

# Metha<sup>®</sup> Short Hip System

Surgical Technique



Aesculap Orthopaedics

# Metha<sup>®</sup> Short Hip System

## Surgical Technique

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## I. Indications and Contraindications

### Indications

The Metha® Hip System (uncemented, press-fit fixation) is intended to replace a hip joint.

*The device is intended for:*

- Skeletally mature individuals undergoing primary surgery for total hip replacement
- Patients suffering from severe hip pain and disability due to rheumatoid arthritis, osteoarthritis, traumatic arthritis, polyarthritis, collagen disorders, a vascular necrosis of the femoral head and nonunion of previous fractures of the femur.
- Patients with congenital hip dysplasia, protrusion acetabuli, or slipped capital femoral epiphysis
- Patients suffering from disability due to previous fusion
- Patients with acute femoral neck fractures

### Contraindications:

*Do not apply in the presence of:*

- Joint diseases that can be treated with reconstructive surgery (e.g. displacement osteotomy)
- Acute or chronic infections near the joint or systemic infections
- Secondary diseases that could influence joint implant functionality
- Systemic diseases and metabolic disturbances
- Acute osteoporosis or osteomalacia
- Severely damaged bone structures that could prevent stable implantation of implant components
- Bone tumors in the region of implant fixation
- Bone deformities, axis misalignments, or other bone conditions that rule out the implantation of a hip joint prosthesis preserving the collum femoris
- Anticipated excessive load on the joint implant
- Dependency on pharmaceutical drugs, drug abuse, or alcoholism Medicinal
- Inadequate patient compliance
- Foreign body sensitivity to the implant materials
- Skeletal immaturity
- Neuromuscular diseases impairing the affected extremity
- Prosthesis head with neck length XL in combination with short-stem prosthesis sizes 0 and 1
- Prosthesis heads with neck length XXL

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### II. System Overview:

The Metha Short Hip Stem was designed to achieve true metaphyseal anchoring for successful cementless hip arthroplasty. The Metha Stem's advanced design 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<sup>®</sup>  $\mu$ -CaP coating of proximal surface supports rapid secondary fixation. The Metha Short Hip Stem is an anatomical implant, following the neck axis to accurately restore joint biomechanics.

#### Design Advantages:

**Follows the Femoral Neck** – Anatomical hip reconstruction.

**Femoral Antetorsion Reconstruction** – The femoral neck guidance allows an anatomical reconstruction of the antetorsion.

**Soft Tissue Preserving Technique** – The Metha Short Hip Stem is ideally suited for minimally invasive techniques due to a minimal stem design, a more medial location of the femur opening, and the medially tilted insertion angle.

**Anatomical Variability** – One medial calcar contour allows implantation at various varus/valgus positions, adapting to the respective bone morphology.

**Bone Preserving Technique** – Broach only technique allows for minimal disturbance to endosteal blood supply and to maximize bone conservation.

**High Performance** – High quality, easy-to-use instrumentation.

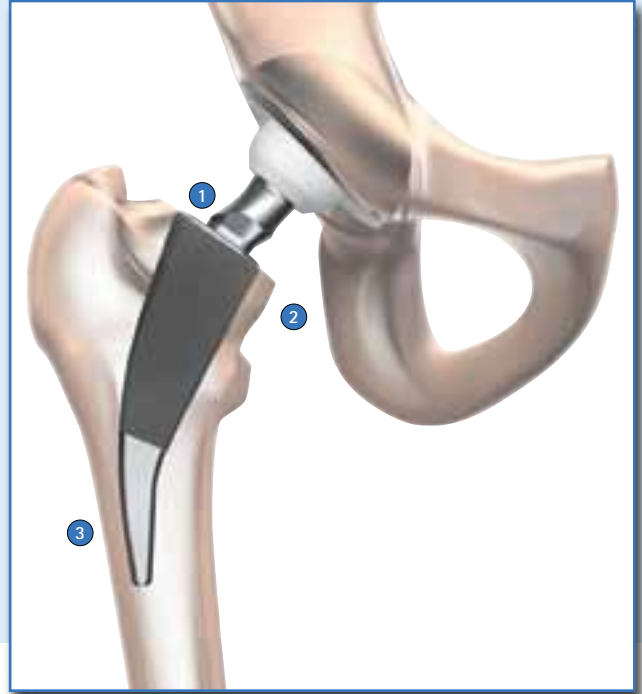
**Intraoperative Flexibility** – Modular design allows intra-operative flexibility for optimum leg length adjustment and soft tissue tension to restore proper biomechanics.

**Engineered From Experience** – 20 years of success in applying Plasmapore to titanium on orthopaedic and spine implants.

**Enhanced Stability** – The Plasmapore  $\mu$ -CaP coating on the proximal surface is microporous to maximize fixation with the bony infrastructure.



