Aesculap Orthopaedics

Metha®

Short Hip Stem

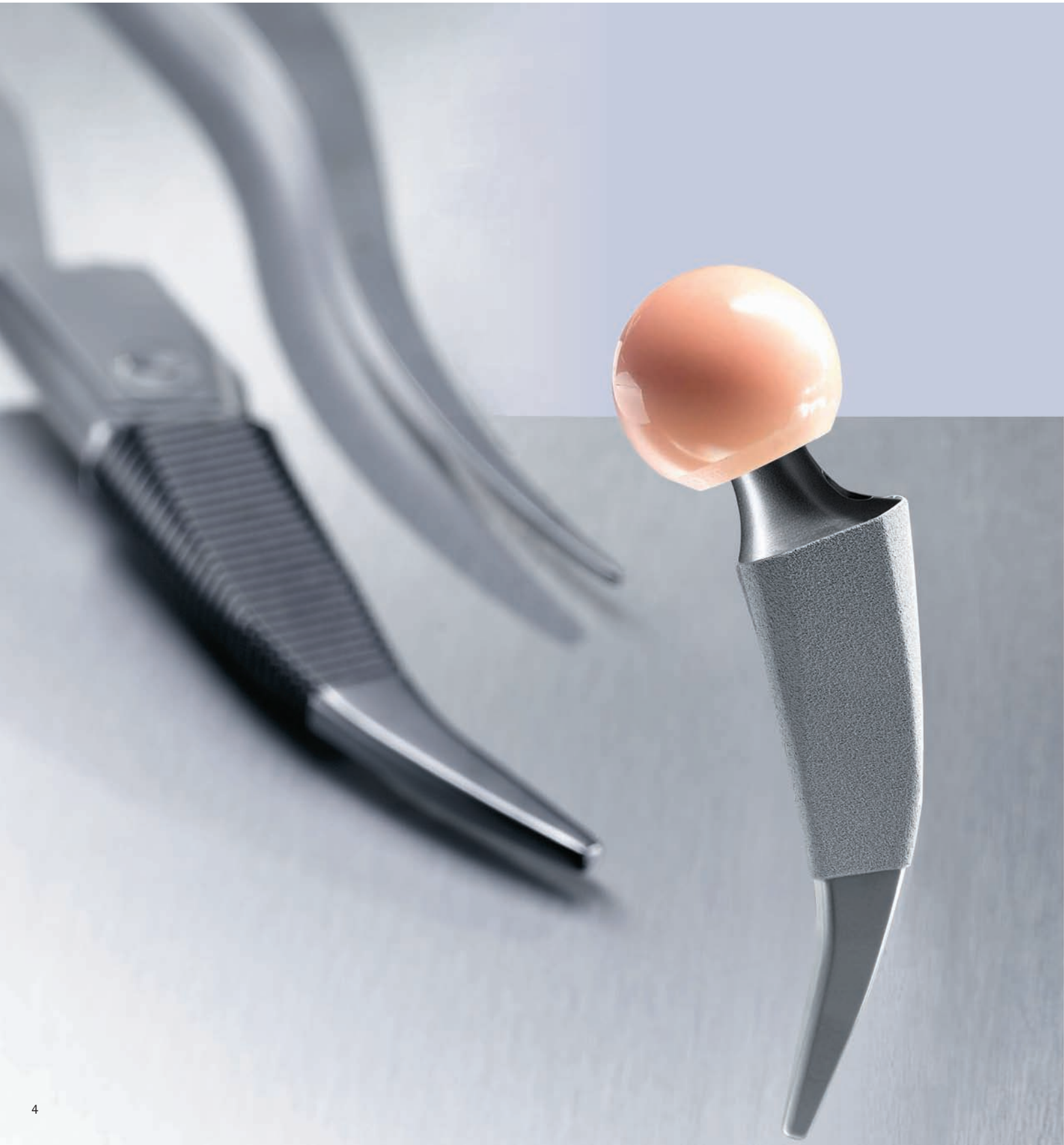
Evolving the State of Arthroplasty

AESCULAP®
Implant Systems

Evolving the State of Arthroplasty

Contents

Short Hip Stem System



System

The Metha Short Hip Stem implant represents a new generation of implants for hip endoprosthesis. It combines three key advantages facilitating surgeries that are as minimally invasive as possible: modular design, minimal stem size and a circumferencial coating. It is particularly suitable for young patients with good bone quality.

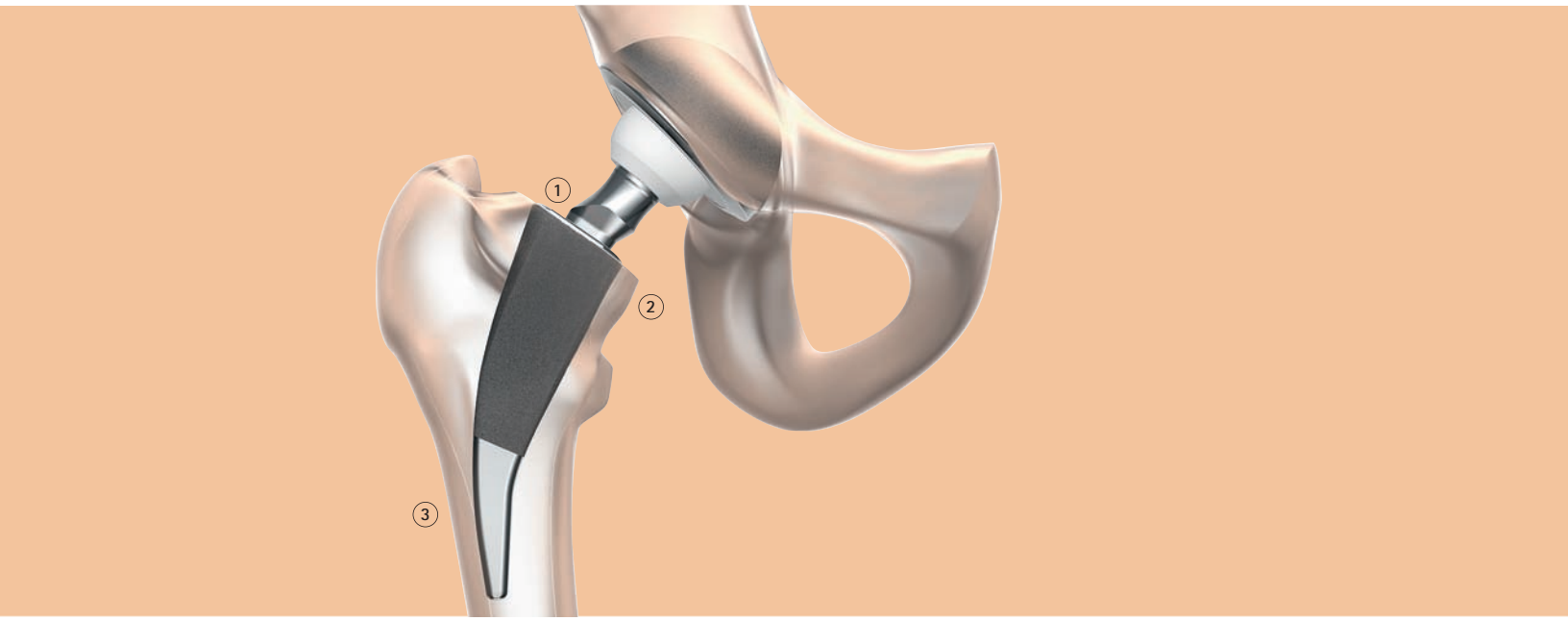
The design continues on the positive experience with non-cemented stems fixated by metaphyseal anchoring. The implant concept allows implantation via the base of the femoral neck, with conservative treatment of the bone in the femoral neck and in the greater trochanter region, preserving the bone, soft tissue and muscle. While the position of the Metha stem ensures primary load stability, the Plasmapore® µ-CaP coating of 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 solution 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. The Metha system also includes non-modular standard short stems with two neck angles.

The implantation instruments are as sophisticated as they are simple. Metha is at the leading edge of technology. Combining the modular stem with the OrthoPilot® navigation technology expands the possibilities for hip replacement surgery even further. The sequential order of cup and stem implantation can be chosen by the surgeon.

