Aesculap Orthopaedics

Metha®

Modular short stem prosthesis

Evolving the State of Arthroplasty.

B BRAUN
SHARING EXPERTISE

Metha®. The modular short stem prosthesis.

Contents

The Metha® short stem prosthesis is intended for conservative total hip replacement and represents a new generation of implants. It combines three key advantages: modular construction, minimal stem size and an all-around coated surface, and thus facilitates operations that are as minimally invasive as possible. It is particularly suitable for young patients with good bone quality. Metha® can be ideally implanted with the OrthoPilot® navigation system.

The design continues the positive experiences made with non cemented, metaphyseally anchored stems. The prosthesis concept allows implantation via the stump of the femoral neck, with conservative treatment of the bone in the femoral neck and in the greater trochanter region, preserving the bone, soft tissue and muscle. While the position of the Metha® stem leads to primary load stability, the Plasmapore® µ-CaP coating over the entire proximal surface supports rapid secondary fixation.

One of the special advantages of the system is its modular design with various neck adapters. This decouples the stem position from that of the head, which makes it possible to a large extent to adapt the stability and mobility of the joint to the individual patient.

Metha® is at the leading edge of technology in other ways also. The implantation instruments are as sophisticated as they are simple. Finally, combination with the OrthoPilot® navigation system offers increased possibilities for hip replacement surgery. If you wish, it can assist you in joint reconstruction and in achieving the optimum range of movement, while leaving you free to choose the sequence in which you navigate the prosthesis stem and the acetabular cup.

Metha®. Modular concept.

Modular neck adapters.
Flexible decisions.

The nine modular neck adapters offer different offset and antetorsion options after the stem has been implanted. This means that the stability and mobility of the joint and the leg length can be adjusted individually, taking account of the soft tissue tension and the position of the implant. Once they are connected, the neck and the stem are securely and permanently joined together.

STABILITY

Metaphyseal anchoring.
Gentle bone treatment.

The non-cemented prosthesis stem is anchored metaphyseally within the closed ring of the femoral neck. The greater trochanter region remains largely untouched. Bone and muscle structures are preserved – a particular bonus for young and active patients with good bone structure. The conical design supports primary stability and proximal force transfer. The high primary stability is further enhanced by guiding the rounded tip of the stem along the lateral cortex.

Plasmapore® µ-CaP surface.
Additional stability.

The Metha® stem has an all around Plasmapore® µ-CaP coating to support osteointegration. In a special procedure, the proven microporous Plasmapore® surface is given a 20 µm thin layer of µ-CaP, very pure calcium phosphate. This layer has an osteoconductive effect and accelerates contact between the bone and the prosthesis stem.

Metha®. Variable implant range.

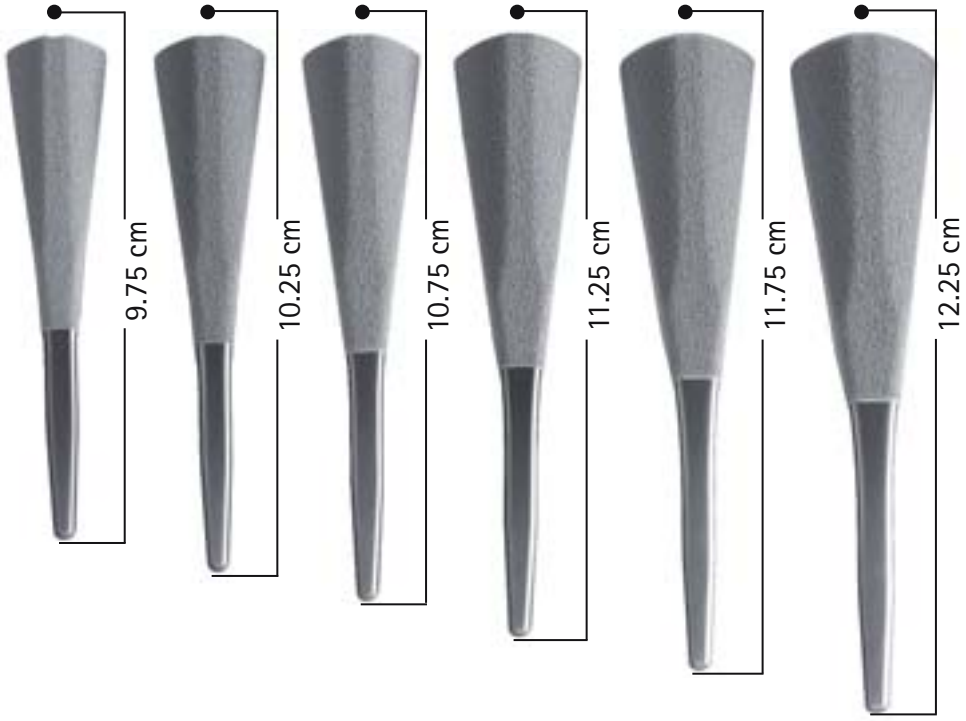
Metha® variability.