### III. Metaphyseal Anchoring Concept:



The Metha® Short Hip Stem is not inserted straight into the femoral canal as with standard conventional stems, but rather introduced through the femoral neck so that the bone and muscle structures are preserved. The non-cemented Metha stem is fixated by metaphyseal anchoring within the closed ring of the femoral neck. The greater trochanter region remains completely untouched, utilizing the lateral neck for support ①. The conical shape of the proximal body (in the lateral view) supports primary stability and proximal force and metaphyseal force transfer, utilizing the cortical calcar for support ②. The high primary stability is further enhanced by the rounded tip of the stem guided along the dorso-lateral cortex ③.



The typical Metha position in the lateral view

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### IV. 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 of templating the Metha Short Hip Stem is to:

- 1 Find the resection point
- 2 Align the distal end of the stem to the lateral cortex
- 3 Achieve support on the calcar
- 4 Reconstruct with the best head option

In addition to the position of the joint center and the leg length, planning the resection height is also vital. The preservation of a cortex ring at least 2 mm thick around the femoral neck is necessary for anchorage.

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.

*Note: Any strong anteversion of the femoral neck can complicate the implantation. Therefore, the pre-operative planning should also include a lateral x-ray.*

## V. Surgical Technique

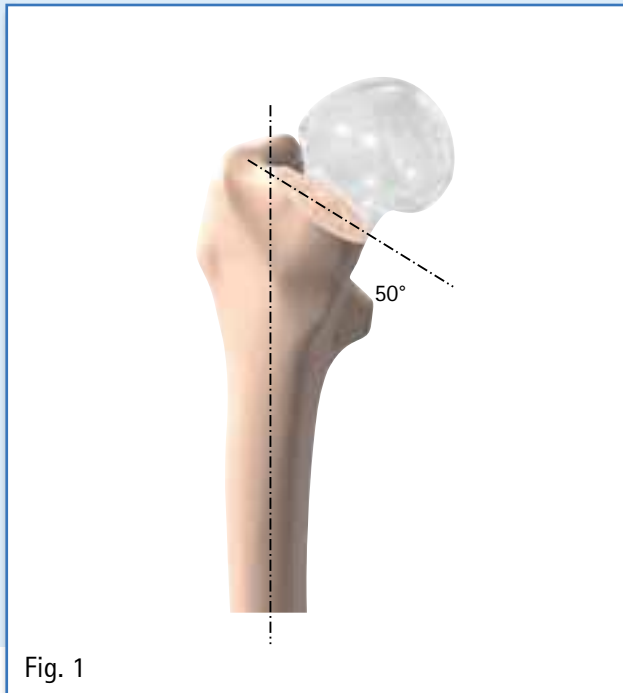


Fig. 1

### 1. Femoral Osteotomy: (Fig. 1)

- The femoral neck resection is performed according to pre-operative planning.
- The femoral osteotomy is positioned approximately 5 mm above the junction of the greater trochanter and the femoral neck, and is ideally inclined at an angle of 50° to the femoral shaft axis (Fig. 1). To aid intraoperative orientation, the distance from the lesser trochanter can be measured medially.
- A closed cortical ring of the femoral neck of at least 2 mm lateral width is to remain intact.
- To achieve an optimum osteotomy position, a resection guide or double osteotomy technique can be applied. (see Fig. 2 & Fig. 3)

**Caution:** Any lower resection than described above can compromise the implant anchoring and therefore demonstrates a contraindication against the implantation.



Fig. 2

### Double Osteotomy Technique: (Fig 2)

- First, a subcapital osteotomy can be performed 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, allows the influence of the anteversion position and facilitates the insertion of the rasps.

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Fig. 3

### Resection Guide: (Fig. 3)

- The resection guide (ND607R) is placed from the anterior direction onto the proximal femur and is guided by the rod onto the trochanteric fossa.
- The attached handle is parallel to the resection guide and should be oriented so that it is also parallel to the axis of the femur.
- The osteotomy can be performed with the resection guide positioned.