Short Stem Anchoring Concept

Metaphyseal

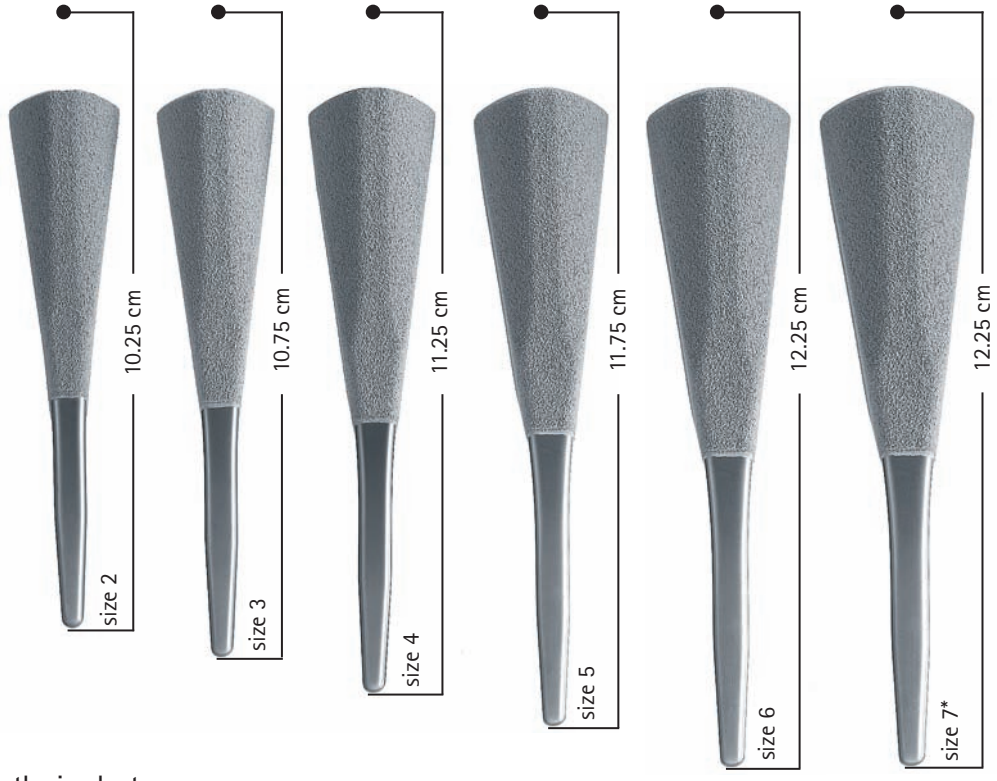


The non-cemented stem is fixated by metaphyseal anchoring within the closed ring of the femoral neck. The greater (1) trochanter region remains completely untouched. Bone and muscle structures are preserved, making the Metha Short Stem Hip an excellent choice for young and active patients with good bone structure. The conical shape supports primary stability and proximal force transfer. (2) The high primary stability is further enhanced by the rounded tip of the stem guided along the dorso-lateral cortex. (3)

Variable Implant Options

Implants

Metha Variability
The nine modular neck adapters allow a variety of offset and version options for stem implantation. The CCD angle specifications of 130°, 135° and 140° relate to a stem position at a 50° osteotomy plane. The Metha stem position allows approximately 20° of varus/valgus variability. The implant range also allows for balancing with respect to leg length and anteversion or retroversion respectively (± 7.5°).

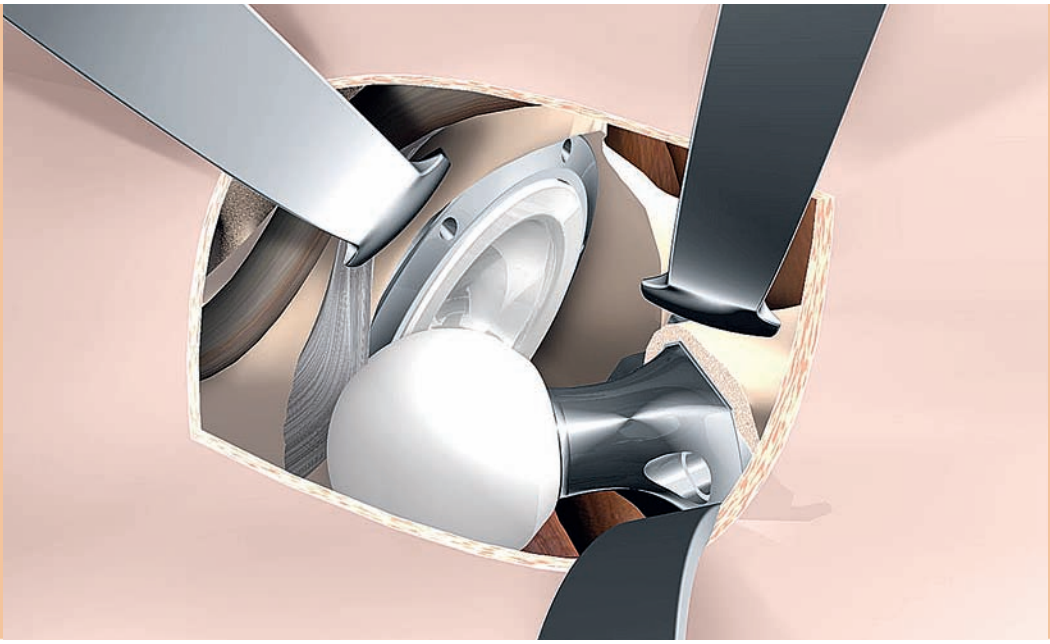


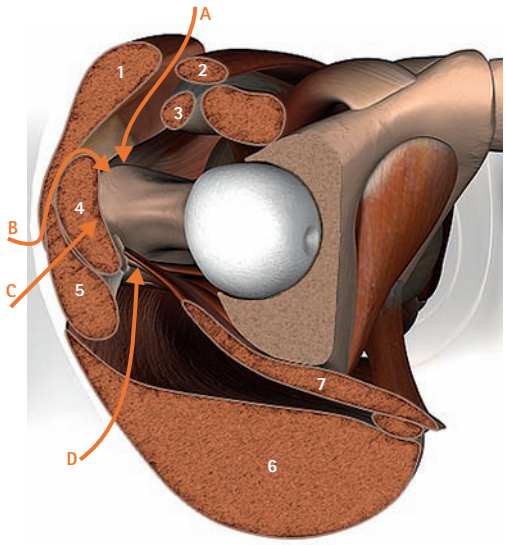
Metha implants
The implant sizes range increase in increments of 1.5 mm in the A/P projection and 1.2 mm in the lateral projection. Anchorage in the closed femoral neck is supported by the conical shape in the lateral view. The difference in nominal length between the smallest and largest implant is only 2 cm.

*Only available with Metha Non-Modular

Less-Invasive Surgery

Instruments





1 *Tensor fascia latae*
2 *Sartorius*
3 *Rectus femoris*
4 *Gluteus minimus*
5 *Gluteus medius*
6 *Gluteus maximus*
7 *Piriformis*

A Direct Anterior
B Anterolateral
C Direct Lateral, Transgluteal
D Posterior

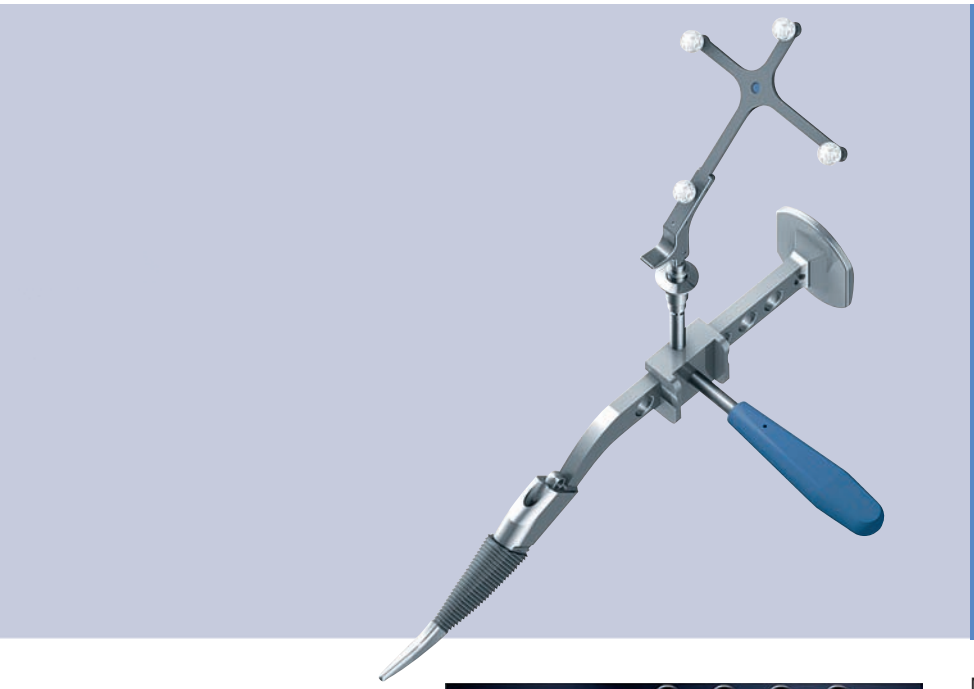
Simple and clear instrumentation is a distinguishing feature of the Metha Stem System. Due to a more medial location of the femur opening, and the medially tilted insertion angle, the Metha implant is ideally suited for minimally-invasive and less-invasive implantation techniques.