The modular design of the neck inserts derives from analysis of the distribution of the hip joint centre. The CCD angle specifications of 130° to 140° relate to a stem position that emergen at a 50° osteotomy plane. The varus-valgus variability of the Metha® stem position is approximately ± 20°. The implant range also allows for balancing with respect to leg length (Δ10 mm) and antetorsion (± 7.5°).

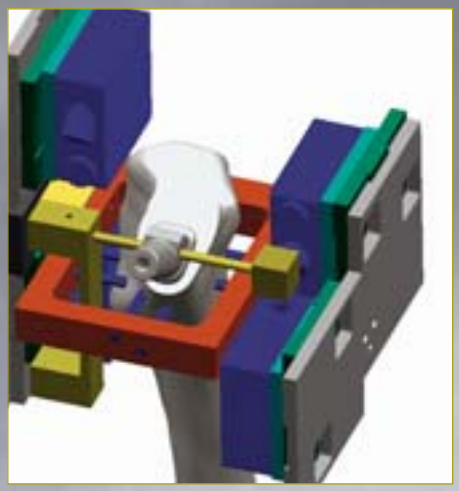
MODULARITY

Metha® stem implants

The stem implant sizes increase in increments of 1.5 mm in the A/P projection and 1.2 mm in the lateral projection. Anchorage in the closed femoral neck is supported by the conical design in the lateral view. The difference in nominal length between the smallest and largest implant is only 2.5 cm.



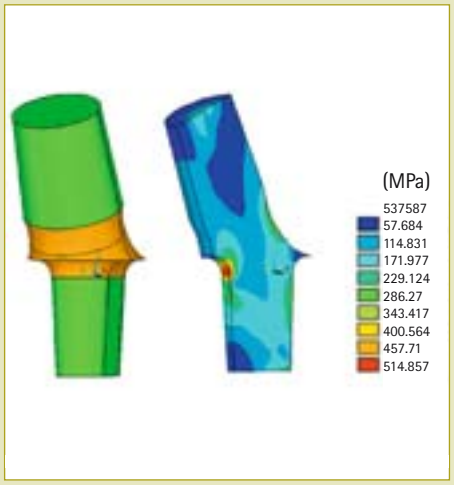
Metha®. Proven design.



Primary stability.
Proven design.

Using different design variations in biomechanical tests, Metha® has been optimized to provide high primary stability with very low micromovement. The load testing was conducted in a composite femur in conformance with ISO 7206-4. The current Metha® design showed micro-movements under 85 µm and settling movements of 110 µm – values that are at least equal to and in some cases significantly better than other clinically proven short stem implants.

RELIABILITY



Proximal metaphyseal force transfer. High stability.

The proximal force transfer and elasticity of the femoral treatment were tested in the biomechanical laboratory. The finding of the comparative investigations on the composite femur and in femur preparations was a fixation in the region of the femoral neck. The force transfer effect of the stem against the lateral cortex was found to be minor. The position against the lateral cortex functions primarily as a supporting element and contributes to primary axial stability.