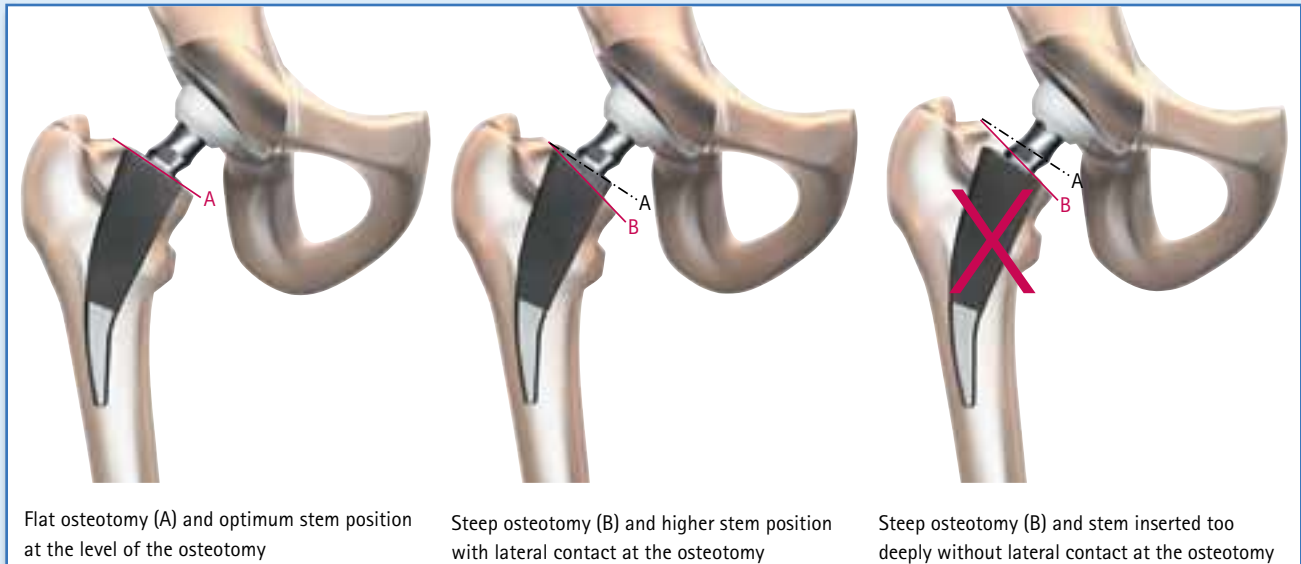


Fig. 4

- If the osteotomy is applied too low medially or if the osteotomy is too steep, the stem will be supported by 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. (Fig. 4)

**Caution:** *If the osteotomy is too steep and there is insufficient support on the proximal lateral cortex, there is a risk that the stem may move 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, resulting in a valgus position.*

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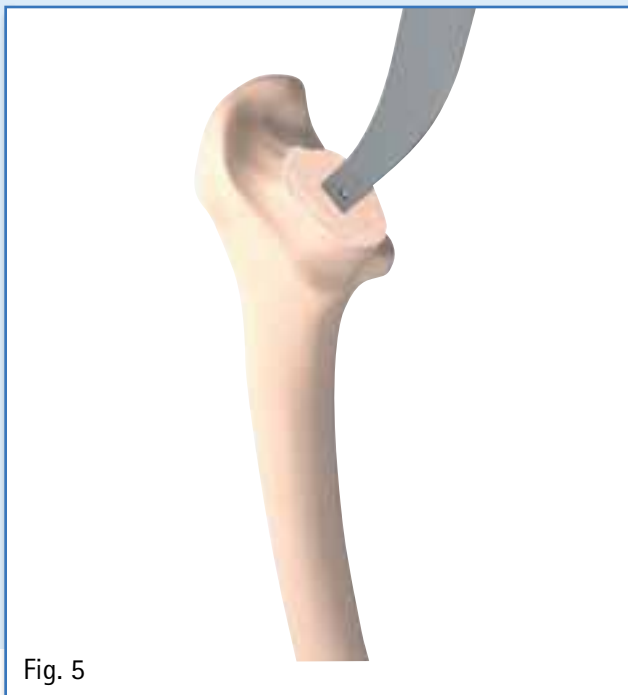


Fig. 5



Fig. 6

### 2. Opening the Medullary Cavity:

- The femoral canal is entered by opening the medullary cavity with a curved awl (ND644R or ND654R) (Fig. 5). 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 (Fig. 6).
- The opening point is at the center of the osteotomy plane, then approach the lateral cortex with light twisting movements. To facilitate proper direction of the awl, first insert the awl slightly in varus, then move more into valgus upon reaching the lateral cortex before advancing it distally along the lateral cortex.
- Marker dots are available on the awl for depth orientation and correspond to the resection height for the small (size 0) or the larger (size 7) Metha Stem.
- A second awl (ND645R or ND672R) with a thicker anterior-posterior profile may be used for further bone preparation in harder structures.