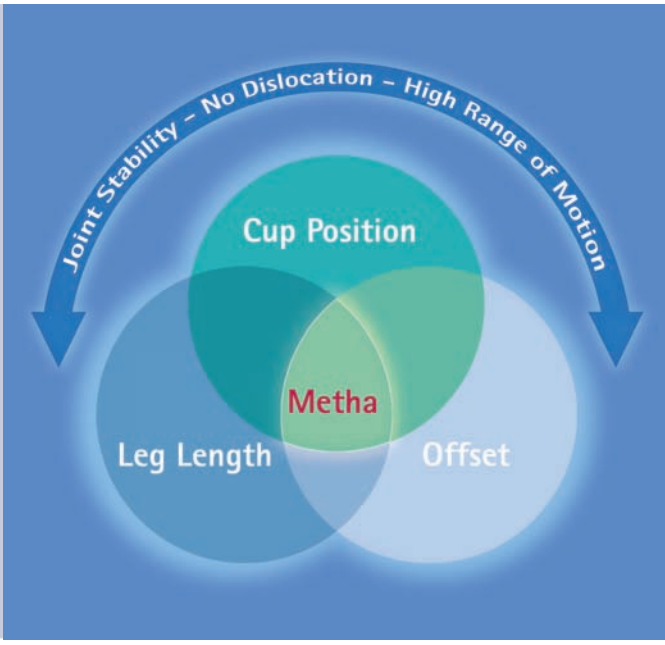
The MIOS® (Minimally Invasive Orthopaedic Solutions) instrument range has been specially designed for less invasive joint replacement procedures. MIOS special retractors, curved instrument profiles and Metha rasp handles facilitate all widely used approaches to the hip joint (see page 25).

The lateral position allows the direct lateral, anterolateral and posterior approaches. In supine position the direct lateral approach, anterolateral approach and direct anterior approach are possible.

Navigation with OrthoPilot®

Navigation





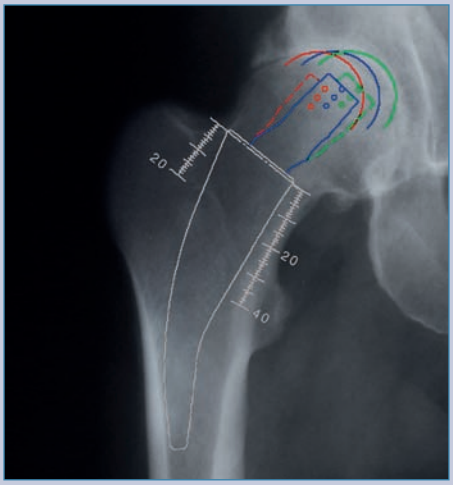
Metha can be implanted using the OrthoPilot Navigation System. The clinically proven standard THA navigation software allows complete navigation of the articular parameters of the cup and stem components to optimize the range of motion.

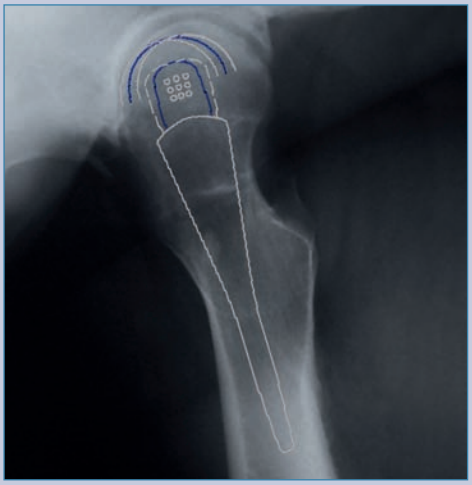
The modularity of the Metha system helps with the intraoperative selection of implants by offering a multitude of options for CCD angle and relative anteversion and retroversion angles in relation to the cup component and the selected head diameter.

The new THAplus software only needs one transmitter on the pelvis for the entire navigation procedure and it supports all minimally-invasive approaches. The functions of the kinematic cup navigation are extended by leg length and offset controls. The position of the femur is palpated intraoperatively to register the leg length and offset parameters for optimal implant selection.

Planning and Surgical Technique

Surgical Technique





Indications and Bone Morphology

The Metha Short Hip Stem is a modern, cementless implant. The spectrum of indications includes degenerative coxarthrosis and femoral head necrosis. Good bone quality is a prerequisite for a successful implantation.

A significant coxa vara or a short femoral neck are less suitable bone shapes for this therapy.

The pre-operative assessment involves checking for a wide femoral neck, especially in the presence of other concerns regarding the osteotomy level or the implant size. An undersized stem could lead to reduced primary stability. The pre-operative assessment with the planning template is very important.

Any strong anteversion of the femoral neck can complicate the implantation even for short stems. Therefore, the pre-operative planning must also include a lateral x-ray.

Pre-operative Planning

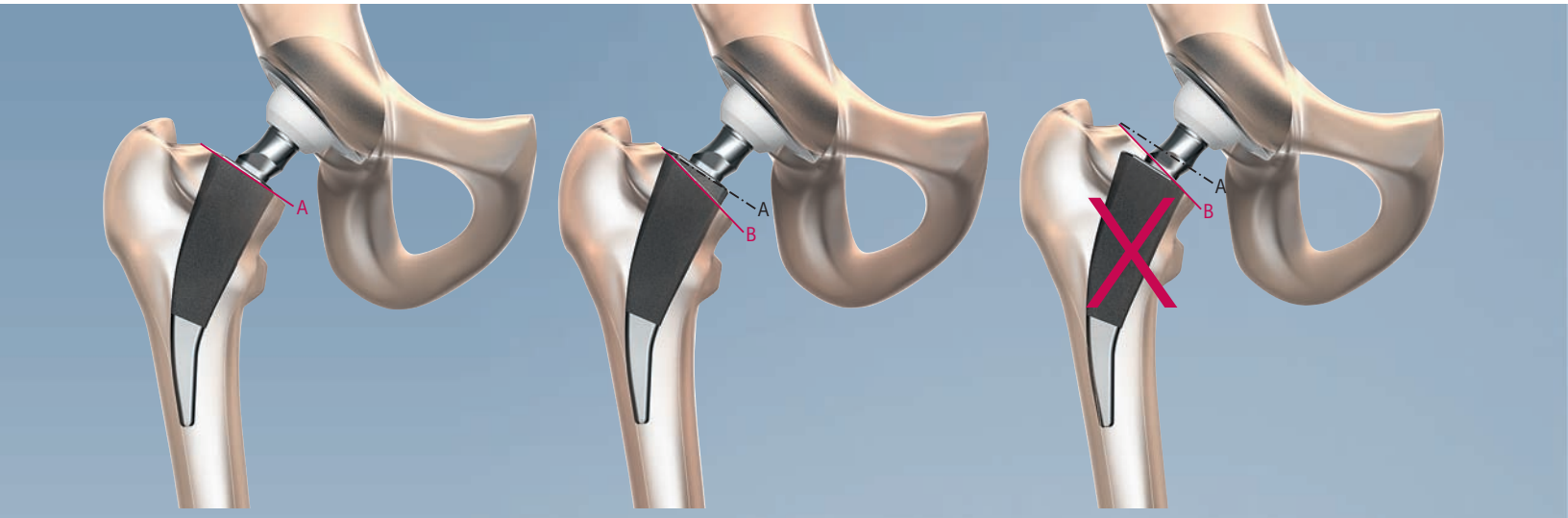
X-ray templates at a scale of 1.15:1 are available for planning the size of the Metha Short Hip Stem implant. The aim is to:

- Fill the femoral neck area
- Achieve support on the calcar
- Achieve surface contact between the distal end of the stem and the lateral cortex.

In addition to the position of the joint center and the leg length, planning the resection height is also very important. The preservation of the approximately 5 - 10 mm thick ring of cortex around the femoral neck 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.

In the lateral x-ray, the objective is to wedge firmly in the proximal femur. The Metha Short Hip Stem is ideally positioned in the direction of the femoral neck and shaft.

Femoral Osteotomy



Flat osteotomy (A) and optimum stem position at the level of the osteotomy

Steep osteotomy (B) and higher stem position with lateral contact at the osteotomy

Steep osteotomy (B) and stem inserted too deeply without lateral contact at the osteotomy

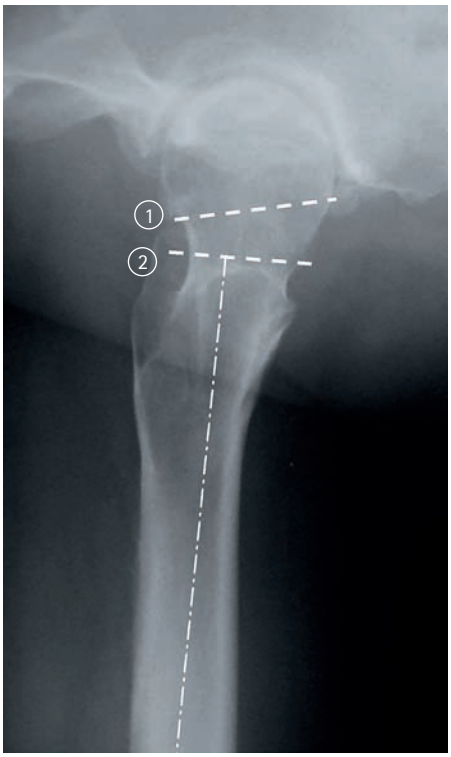
Femoral Osteotomy

The femoral neck resection is performed according to pre-operative planning. In most cases starting approximately 10 mm above the junction of the greater trochanter and the femoral neck, 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 lateral width is left intact.
Any lower resection than described above can compromise the implant anchoring and therefore demonstrates a contraindication against the implantation.

