

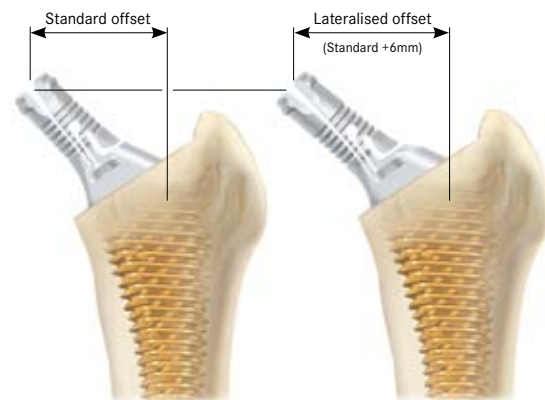


figure 15

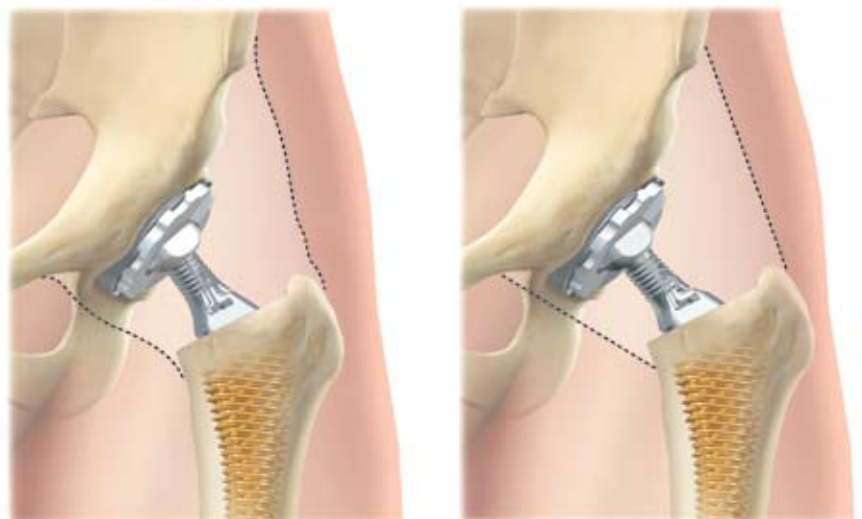


figure 16

7. Femoral component insertion

– Cementless

When implanting a cementless implant, the definitive implant is equivalent to the last broach used. (ie. 13mm broach = 13mm implant)

Select the desired stem and attach it to the inserter handle (Figure 17). The stem is then impacted until the edge of the porous coating is aligned with the rim of the planed calcar (Figure 18). The inserter handle is then removed.



figure 17



figure 18

8. Femoral component insertion

– Cemented

When implanting a cemented implant, the definitive implant is 2mm smaller than the last broach used. (i.e. 13mm broach = 11mm implant)

Prior to implanting the desired stem, the femoral canal must be prepared in the following manner. First, the femoral canal must be closed with an adequate cement restrictor. This is used to facilitate the pressurisation of the cement within the femur. The correct size restrictor is selected by using the trials/gauges to correctly size the femoral canal and the restrictor is driven into the femur using the insertion device. It is essential that the restrictor is tight inside the femur and that it is placed at least 2cm distal to the distal tip of the selected implant.

Prior to insertion of the cement, it is important that the femur is thoroughly cleaned by pulse lavage and dried to provide a clean dry surface into which the cement can interdigitate.

Cementing should always take place in a retrograde fashion. When the canal has been sufficiently filled with cement, the nozzle of the cement gun is shortened and the proximal pressurisation flange attached. The cement gun and pressurisation flange is then re-inserted into the proximal femur and pressurisation continues until immediately prior to stem insertion. The time at which the stem is inserted into the cement will vary on the type of cement used and the theatre temperature. Typically, for Refobacin®R bone cement with a theatre temperature of 21°C mixed in the OptiVac® cement-mixing system, the stem can be introduced 4 - 5 minutes after mixing has commenced.