Modular neck connection. For high load conditions.

The Metha® neck adapters have been optimized with FEM simulations to provide a high connecting strength. Continuous loading experiments in accordance with ISO 7206-4 gave an endurance of 5.3 kN for a 130° neck adapter tested under an asymmetric offset load lever of 51 mm. The rotationally-stable oval cone displayed a high level of stability in the continuous loading experiments with > 24 million load cycles. The values for corrosion resistance were comparable to those of a traditional head and trunnion connection.

Metha®. Total treatment concept.

SYSTEMATIC

OrthoPilot® hip navigation.
More accurate implantation.

Combining the modular stem with the OrthoPilot® navigation technology expands the possibilities for hip replacement surgery. After implantation of the stem component, OrthoPilot® simplifies the choice of neck adapter and assists the surgeon in achieving the best possible joint reconstruction. The free choice in the sequence of cup and stem implantation and the modular adapters are customized to the individual patient – resulting in the optimum range of movement.

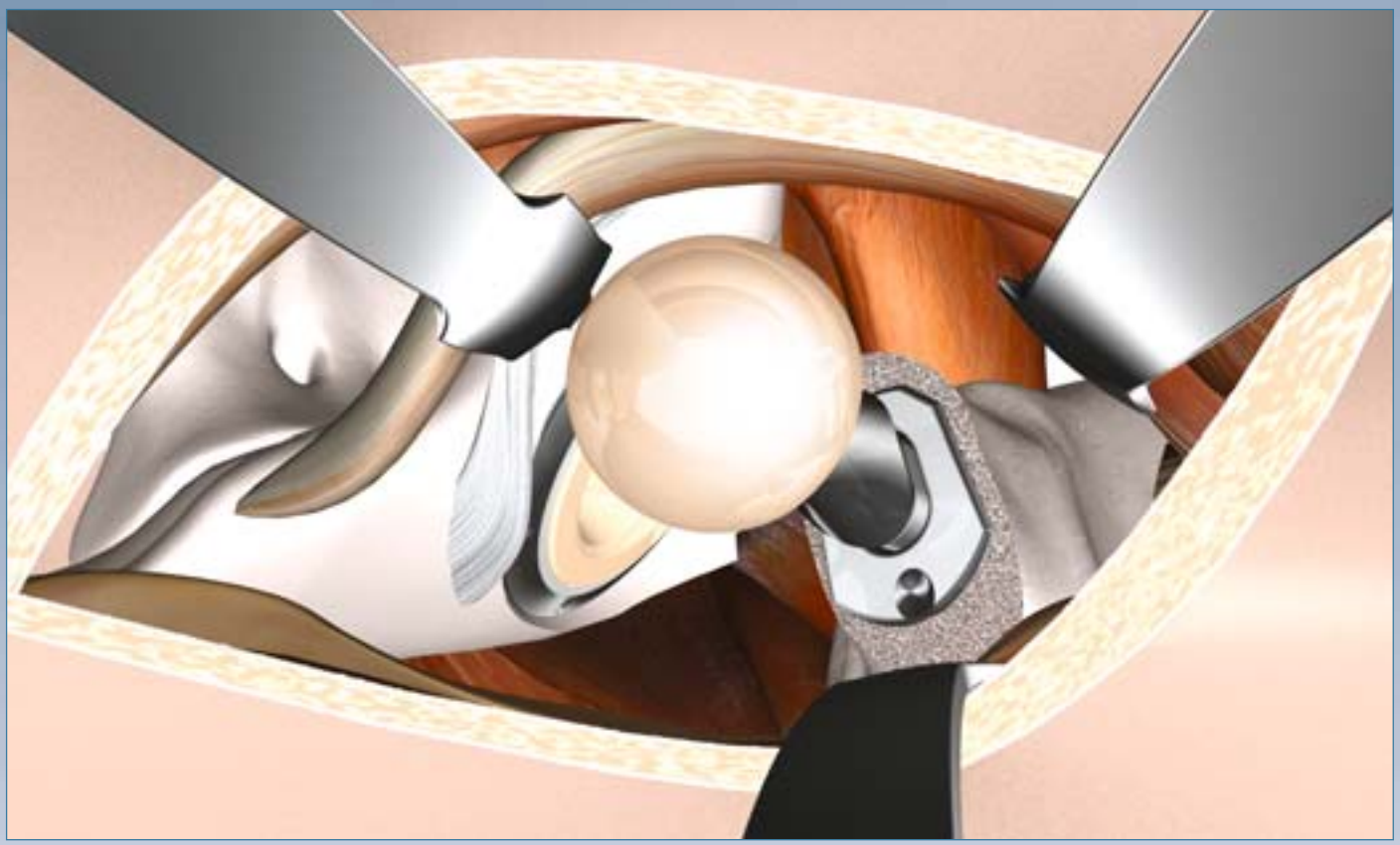
MIOS® operating techniques.
More gentle procedure.