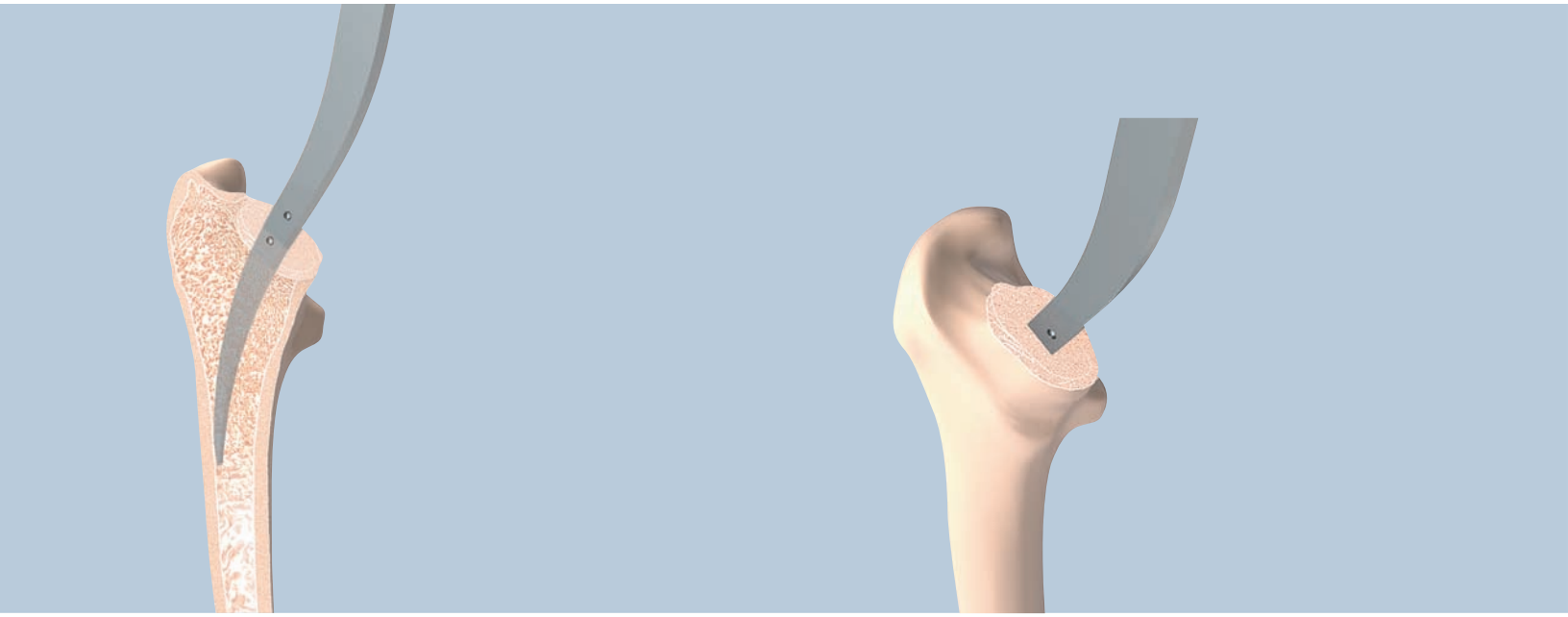
If the osteotomy is applied too low medially or the osteotomy is too steep, the stem will have to rest on a smaller medial bone surface. For this stem position, the primary stability comes from the cortical lateral support in the closed ring of the femoral neck.

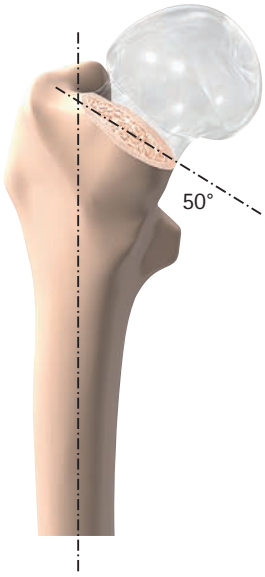
If the osteotomy is too steep and there is insufficient support on the proximal lateral cortex, there is a risk that the stem moves into valgus.

The orientation of the implantation depth on a very deep calcar osteotomy can increase the risk of a stem position without lateral support. This can result in the rasp or implant stem moving into valgus.



Proper osteotomy level may be achieved through two osteotomies





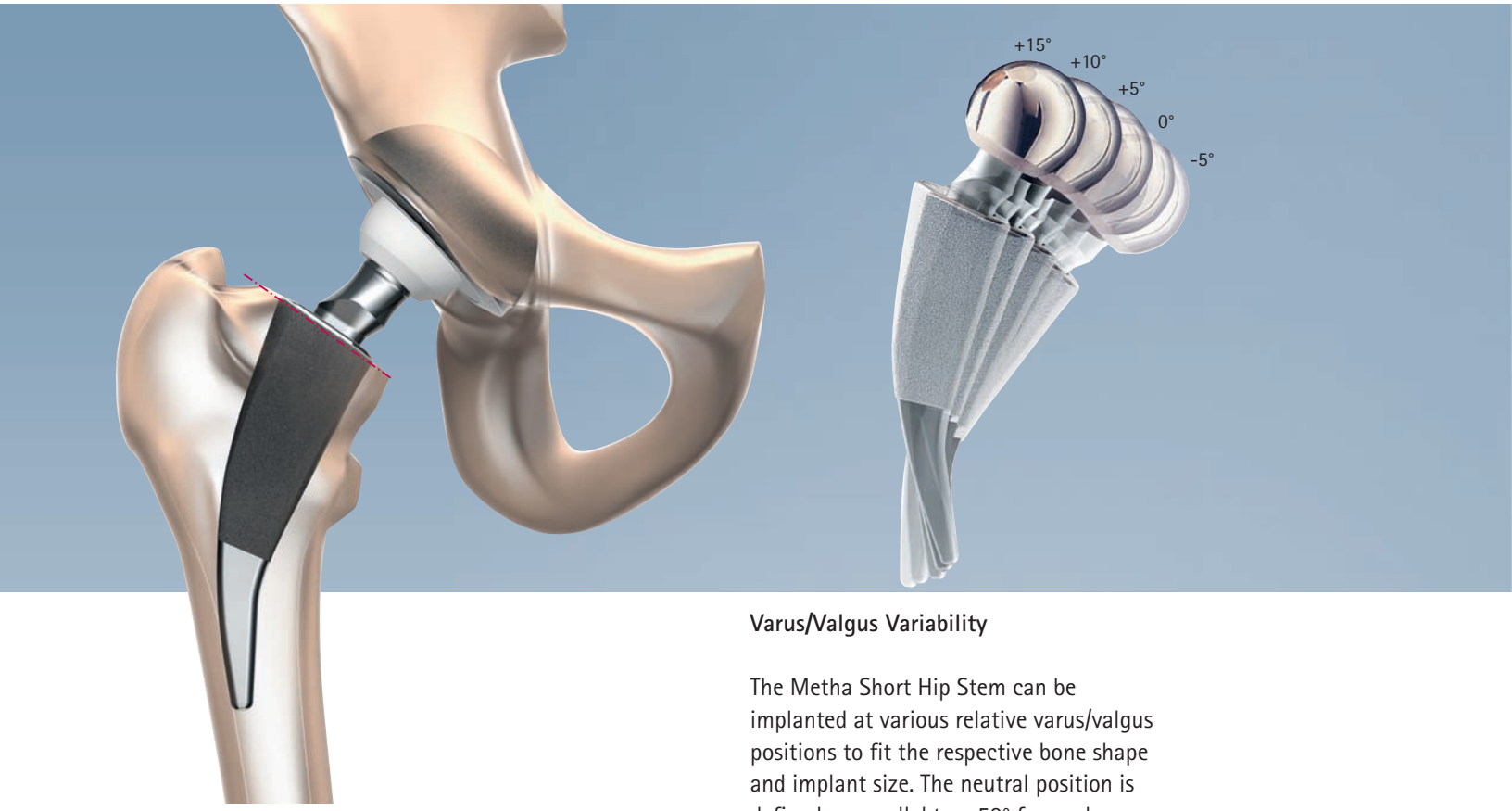
To achieve an optimum osteotomy position, the osteotomy can be applied in two steps. First, subcapital osteotomy can be carried out in situ. The second osteotomy is guided by the planned implantation depth and stem position. A trapezoidal second osteotomy, (higher at the posterior side Ⓐ than at the anterior side Ⓑ, see illustration on page 16) allows the influence of the anteversion position and facilitates the insertion of the rasps.

Opening the Medullary Cavity

The medullary cavity is opened with a curved awl. The opening point is at the center of the osteotomy plane. The awl is advanced to the lateral cortex with light twisting movements. It is helpful to insert the awl in slight varus first, then move more into valgus upon reaching the lateral cortex before pushing it distally along the lateral cortex. The marker dots on the awl are for depth orientation and correspond to the resection height for the small (size 1) or larger (size 6) Metha Stem. The curvature of the awl resembles the lateral profile of the implant so that it produces a first impression of the subsequent implant bed. The awl also defines the working direction of the rasps.

A second awl with a thicker anterior-posterior profile is available for easier bone preparation in harder structures. As a general rule, the awls are for manual application only and must not be impacted with a mallet.