Select the desired stem and attach it to the inserter handle as shown (Figure 19). The stem is then inserted down the centre of the canal in one continuous movement. During insertion of the stem, pressure must be maintained within the canal by sealing or closing the medial calcar (Figure 20). Pressure is then maintained on the stem through the inserter handle until the cement has polymerised.



figure 19



figure 20

9. Trial reduction - Implant

If desired, a further trial reduction can be completed after the implantation of the femoral stem and prior to placement of the modular head onto the taper (Figure 21). This is important because the femoral component may not in every instance seat exactly to the same depth as the broach and planed calcar. If this is the case, then it is recommended that a further trial reduction is carried out.



figure 21

10. Modular head impaction

The selected modular head is positioned on the clean male taper of the femoral stem with hand pressure only. Alternatively, a combination of hand pressure and a twisting motion can be used. The modular head is finally seated in position by means of a gentle tap utilising the femoral head impaction device and mallet (Figure 22)



figure 22

Modular heads should never be heavily impacted onto the trunnion as this may cause damage to highly polished surface of the modular head.

Once the correct modular femoral head has been attached to the femoral component, the hip joint can be reduced (Figure 23).



figure 23

11. Component removal

Should a Bi-Metric® femoral component ever require removal, included in the implant removal tray are two special instruments. These are the modular head removal instrument and the stem removal instrument.

The modular head removal instrument locates either side of the taper and exerts a tensile force to eject the femoral modular head (Figure 24).



figure 24

The stem removal instrument again locates either side of the taper and combined with a slide hammer can exert sufficient force to facilitate removal of the femoral stem (Figure 25)

It is important to note that the stem removal instrument must be used in conjunction with flexible osteotomes to sufficiently loosen the stem. Failure to break the bone/implant or cement/implant interface may result in a fractured femur.



figure 25

Ordering Information

Implants

Bi-Metric® Femoral Primary Components - Type 1 Taper (T1)

Stem Diameter	Length	Cementless				Cemented	
		Porous Coated		Porous Coated with HA		CoCrMo	
		Standard	Lateralised	Standard	Lateralised	Standard	Lateralised
7mm	115mm	162310	650-0215	162027	650-0215HA	650-0387	650-1707
8mm	120mm	162251	650-0216	162028	650-0216HA	-	-
9mm	125mm	162311	650-0217	162029	650-0217HA	650-0389	650-1709
10mm	130mm	162252	650-0218	162030	650-0218HA	-	-
11mm	135mm	162312	650-0219	162031	650-0219HA	650-0391	650-1711
12mm	140mm	162253	650-0220	162032	650-0220HA	-	-
13mm	145mm	162313	650-0221	162033	650-0221HA	650-0393	650-1713
14mm	150mm	162254	650-0222	162034	650-0222HA	-	-
15mm	155mm	162314	650-0223	162035	650-0223HA	650-0395	650-1715
16mm	160mm	162255	650-0224	162036	650-0224HA	-	-
17mm	165mm	162315	650-0225	162037	650-0225HA	650-0397	650-1717



Modular Femoral Head Components - Type 1 Taper (T1)

Neck Length	CoCrMo		BioloX Delta Ceramic		M2A CoCrMo
	28mm	32mm	28mm	32mm	MMA 28mm
-6mm	163660	163667	-	-	164116
-3mm	163661	163668	164135	164185	164117
0mm	163662	163669	164136	164186	164118
+3mm	163663	163670	164137	164187	164119
+5mm	-	-	164138	-	-
+6mm	163664	163671	-	-	164120
+9mm	163665	163672	-	-	-
+12mm	163666	163673	-	-	-



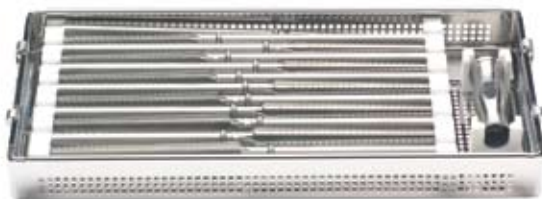
The modular heads listed above are only suitable for Biomet Femoral Components with Biomet Type 1 Taper (T1).