The higher osteotomy level and the more medial location of the stem opening make the Metha® prosthesis ideally suited for minimally invasive implantation techniques. The MIOS® – Minimally Invasive Orthopaedic Solutions – instrument range has been carefully and specially designed for such procedures and for Metha®, and gives excellent support in the most frequent approaches to the hip joint: special retractors and curved instrument profiles make smaller approaches easier.

Metha® implantation
More simple surgery.

Easy, uncomplicated instrumentation is a distinguishing feature of the Metha® stem. The implant site is prepared using a canal finder and modular forming rasps. Trial reduction and selection of the neck adapter is performed after stem implantation, thus permits very accurate adjustment and rapid definition of the joint centre and the free range of movement.

Metha® Surgical technique.



Indication

The Metha® prosthesis stem is a modern implant. The indication spectrum includes degenerative coxarthrosis and femoral head necrosis. Good bone quality is the prerequisite for implantation.

Preoperative planning

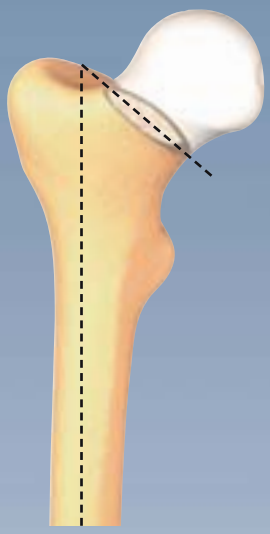
Preoperative planning for the Metha® short stem prosthesis is performed using front and lateral projection x-rays.

In addition to the position of the joint centre and the leg length, the planning of the resection height also takes into account the preservation of the approx. 5 - 10 mm thick ring of cortex around the femoral neck that is important for anchorage. The osteotomy of the femoral neck is performed ideally at an angle of 50° to the femoral shaft axis. To aid intraoperative orientation, the distance from the lesser trochanter can be measured medially.

X-ray templates with a scale of 1.15:1 are available for planning the size of the Metha® short stem prosthesis. In addition to filling the femoral neck area, the aim is to achieve support on the calcar that is capable of bearing load, as well as surface contact between the distal end of the stem and the lateral cortex.

In the lateral x-ray, the objective is to wedge the stem firmly in the proximal femur. The Metha® short stem is positioned as centrally as possible in the femur. Depending on the femoral geometry, the shaft can be oriented so the tip is against the lateral dorsal cortex.

Metha®
Operating technique.



Femoral osteotomy

The femoral neck resection is performed in accordance with the preoperative planning. It usually begins approx. 10 mm above the junction of the greater trochanter and the neck of the femur and is ideally carried out at an angle of 50° to the femoral axis. Care must be taken that a closed cortical ring of the femoral neck of at least 5 mm width, laterally, is left intact. Any deeper resection height can compromise the prosthesis anchoring and, therefore, presents a contraindication.