Implant and Rasp Position

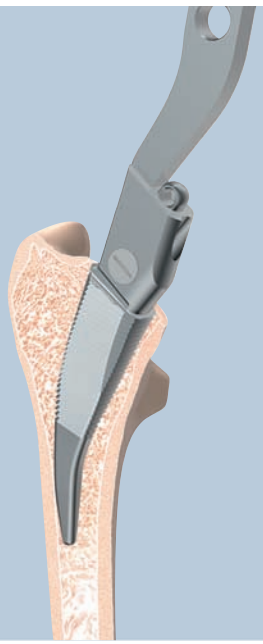


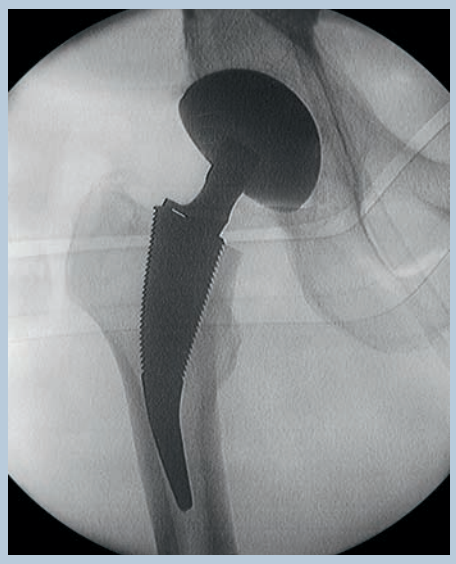
Varus/Valgus Variability

The Metha Short Hip Stem can be implanted at various relative varus/valgus positions to fit the respective bone shape and implant size. The neutral position is defined as parallel to a 50° femoral osteotomy.

Other implant positions are up to 5° relative varus or 15° relative valgus.

When preparing the medullary cavity, a position change of the rasp can be detected by intraoperative comparison with the osteotomy plane.





Femur Preparation

The implant bed is prepared in stages, beginning with the smallest rasp.
The rasp is introduced centrally into the opening of the medullary canal, observing the anteversion. During insertion, the tip of the rasp should touch the lateral cortex and run along it.

To control the tendency towards valgus of the instrument, it helps to apply slight varus pressure when inserting the rasps. The position and alignment of the osteotomy can be checked after inserting the first rasp. Valgus positioning of the rasp can cause unintended leg lengthening. This has to be considered when carrying out the pre-operative planning and during the intraoperative selection of the next rasp size.

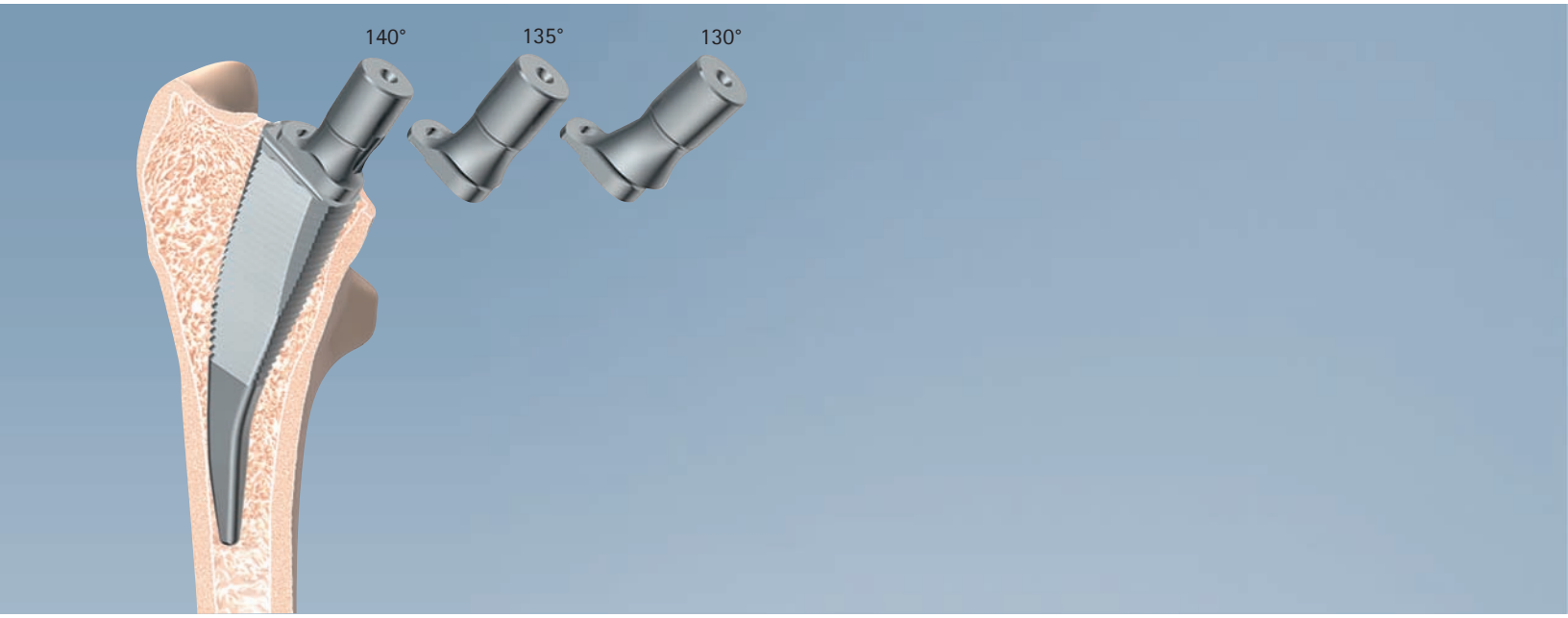
The lateral boundary of the osteotomy must never be removed by any additional resection. To assess such a resection, a proper visibility of the lateral femoral neck is essential.

The implant bed is the correct size as soon as the rasp touches the lateral cortex, sits firmly in the femoral neck, and cannot rotate anymore. The teeth of the rasp should be aligned to the resection level, but never below the osteotomy plane.

The position of the rasp can be checked with the fluoroscopy or x-ray.

If the rasp is not in contact with the dorsolateral cortex in any plane (radiography with internal rotation, see above photo), the position should be corrected by carefully inserting a larger rasp under slight varus pressure.

Trial Reduction and Stem Implantation

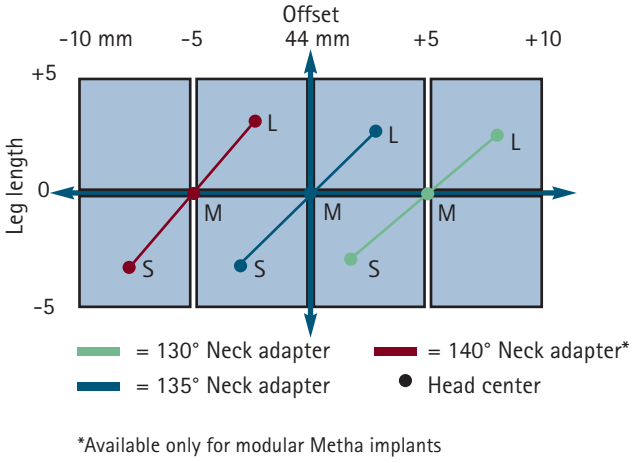


Trial Reduction

The trial reduction is carried out using modular trial neck adapters, which are clipped on the rasp. For Metha modular, there are nine neck adapters available with various CCD angles (130°, 135°, 140°) and anteversion options (7.5° ante, 0°, 7.5° retro).

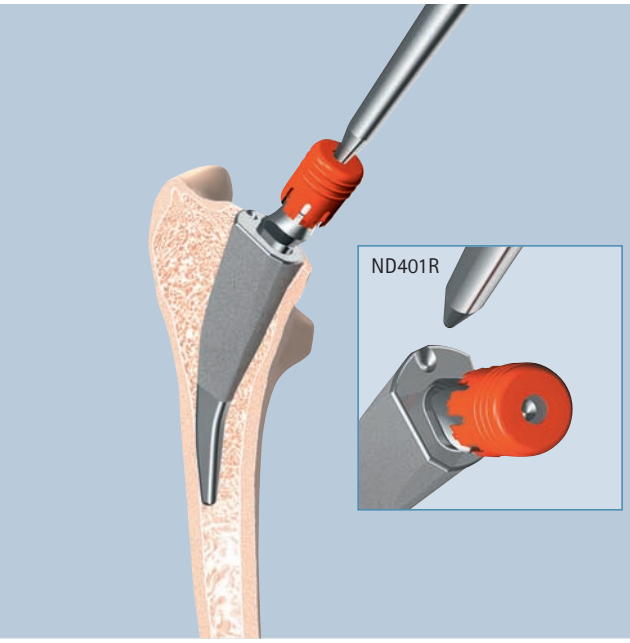
The different CCD angles allow changing the offset by -5 mm / +5 mm without changing the leg length. The neutral offset is 44 mm for a standard varus/valgus rasp position.

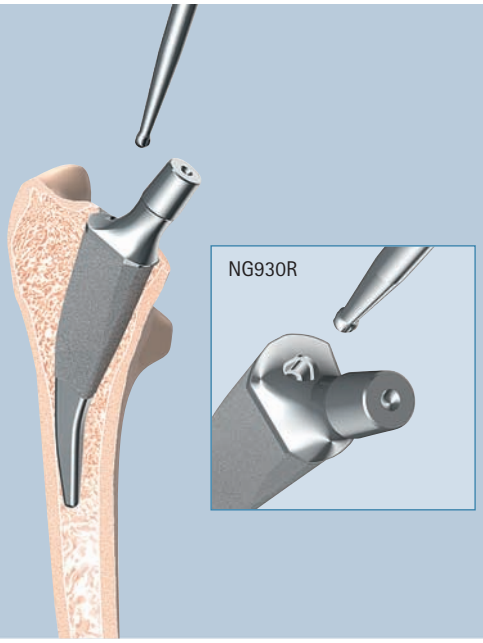
The appropriate neck adapter is selected by assessing the possibility of a luxation tendency, range of motion and the soft tissue or ligamentary tension. The leg length is corrected by choosing an implant head for the required neck length.