**Note:** *The awls are for manual application only and should not be impacted with a mallet.*



Fig. 7



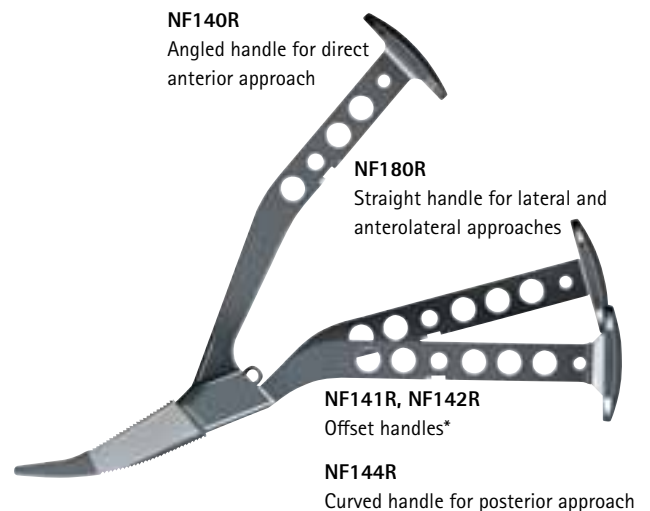
Fig. 8

### 3. Preparation of the Femoral Canal:

- The femoral canal is prepared using sequential rasps, beginning with the smallest rasp.
- The rasp is introduced centrally into the opening of the medullary cavity, observing the anteversion. Then approach the lateral cortex and advance it distally along the lateral cortex. (Fig. 7) To mediate the directional tendency of a valgus orientation upon insertion, apply slight varus pressure when inserting the rasps.
- The implant bed is prepared for the proper size when the rasp is in contact with the dorso-lateral cortex, seated firmly in the femoral neck, and resists rotation. The teeth of the rasp should be aligned to the resection level, but never below the osteotomy plane. (Fig. 8) The implant stem to be inserted is selected according to the size of the final rasp.
- Position of the rasp and its alignment to the osteotomy plane should be examined with fluoroscopy or x-ray, during intraoperative selection of the subsequent rasp size.

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

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



**\*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)

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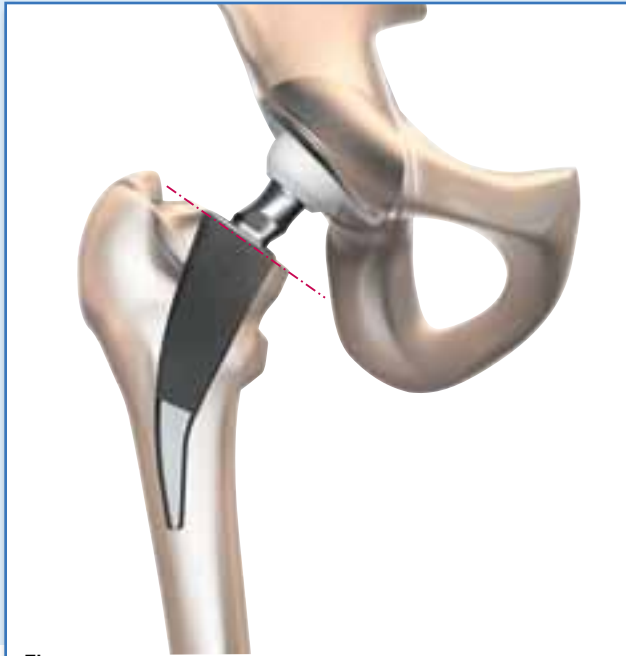


Fig. 9



Fig. 10

#### 4. Varus/Valgus Variability:

- The Metha Short Hip Stem can be implanted at various relative varus/valgus positions in order to fit the patient's respective bone shape and implant size.
- During preparation of the medullary cavity, a position change of the rasp should be assessed intraoperatively with a comparison of the rasp position to the osteotomy plane.
- The neutral position is defined as parallel to a 50° femoral osteotomy. (Fig. 9)
- Other implant positions are up to 5° relative varus to 15° relative valgus. (Fig. 10)

**Note:** *It must be taken into consideration that a valgus position of the rasp and implant can result in unintended leg lengthening.*