Opening the medullary cavity

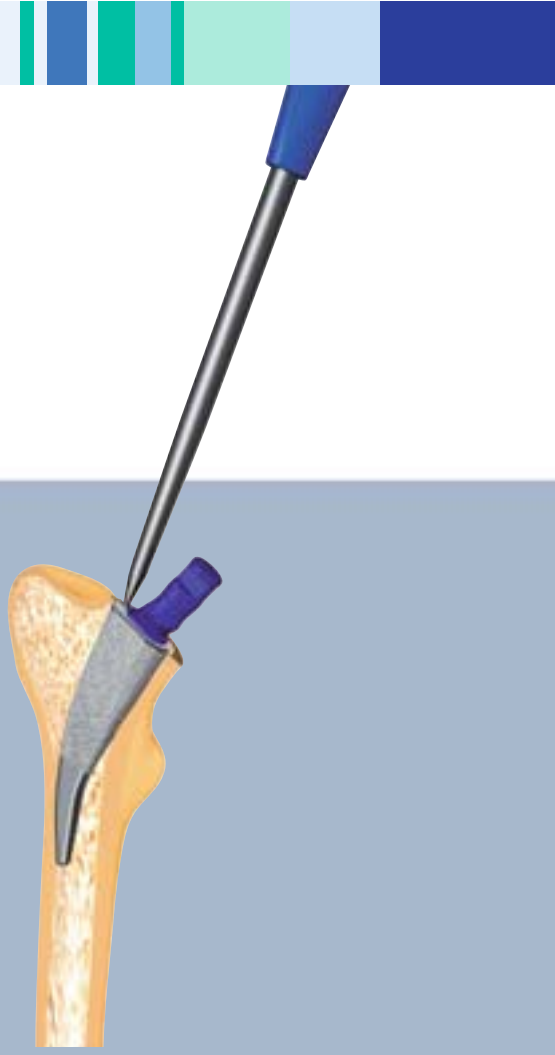
The medullary cavity is opened with a curved canal finder. The opening should be in the center of the osteotomy plane.

The canal finder is advanced to the lateral cortex with light twisting movements. It can be helpful to insert the canal finder in a slightly varus position first, then straighten it on reaching the lateral cortex before pushing it distally along the lateral cortex. The marker dots on the canal finder are for depth orientation and correspond to the resection height for the smallest and largest Metha® stem respectively.

The curvature of the canal finder is identical to the lateral profile of the implant, so that it produces a first impression of the subsequent implant bed. The canal finder also defines the direction for the forming rasps.

A second canal finder with a thicker anterior-posterior profile is available to simplify bone preparation in harder structures.

The canal finders are in general to be used manually and should not be driven in with a mallet.



Femur preparation

The implant bed is prepared in stages, beginning with the smallest forming rasp. The forming rasp is introduced centrally into the opening in the medullary canal taking account of the antetorsion. Upon insertion the tip of the rasp should touch the lateral cortex and run along it. The correct size is achieved when the forming rasp lies against the lateral cortex and simultaneously sits fully and completely in the femoral neck, and is rotationally stable. The rasp serrations should ideally end flush with the resection surface.

If desired, initial trial reduction can be performed with the final rasp using a neutral trial neck adapter (135°/0°). This gives a preliminary estimate of the leg length. To do this, the modular handle is removed and the trial neck adapter is attached to the rasp with the corresponding trial head. The position of the rasp can be checked using the image intensifier.

If there is obvious lengthening of the leg or if the rasp does not lie against the lateral cortex in any plane, the femoral neck can be resected again slightly and the rasp introduced more deeply. However, it is essential to preserve a closed ring of cortex around the neck of the femur.

Inserting the Metha® stem

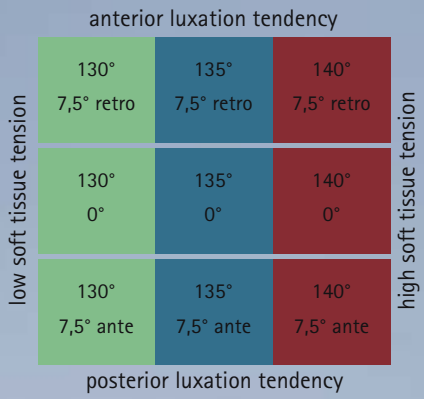
The prosthesis stem to be inserted is selected according to the size of the final rasp used. The Metha® stem is inserted manually and driven into its final firm position using the implantation instrument. The prosthesis does not need to be guided into place, as it follows the path made by the rasp.