*Available only for modular Metha implants

The OrthoPilot® Navigation System helps you select the best possible implant combination and adapt it to the individual articular situation. The system computes and displays the parameters of mobility, any implant impingement, anteversion position and any changes in offset and leg length associated with each of the possible combinations.





Selection of Metha Modular Stem Size and Neck Adapter

The implant stem to be inserted is selected according to the size of the final rasp. The selection of the neck adapter is guided by the trial reduction performed with the implantation rasp and finished by a reduction check of the selected implant head length.

Assembling the Metha Modular Adapter Prior to Implantation

The modular implant components (Metha stem and neck adapter) are assembled prior to the implantation. With the orange protective cap in place, they are joined together by impacting on the recess in the neck adapter center using the Stem Impactor (ND401R).

Then the Metha Stem is inserted by hand making sure to point the arrow (▼) medially and implanted by impacting on the recess in the neck adapter using the Stem Impactor (ND401R).

Once the adapter is securely and firmly fixed in the Metha Stem, the stem can be implanted by applying the same stem impactor in the lateral recess of the Metha Stem. This is followed by a trial reduction with modular heads.

Inserting the Metha Non-Modular Stem

The Metha Non-Modular Stems are available with CCD angles of 130° and 135°, without anteversion or retroversion. Implantation is carried out with the Stem Impactor (NG930R) (Green Handle) or with the Stem Impactor (ND401R) applied in the adapter recess (with the orange protective cap in place).

Implanting the Head

The final trial reduction is followed by the implantation of the head. Careful cleaning and drying of the 12/14 trunnion head interface is absolutely essential.

Modular Stem Implantation

Careful Cleaning of the Cone Surfaces

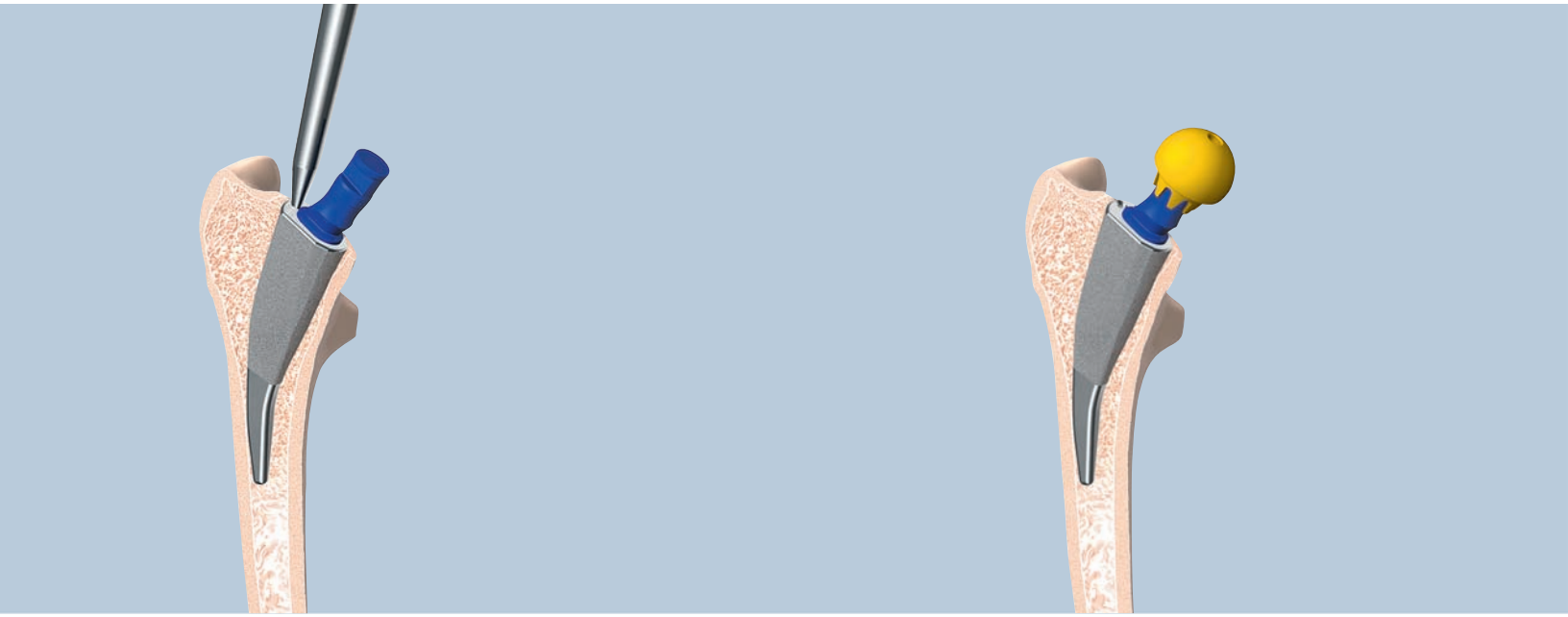
Before the neck adapter can be inserted, the inner socket of the stem must be carefully rinsed, cleaned and dried. The surfaces of the neck adapter must be also clean and dry. Cleaning swabs (ND622) are available for this purpose.

Caution

The cone surfaces must be cleaned and dried under all circumstances, as unclean or damaged connecting surfaces may lead to implant failure. Always follow the instructions for use supplied with the implant components. We recommend assembling the Metha Stem and the modular neck adapters prior to implantation.

Inserting the Neck Adapter

The selected neck adapter is inserted into the implant stem with the marker arrow pointing medial (▼) and driven in lightly but firmly with the stem impacter. To avoid damage to the trunnion, the protective cap is only removed after the neck adapter has been driven firmly into place.
A trial reduction is performed with trial implant heads. After cleaning and drying of the implant cone adapter the final head is inserted and the joint reduced. Finally, the joint mobility, range of motion, articular tension and leg length are checked.



Option: Trial Reduction with Metha Stem

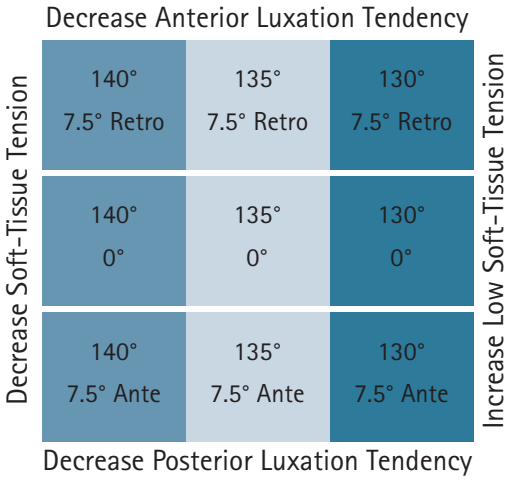
The Metha Stem is inserted as deep as possible by manual pressure and then driven with the stem impacter (ND401R) into its final, fixed position. The implant does not need to be guided as it aligns itself with the rasped cavity.

If guidance of the implant stem is necessary during the implantation, the ND655R Impactor/Extractor Instrument may be used, making sure that the inner socket of the stem is not damaged under any circumstances. The same instrument can also be used for extracting the stem (see page 24).