Instruments

Bi-Metric Femoral Instrumentation for Primary Components (Type 1 Taper)

Catalogue Number	Description
31-600000A	Bi-Metric Intramedullary Reamer Tray - Complete
31-600000B	Bi-Metric Intramedullary Reamer Tray - Reduced (Odd sizes only)
31-600001A	Bi-Metric Rasp/Provisional Tray - Complete
31-600001B	Bi-Metric Rasp/Provisional Tray - Reduced (Odd sizes only)
31-600002	Bi-Metric General Instrument Tray complete
31-600003	Bi-Metric Trial Head Tray Insert complete (T1)
31-600340	Bi-Metric X-Ray Templates (T1)
31-600005	Biomet Femoral Head and Stem Removal Instrument Tray complete

Trial Head Tray Inserts must be ordered separately and are designed to fit within the General Instrument Case



Intramedullary Reamer Tray



Bi-Metric Rasp/Provisional Tray



Bi-Metric General Instrument Tray



Bi-Metric Trial Head Tray Insert



Biomet Femoral Head and Stem Removal
Instrument Tray

Bi-Metric Femoral Primary Components - 12/14 Taper (12/14)

Stem Diameter	Length	Cementless				Cemented	
		Porous Coated		Porous & HA Coated		CoCrMo	
		Standard	Lateralised	Standard	Lateralised	Standard	Lateralised
7mm	115mm	650-0280	650-1607	650-0280HA	650-1607HA	50-152347	650-1807
8mm	120mm	650-0281	650-1608	650-0281HA	650-1608HA	-	-
9mm	125mm	650-0282	650-1609	650-0282HA	650-1609HA	50-152349	650-1809
10mm	130mm	650-0283	650-1610	650-0283HA	650-1610HA	-	-
11mm	135mm	650-0284	650-1611	650-0284HA	650-1611HA	50-152351	650-1811
12mm	140mm	650-0285	650-1612	650-0285HA	650-1612HA	-	-
13mm	145mm	650-0286	650-1613	650-0286HA	650-1613HA	50-152353	650-1813
14mm	150mm	650-0287	650-1614	650-0287HA	650-1614HA	-	-
15mm	155mm	650-0288	650-1615	650-0288HA	650-1615HA	50-152355	650-1815
16mm	160mm	650-0289	650-1616	650-0289HA	650-1616HA	-	-
17mm	165mm	650-0290	650-1617	650-0290HA	650-1617HA	50-152357	650-1817



Modular Femoral Head Components - Type 12/14 Taper (12/14)

Neck Length	CoCrMo		Biolox Forte Ceramic		M2A CoCrMo
	28mm	32mm	28mm	32mm	MMA 28mm
-4mm	-	53-111232	-	164195	-
-3.5mm	53-111228	-	164190	-	650-0130
0mm	53-121228	53-121232	164191	164196	650-0131
+3.5mm	53-131228	-	164192	-	650-0132
+4mm	-	53-131232	-	164197	-
+7mm	53-141228	-	-	-	-
+8mm	-	53-141232	-	-	-
+10.5mm	53-151228	-	-	-	-
+12mm	-	53-151232	-	-	-



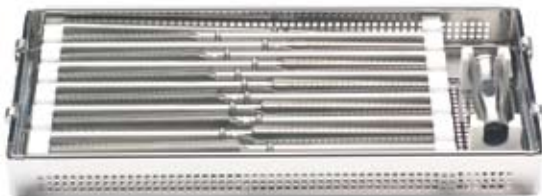
The modular heads listed above are only suitable for Biomet Femoral Components with Biomet 12/14 Taper (12/14).

Instruments

Bi-Metric Femoral Instrumentation for Primary Components (12/14 Taper)

catalogue number	description
31-60000A	Bi-Metric Intramedullary Reamer Tray - Complete
31-60000B	Bi-Metric Intramedullary Reamer Tray - Reduced (Odd sizes only)
31-600001A	Bi-Metric Rasp/Provisional Tray - Complete
31-600001B	Bi-Metric Rasp/Provisional Tray - Reduced (Odd sizes only)
31-600002	Bi-Metric General Instrument Tray complete
31-600004	Bi-Metric Trial Head Tray Insert complete (12/14)
31-600341	Bi-Metric X-Ray Templates (12/14)
31-600005	Biomet Fem Hd and Stem Removal Instrument Tray complete

Trial Head Tray Inserts must be ordered separately and are designed to fit within the General Instrument Case



Intramedullary Reamer Tray



Bi-Metric Rasp/Provisional Tray



Bi-Metric General Instrument Tray



Bi-Metric Trial Head Tray Insert



Biomet Fem Hd and Stem Removal Instrument Tray

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