Metha® Operating technique.

Trial reduction

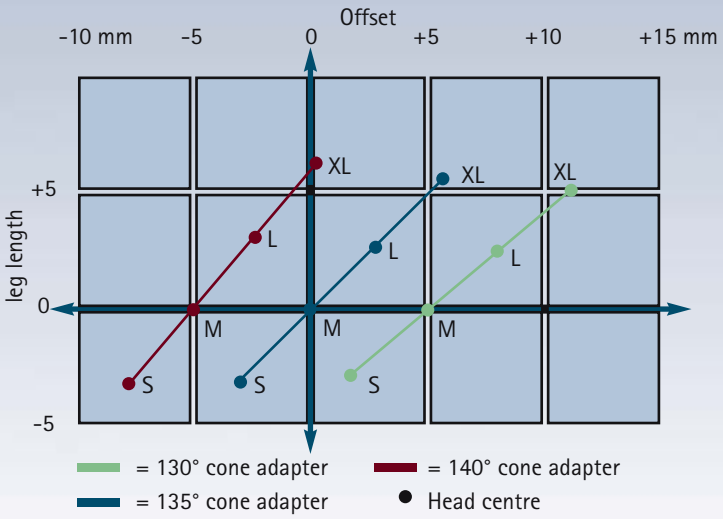
Following implantation of the prosthesis stem, trial reduction is performed using the colour-coded modular trial neck adapters and trial heads.

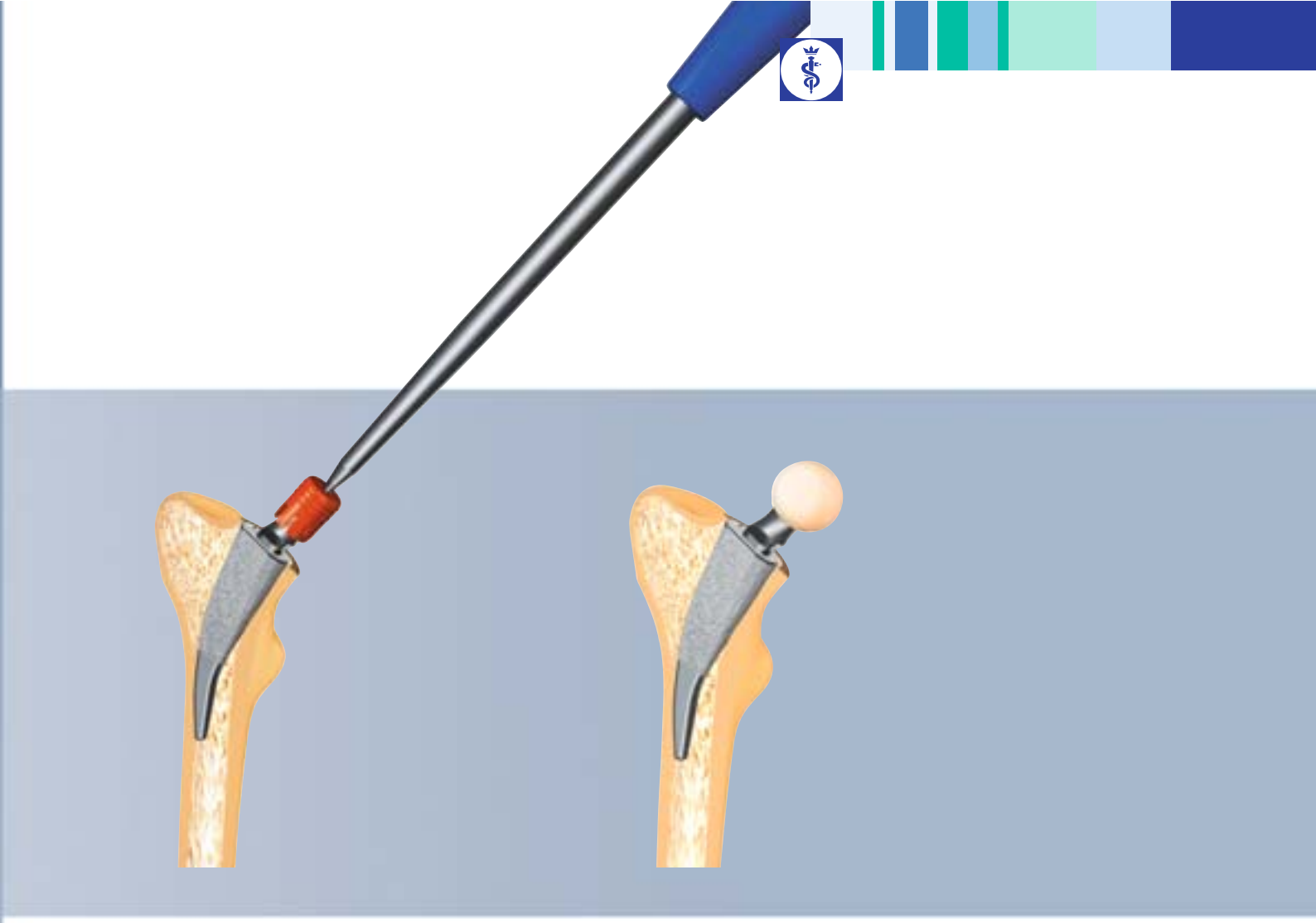
Nine neck adapters are available with different CCD angles (130°, 135°, 140°) and antetorsion positions (7.5° ante, 0°, 7.5° retro). The various CCD angles make it possible to change the offset by - 5 mm or + 5 mm while the leg length remains constant. The neutral offset value is 44 mm.