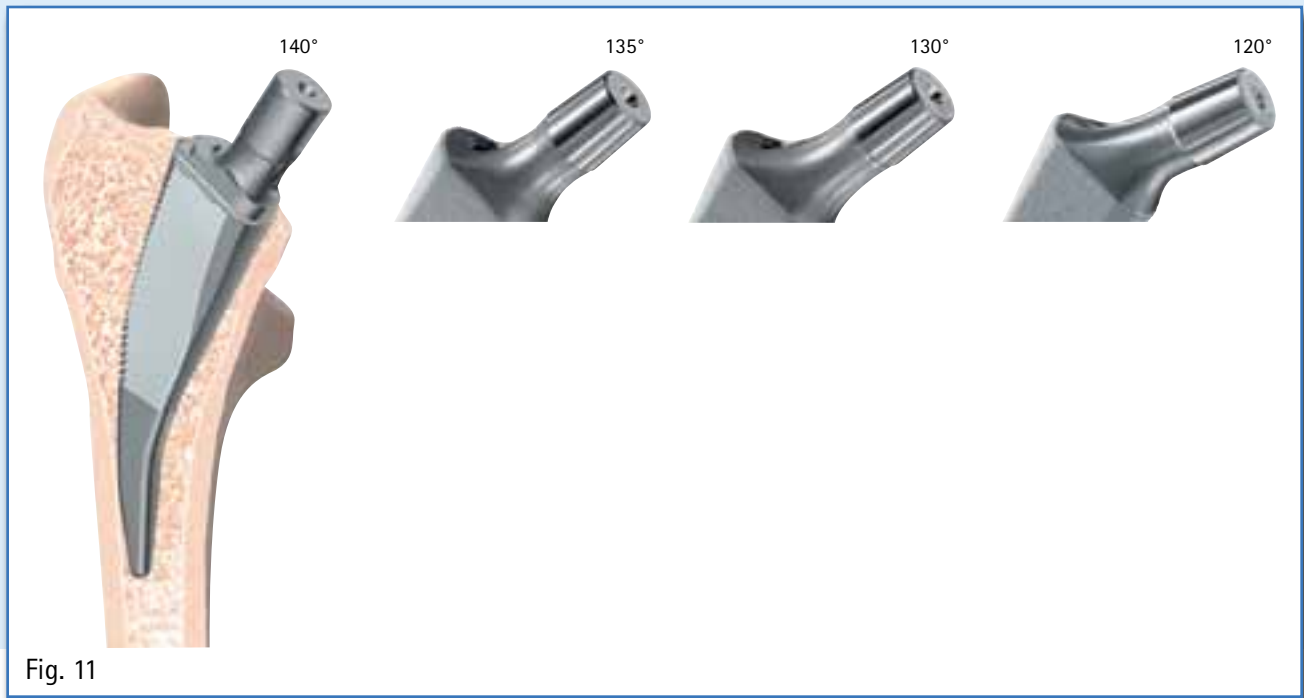


Fig. 11

#### 5. Trial Reduction:

- The trial reduction assesses joint mobility, range of motion, articular tension, and leg length.
- The trial reduction is performed using trial neck adapters, the implantation rasp, and trial implant heads.
- Remove the rasp handle and leave the rasp in the femoral canal.
- Choose the appropriate trial neck adapter and attach it to the rasp. (Fig. 11)
- Choose the appropriate trial head and place it on the neck cone.
- Reduce the joint and repeat as necessary.

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Fig. 12

### 6. Biomechanical Considerations:

The selection of the neck is guided by the trial reduction, in order to assess luxation tendency, range of motion, and soft tissue or ligamentary tension. (Fig. 13)

The various CCD angles influences the soft tissue tension by changing the offset by -5mm / +5mm, without changing the leg length. (Exception: the 120° CCD angle does change the leg length). The neutral offset is 44mm for a standard varus/valgus rasp position. The leg length is assessed by choosing an implant head for the required neck length.

The relative anteversion or retroversion position of the trial adapter can be balanced with respect to the leg length by  $\pm 7.5^\circ$ . (Fig. 12)

- The Metha Modular Implant is compatible with 9 neck adapters, available with various CCD angles (130°, 135°, and 140°) and anteversion options (7.5° ante, 0°, 7.5° retro)
- The Metha Non-Modular Implant is compatible with 3 neck adapters, available with various CCD angles (120°, 130°, and 135°) without anteversion or retroversion (it will follow the anatomical direction of the patient's femoral neck).