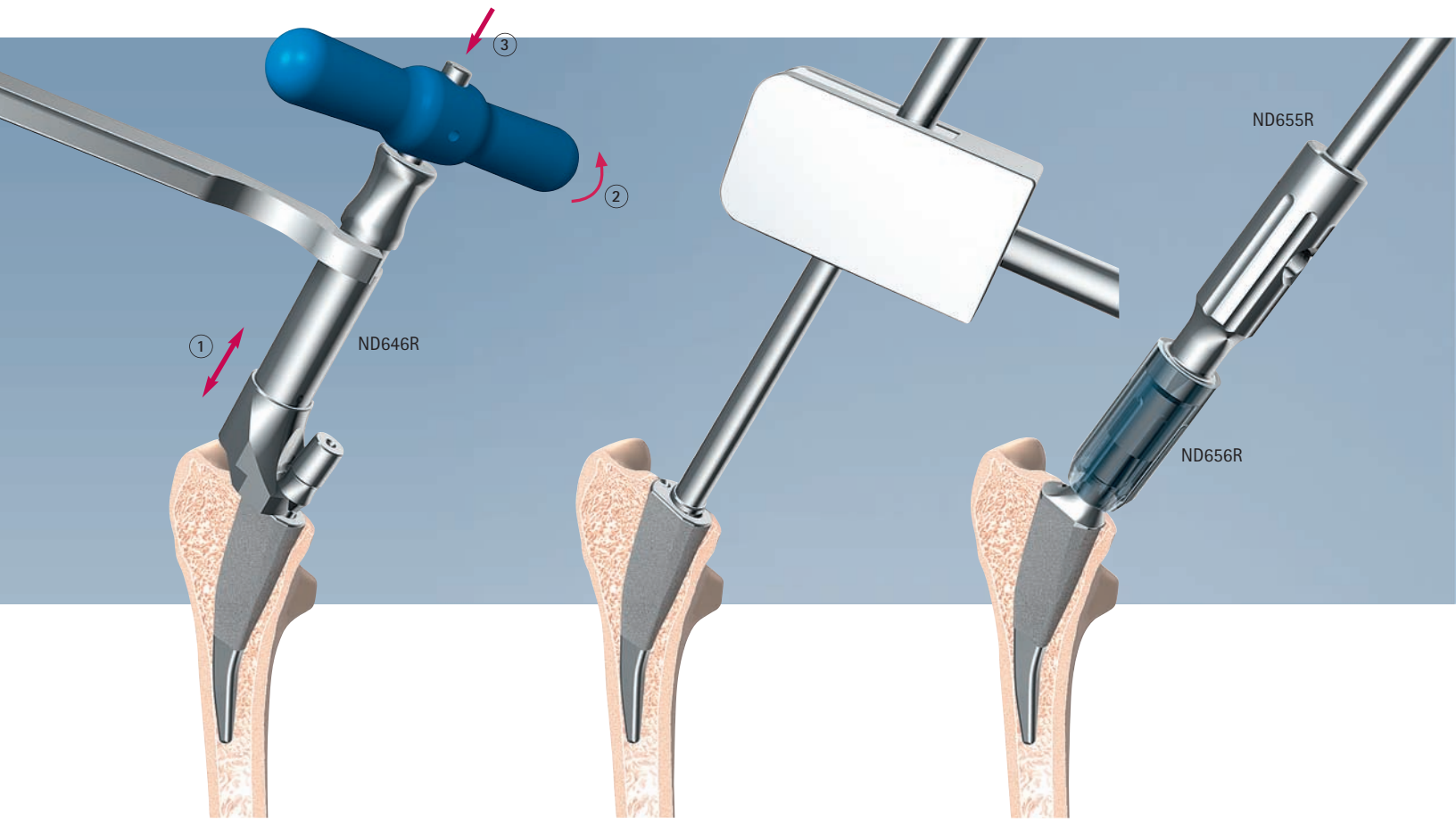
If necessary, an additional trial reduction can be carried out even after the implantation of the Metha Stem using the color-coded modular trial neck adapters and trial heads. The instructions for cleaning the modular adapter prior to insertion must be closely followed (see page 22).

The relative anteversion or retroversion position of the trial adapter can be corrected by 7.5°. The marking of the adapters is dependent on the implantation side. The CCD angle influences the soft tissue tension by changing the offset.

The relative retroversion or anteversion can also be selected according to the position or cup coverage of the trial implant head after the trial reduction.



Explantation of the Stem



Removing the Neck Adapter

To remove the Metha Modular Stem, first extract the modular neck component from the stem. The extractor is applied and tightened between the surface of the stem ① and the modular neck component. ②

The connection between the two components is loosened by pulsed impacts with a hammer on the extractor. ③ The extractor is carefully retightened between the hammer blows. ②

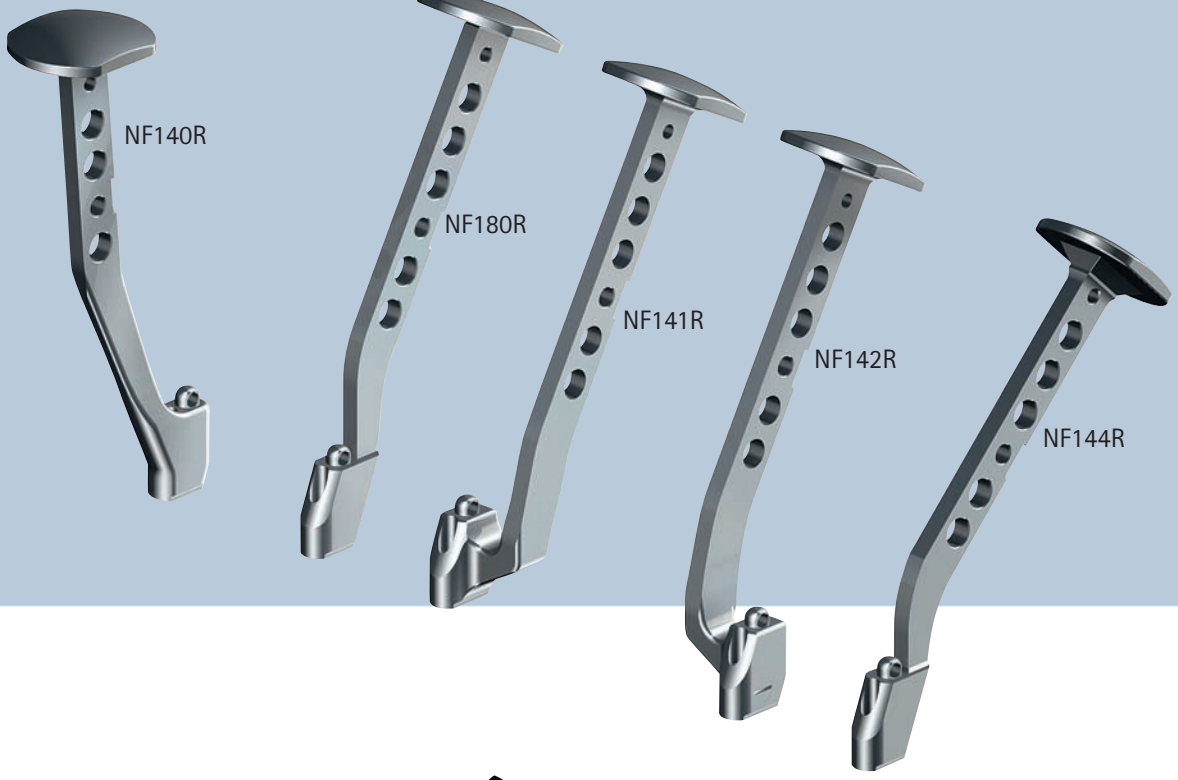
Explanting the Stem

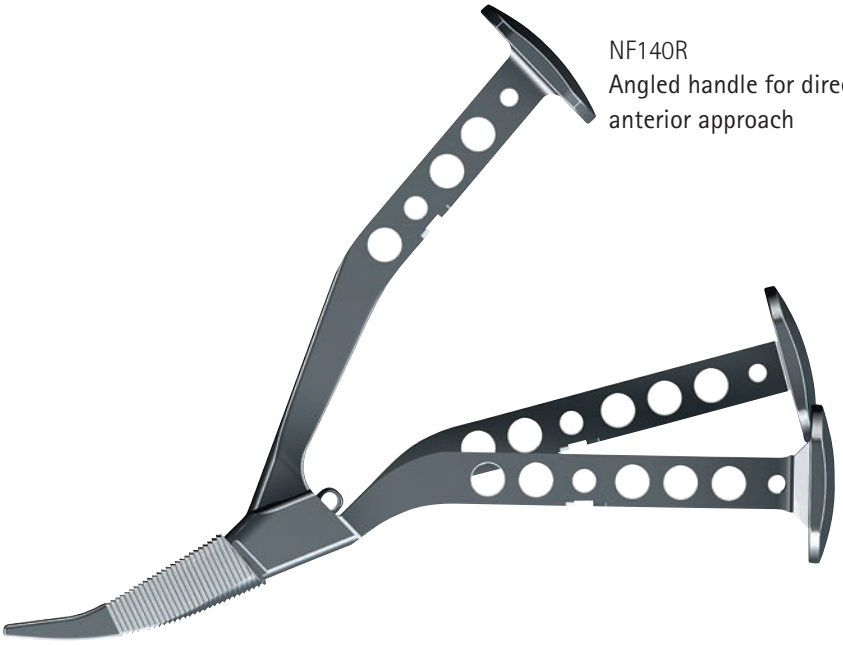
Once the modular neck adapter has been removed, the stem explantation instrument is screwed firmly into the thread of the stem. The stem can then be explanted using a slotted hammer. If the stem has become strongly ingrown in the bone, a flexible osteotome is applied around the coated area of the stem (anterior, posterior, lateral then medial).
Since the surfaces are straight, it is also possible to use an oscillating saw (blade width 10 mm, depth 30 mm).

Extraction of the Metha Non-Modular Stem

The Metha Non-Modular Stem can be extracted intraoperatively, if necessary, with the ND656R instrument. This instrument, which grips around the 12/14 trunnion, is connected to the ND655R extraction instrument. The stem must not be reused after an extraction since the cone could be damaged during this procedure.
The extraction of a strongly ingrown Metha Non-Modular Stem is carried out in the same way as the standard hip stems, using a stem extractor for the 12/14 trunnion.