The selection of the appropriate neck adapter takes into account any possible luxation tendency, the range of movement and the soft tissue or ligamentary tension. The leg length is corrected through the different head lengths of the prosthesis heads.

The OrthoPilot® navigation system helps you select the best possible implant combination and adapt it to the individual patient. The system displays the movement parameters, any possible implant impingement, the antetorsion and changes in offset and leg length that are associated with each of the possible combinations.





Inserting the neck adapter

Before the modular neck adapter is inserted, the inner socket of the stem is carefully irrigated, cleaned and dried. The swab (ND622) can be used for easy cleaning and drying the inner cone. The selected neck adapter is inserted into the prosthesis stem with the marker arrow pointing in a medial direction (▼) and driven lightly but firmly into place with the implantation instrument.
To avoid damage to the trunnion, the protection cap is only removed after the neck adapter had been driven firmly into place. The selected prosthesis head or trial head is inserted and the joint reduced. This is followed by checks on joint mobility, range of movement, joint tension and leg length.

Metha® Operating technique.

Removing the neck adapter

In order to explant the prosthesis stem, the modular neck component is first removed from the stem. The extractor is applied between the osteotomy surface of the stem and the modular neck component and tightened. The connection between the two components is loosened by pulsed blows with a mallet onto the extractor. It can be helpful to keep tightening the extractor during this process.

Explanting the stem

Once the modular neck adapter has been removed the stem explantation instrument is screwed firmly into the thread in the stem. The stem can then be explanted using a slotted hammer. If osteointegration has already occurred between the prosthesis stem and the surrounding bone, a straight osteotome can be used to loosen the stem before explantation to avoid fracturing the femoral neck.

Metha®
Implantation instruments.