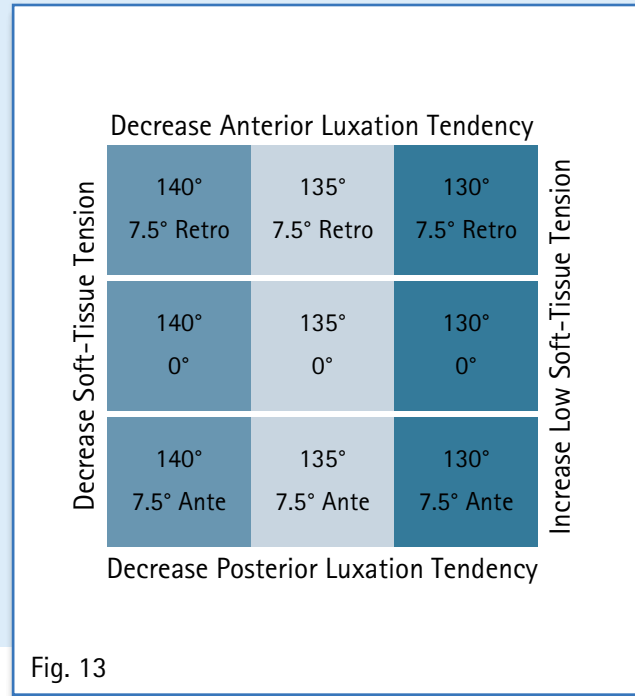


Fig. 13

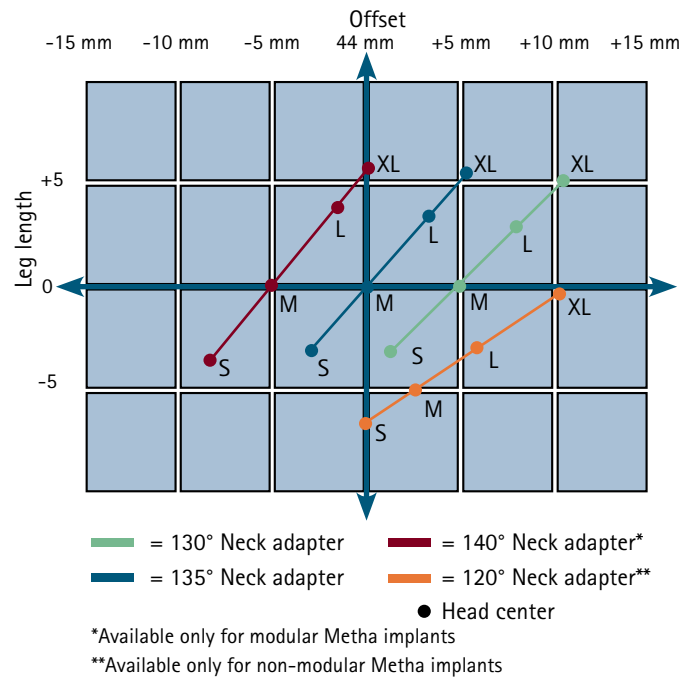




Fig. 14a



Fig. 14b

### 7. Insertion of the Metha® Modular Stem:

- The modular components (Metha stem and neck adapter) are assembled prior to implantation.
- Prior to insertion of the neck adapter, the inner socket of the stem and surfaces of the neck adapter must be carefully cleaned and dried. Cleaning swabs are available for this purpose. (Fig. 14a)

**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 modular neck adapters prior to implantation.*

- 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 impactor, pointed tip. (ND401R) via the recess in the neck adapter center. (Fig. 14b)

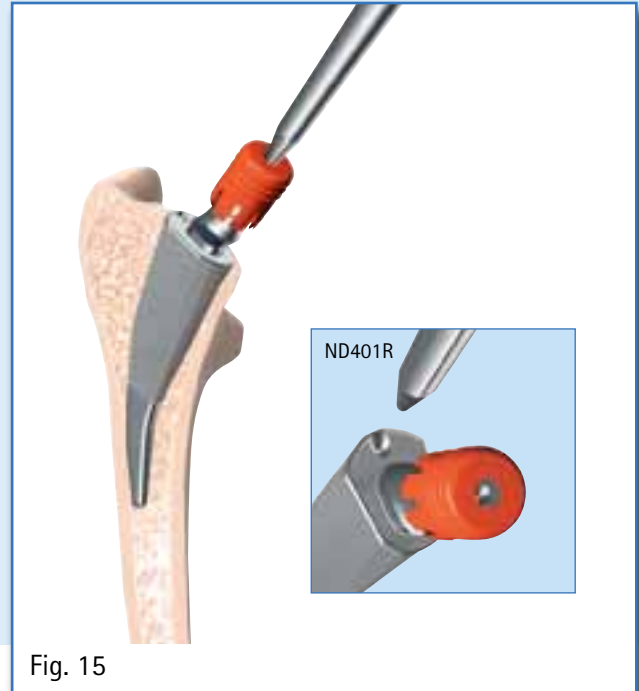


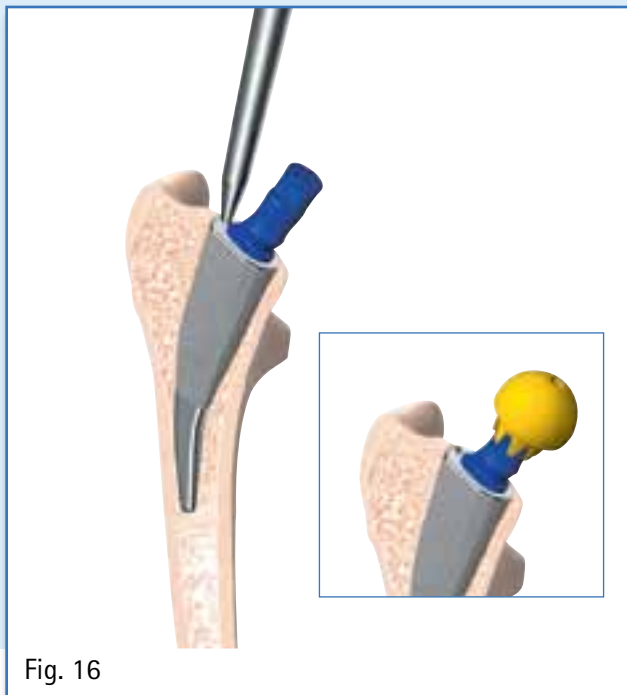
Fig. 15

- The stem, with the attached neck adapter, is inserted as deep as possible by manual pressure and then driven-in by applying the same stem impactor to the lateral recess of the Metha stem. (Fig. 15)
- The implant does not need to be guided as it aligns itself with the rasped cavity. However, if guidance of the implant stem is necessary during the implantation, the impactor/extractor instrument (ND655R) may be used. Be sure that the inner socket of the stem is not damaged under any circumstances.