Handles for Different Approaches





NF140R
Angled handle for direct anterior approach

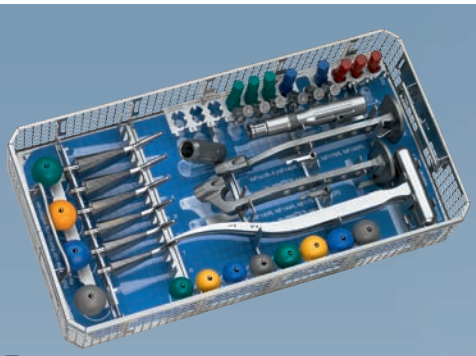
NF180R
Straight handle for lateral and anterolateral approaches

NF141R, NF142R
Offset handles*

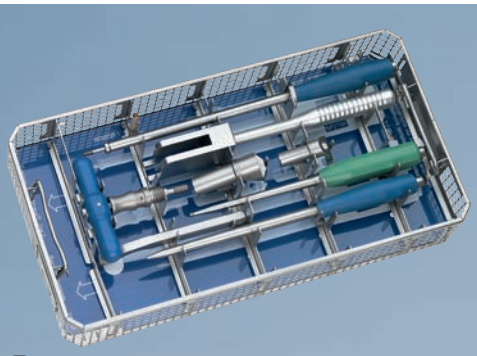
NF144R
Curved handle for posterior approach

* Note:
NF141R for the left hip (lateral and anterolateral approaches) or right hip (posterior approach)
NF142R for the right hip (lateral and anterolateral approaches) or left hip (posterior approach)

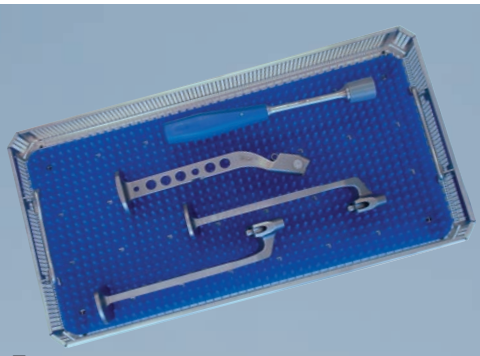
Metha® Modular Instruments and Implants



Tray 1



Tray 2



Tray 3

Tray 1	
ND613R	Perforated tray for tray 1
TE928	Graphics template for tray 1
JH217R	Tray lid
ND644R	Metha awl narrow
ND645R	Metha awl wide
ND656R	Metha extraction instrument for 12/14 trunnion
NF180R	Straight, lateral approach

Metha Rasps				
Size	1	2	3	4
	NF181R	NF182R	NF183R	NF184R
Size	5	6	7	
	NF185R	NF086R	NF087R	

Metha Rasp Trial Neck Adapters			
	130°	135°	140°
7.5° L Ante R Retro	ND714R	ND724R	ND734R
0°	ND715R	ND725R	ND735R
7.5° L Retro R Ante	ND716R	ND726R	ND736R

Metha Trial Neck Adapters			
	130°	135°	140°
7.5° L Ante R Retro	ND627	ND637	ND647
0°	ND628	–	ND648
7.5° L Retro R Ante	ND629	ND639	ND649

Trial Heads 12/14				
Head	Neck Length	28 mm	32 mm	36 mm
S	-4	NG296	NG306	NG326
M	0	NG297	NG307	NG327
L	+4	NG298	NG308	NG328

Tray 2	
ND614R	Perforated tray for tray 2
TE929	Graphics template for tray 2
JH217R	Tray lid
NF275R	Slotted hammer, slot W = 12 mm
ND655R	Metha impaction/extraction handle
NG930R	Metha Non-modular impactor
ND401R	Metha standard impactor
ND646R	Metha modular neck extractor

Container	
JK486	Container Lid
JN444	Container

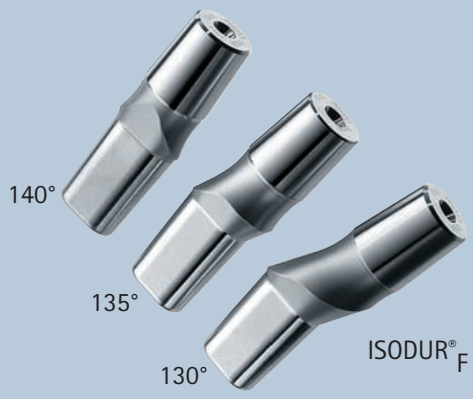
Tray 3	
JH213R	Tray
JH217R	Tray Lid
JF932	Silicone Pad
ND050	Head Impactor

Metha Rasp Handles	
NF141R	Offset, left/right
NF142R	Offset, right/left
NF144R	Curved, posterior approach

Container	
JK486	Container Lid
JN444	Container

Optional Instrument (Order separately)	
NF140R	Angled, direct anterior approach

Cone 12/14



Metha Modular Stems

with trial neck adapter 135°/0°

Stem Size	Modular
2	NC082T
3	NC083T
4	NC084T
5	NC085T
6	NC086T

Modular Neck Adapters

12/14 trunnion

CCD Angle Offset	130° + 5 mm	135° 0 mm	140° – 5 mm
Correction Anteversion			
7.5° L Ante / R Retro	NC077K	NC087K	NC097K
0°	NC078K	NC088K	NC098K
7.5° L Retro / R Ante	NC079K	NC089K	NC099K

Cleaning Swabs

ND622	10 Cleaning swabs for inner cone (Order separately)

Implant Materials:

ISOTAN®F - Titanium forged alloy (Ti6Al4V / ISO 5832-3)

Plasmapore® µ-CaP - Pure titanium surface with 20 µm coating dicalcium phosphate dihydrate ($CaHPO_4x2H_2O$)

Biolox® forte - Aluminum oxide ceramics (Al_2O_3 / ISO 6474)

ISODUR®F - Cobalt-Chromium forged alloy (CoCr29Mo / ISO 5832-12)

UHMWPE - Ultra-high molecular weight polyethylene (ISO 5834-2)

Metha® Non-Modular Instruments and Implants

Tray 1

Tray 2

Tray 1	
ND609R	Perforated tray for Non-modular set
TE931	Graphics template for Non-modular set
JH217R	Tray lid
ND644R	Metha awl narrow
ND645R	Metha awl wide
ND656R	Metha extraction instrument for 12/14 trunnion
ND655R	Metha impaction/extraction handle
NG930R	Metha Non-modular stem impactor
ND715R	Rasp trial neck adapter 130°/0°
ND725R	Rasp trial neck adapter 135°/0°
NF180R	Metha Rasp Handle Straight

Metha Rasps				
Size	1	2	3	4
	NF181R	NF182R	NF183R	NF184R
Size	5	6	7	
	NF185R	NF086R	NF087R	

Trial Heads 12/14				
Head	Neck Length	28 mm	32 mm	36 mm
S	-4	NG296	NG306	NG326
M	0	NG297	NG307	NG327
L	+4	NG298	NG308	NG328

Tray 2	
JF932	Silicone Pad
JH213R	Tray
JH217R	Tray Lid
ND050	Head Impactor

Metha Rasp Handles, also for Navigation	
NF141R	Offset, left/right
NF142R	Offset, right/left
NF144R	Curved, posterior approach

Container	
JK486	Container Lid
JN444	Container

Optional Instrument (order separately)	
NF140R	Angled, direct anterior approach

Metha Stems with 12/14 trunnion					
Stem size	CCD = 130°	CCD = 135°	Stem size	CCD = 130°	CCD = 135°
2	NC272T	NC282T	5	NC275T	NC285T
3	NC273T	NC283T	6	NC276T	NC286T
4	NC274T	NC284T	7	NC277T	NC287T

Plasmacup® Implants and Heads

Plasmacup® SC µ-CaP

44 mm	NC444T
46 mm	NC446T
48 mm	NC448T
50 mm	NC450T
52 mm	NC452T
54 mm	NC454T
56 mm	NC456T
58 mm	NC458T
60 mm	NC460T
62 mm	NC462T
64 mm	NC464T
66 mm	NC466T
68 mm	NC468T

ISOTAN ®F

SC Polyethylene Cup Liners

	Symmetric		Posterior Wall	
	28 mm	32 mm	28 mm	32 mm
44 mm 46 mm	NH191	–	NH401	–
48 mm 50 mm	NH192	NH202	NH402	–
52 mm 54 mm	NH193	NH203	NH403	NH413
56 mm 58 mm	NH194	NH204	NH404	NH414
60 mm 62 mm	NH195	NH205	NH405	NH415
64 mm 66 mm 68 mm	NH196	NH206	NH406	NH416

UHMWPE

Heads

12/14

	28 mm	32 mm	36 mm*
Short	NK460	NK560	NK650
Medium	NK461	NK561	NK651
Long	NK462	NK562	NK652

BIOLOX® forte

* Only available with Metha Non-Modular stems

12/14

	28 mm	32 mm
Short	NK429K	NK529K
Medium	NK430K	NK530K
Long	NK431K	NK531K

ISODUR®F

Implant Materials:

ISOTAN®F - Titanium forged alloy (Ti6Al4V / ISO 5832-3)

Plasmapore® µ-CaP - Pure titanium surface with 20 µm coating dicalcium phosphate dihydrate ($CaHPO_4x2H_2O$)

Biolox® forte - Aluminum oxide ceramics (Al_2O_3 / ISO 6474)

ISODUR®F - Cobalt-Chromium forged alloy (CoCr29Mo / ISO 5832-12)

UHMWPE - Ultra-high molecular weight polyethylene (ISO 5834-2)

Notes

AESCULAP®
Implant Systems

Aesculap Implant Systems, Inc.

3773 Corporate Parkway
Center Valley, PA 18034
Phone: 866-229-3002

www.aesculapimplantsystems.com