ND700
Metha® instrument set

comprising:

1	Forming rasp size 1	NF181R
1	Forming rasp size 2	NF182R
1	Forming rasp size 3	NF183R
1	Forming rasp size 4	NF184R
1	Forming rasp size 5	NF185R
1	Forming rasp size 6	NF086R
1	Trial neck adapter 135°, 0° for forming rasp	ND624
1	Trial neck adapter 130°, 7,5° L ante - R retro	ND627
1	Trial neck adapter 130°, 0°	ND628
1	Trial neck adapter 130°, 7,5° L retro - R ante	ND629
1	Trial neck adapter 135°, 7,5° L ante - R retro	ND637
1	Trial neck adapter 135°, 7,5° L retro - R ante	ND639
1	Trial neck adapter 140°, 7,5° L ante - R retro	ND647
1	Trial neck adapter 140°, 0°	ND648
1	Trial neck adapter 140°, 7,5° L retro - R ante	ND649
1	Stem impactor for prostheses	ND401R
1	Explantation instrument	ND634R
1	Canal finder wide	ND645R
1	Canal finder narrow	ND644R
1	Trial head 28 mm S	NG296
1	Trial head 28 mm M	NG297
1	Trial head 28 mm L	NG298
1	Trial head 28 mm XL	NG299
1	Trial head 32 mm S	NG306
1	Trial head 32 mm M	NG307
1	Trial head 32 mm L	NG308
1	Trial head 32 mm XL	NG309
1	Perforated tray	ND699R

Please order separately:

Rasp handle for lateral approach	NF180R
Rasp handle for posterior approach	NF175R
Rasp handle angled to the left	NF141R
Rasp handle angled to the right	NF142R
Cross bar for rasp handle	ND017R
X-ray templates	ND603

ND710
Metha® explantation instrument set

Recommended container for ND700 and ND710
Aesculap basic container 592 x 285 x 138 mm

comprising:

1	Modular neck extractor	ND646R
1	Slotted hammer	NF275R
1	Perforated tray	ND707R
1	Lid for perforated tray	JF117R

Please order separately:

1	Cleaning swab for inner cone (pack of 10)	ND622

Please note:
The Metha® Short stem prosthesis is delivered with 3 cleaning swabs.

For more information on OrthoPilot®
hip navigation please contact Aesculap:
OrthoPilot@aesculap.de
www.orthopilot.de

Implant materials:

ISOTAN®$_F$	Forged titanium alloy (Ti6Al4V / ISO 5832-3)
ISOTAN®$_P$	Pure titanium (Ti / ISO 5832-2)
Plasmapore® µ-CaP	Pure titanium surface with 20 µm layer dicalcium phosphate dihydrate ($CaHPO_4x2H_2O$)
ISODUR®$_F$	Forged cobalt chromium molybdenum alloy (CoCr29Mo / ISO 5832-12)
Biolox® forte	Aluminium oxide ceramic (Al_2O_3 / ISO 6474)
UHMWPE	Ultra-high molecular weight polyethylene (ISO 5834-2)

Metha® Ordering information.

Metha® prosthesis stems
with neutral trial neck adapter
135° / 0°

Stem size	
1	NC081T
2	NC082T
3	NC083T
4	NC084T
5	NC085T
6	NC086T

Modular cone adapters
Cone 12/14

CCD angle / Antetorsion correction / Offset	130° + 5 mm	135° 0 mm	140° - 5 mm
7.5° L ante / R retro	NC077T	NC087T	NC097T
0°	NC078T	NC088T	NC098T
7.5° L retro / R ante	NC079T	NC089T	NC099T

Ceramic prosthesis heads
Cone 12/14


Biolox® forte

	ø 28 mm		ø 32 mm	
short	- 3.5 mm	NK460	- 4 mm	NK560
medium	0 mm	NK461	0 mm	NK561
long	+ 3.5 mm	NK462	+ 4 mm	NK562

Metal prosthesis heads
Cone 12/14


Isodur® F

	ø 28 mm		ø 32 mm	
short	- 3.5 mm	NK429K	- 4 mm	NK529K
medium	0 mm	NK430K	0 mm	NK530K
long	+ 3.5 mm	NK431K	+ 4 mm	NK531K
x-long	+ 7.0 mm	NK432K	+ 8 mm	NK532K

AESCULAP®

B BRAUN
SHARING EXPERTISE

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