**Note:** *To avoid damage to the trunnion, the protective cap is only removed after the neck adapter and stem have been joined and driven firmly into place.*

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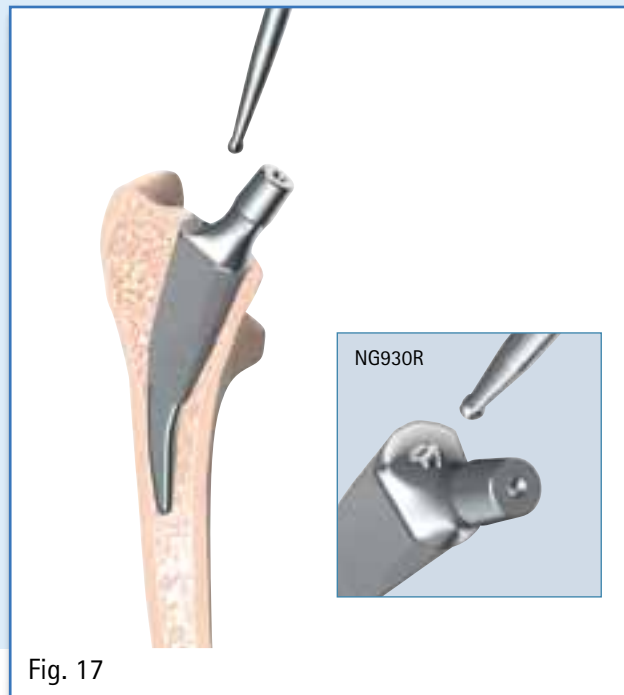
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### 8. Optional: Trial Reduction of the Metha Modular Stem:

- If necessary, the Metha Modular Stem can be implanted without the neck adapter and an optional trial reduction can be completed using the color-coded modular trial neck adapters. (Fig. 16)
- The instructions for cleaning the modular adapter prior to insertion must be closely followed.

**Note:** *It is recommended to apply impact forces to the trunnion recess; implantation via impact forces to the lateral recess of the Metha stem could move the stem into a valgus position.*



### 9. Insertion of the Metha Non-Modular Stem:

- The stem is inserted as deep as possible by manual pressure and then driven-in by applying the stem impactor (NG930R), ball-tip, to the lateral recess of the Metha stem. (Fig. 17)
- If necessary, the stem impactor (ND401R) pointed-tip can be applied to the trunnion recess with the orange protective cap in place.



## Explantation of the Metha® Short Hip Stem

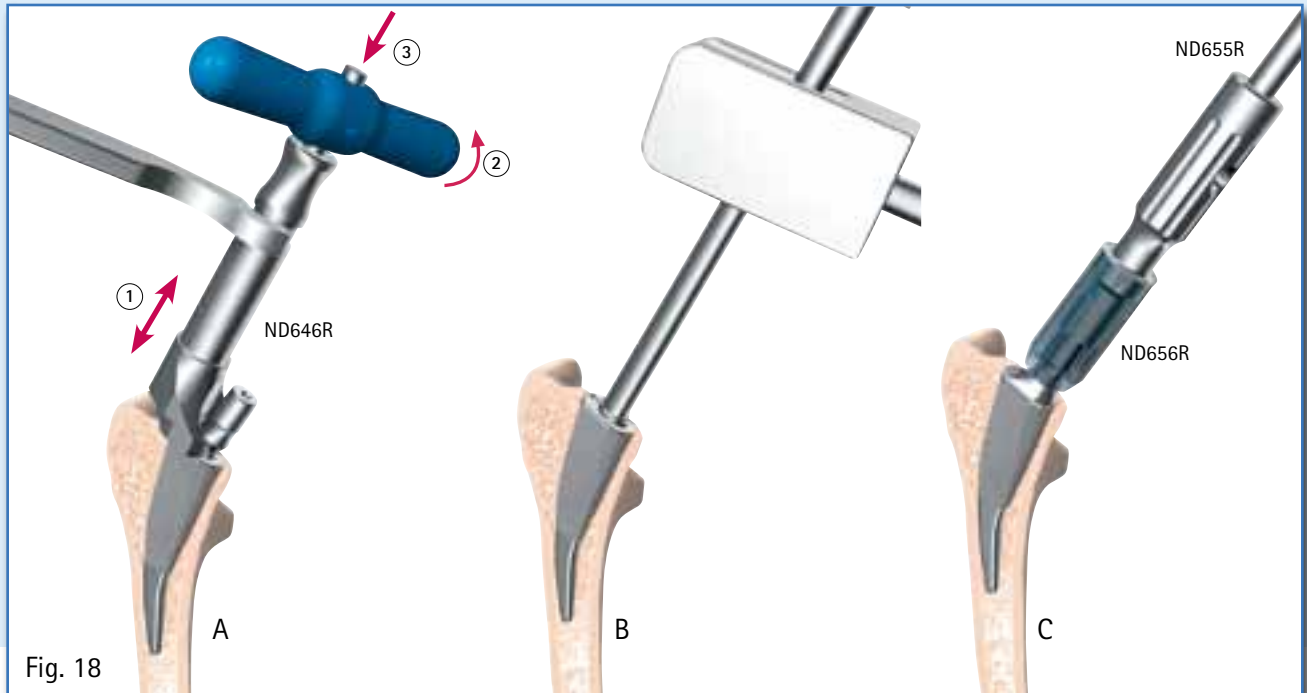


Fig. 18

### 10. Explantation of the Metha Stem:

#### A. Removal of the Modular Stem Neck Adapter (Fig 18a)

- To remove the Metha Modular Stem, first extract the modular neck component from the stem. The neck extractor (ND646R) is applied and tightened with the handle between ① the surface of the stem and ② the modular neck component.
- The connection between the two components is loosened by ③ pulsed impacts with a hammer on the neck extractor.
- The extractor is carefully retightened between the hammer blows.

#### B. Explantation the Modular Stem (Fig. 18b)

- Once the modular neck adapter has been removed, the stem explantation handle (ND655R) is screwed firmly into the thread of the stem.
- The stem can then be loosened by pulsed impacts using a slotted hammer (NF275R).

#### C. Explantation of the Non-Modular Stem (Fig. 18c)

- To remove the Metha Non-Modular Stem, the stem explantation handle (ND655R) is threaded into the trunnion adapter (ND656R).
- This instrument grips around the trunnion and is explanted in the same manner as standard hip stems using a stem extractor for the trunnion.

**Note:** If the stem has become strongly incorporated with the bony structure, a flexible osteotome is applied around the coated area of the stem (anterior, posterior, lateral, then medial). Due to the straight surfaces, it is possible to use an oscillating saw (blade width 10 mm, depth 30 mm).

**Note:** The stem must not be re-implanted after an extraction, since the stem and neck areas could be damaged during this procedure.

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### 11. Navigation with OrthoPilot<sup>®</sup>:

Metha Short Hip Stem can be implanted using the OrthoPilot Navigation system. The THA software module is designed to provide computer aided navigation of the articular parameter of the cup and stem components to optimize the range of motion. The THA plus software only needs one transmitter on the pelvis for the entire navigation procedure and it supports all minimally invasive procedures.

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.

#### Indications for Use:

The OrthoPilot Next Generation Navigation Platform is a system for computer-aided navigation of surgical instruments. Its purpose is to position endoprosthesis in arthroplasty in the patient. It aids the surgeon in accurately positioning the cutting guides, drills and reamers for endoprosthesis replacement surgery (such as total knee, revision knee, unicondylar knee, and total hip systems) and provides intraoperative measurements of bone alignment. It indicates angles and positions for implant placement.

*Refer to indications for use for complete contraindications, cautions, precautions and warnings.*

## VI. Implant and Instrument Overview

### Metha® Modular Implants

Plasmapore®  
μ-CaP



ISOTAN<sub>F</sub>

Cone 12/14



140°

135°

130°

ISODUR<sub>F</sub>

### Metha® Non-modular Implants



12/14

12/14

12/14

Plasmapore®  
μ-CaP

ISOTAN<sub>F</sub>

135°

130°

120°

### Metha Modular Stems

Stem Size	Modular
2	NC082T
3	NC083T
4	NC084T
5	NC085T
6	NC086T
7	NC080T

### Metha Stems with 12/14 trunnion

Stem Size	CCD = 120°	CCD = 130°	CCD = 135°
0	NC310T	NC320T	NC330T
1	NC311T	NC321T	NC331T
2	NC292T	NC272T	NC282T
3	NC293T	NC273T	NC283T
4	NC294T	NC274T	NC284T
5	NC295T	NC275T	NC285T
6	NC296T	NC276T	NC286T
7	NC297T	NC277T	NC287T

### Cleaning Swabs

ND622 | 10 Cleaning swabs for inner cone (Order separately)



### Modular Neck Adapters

12/14 trunnion

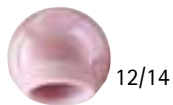
CCD Angle Offset	130° + 5 mm	135° 0 mm	140° - 5 mm
Correction Anteversion			
7.5° L Ante / R Retro	NC077K	NC087K	NC097K
0°	NC078K	NC088K	NC098K
7.5° L Retro / R Ante	NC079K	NC089K	NC099K

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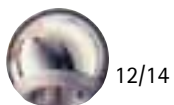
#### Heads



12/14

	28 mm	32 mm	36 mm
Short	NK460D	NK560D	NK650D
Medium	NK461D	NK561D	NK651D
Long	NK462D	NK562D	NK652D
X-Long		NK563D	NK653D

BILOX<sup>®</sup> delta



12/14

	28 mm	32 mm	36 mm
Short	NK429K	NK529K	NK669K
Medium	NK430K	NK530K	NK670K
Long	NK431K	NK531K	NK671K
X-Long	NK432K	NK532K	NK672K

ISODUR<sub>F</sub>

#### Implant Materials:

**ISOTAN<sub>F</sub>** - Titanium forged alloy  
(Ti6Al4V / ISO 5832-3)

**Plasmapore<sup>®</sup> μ-CaP** - Pure titanium surface with 20 μm coating dicalcium phosphate dihydrate (CaHPO<sub>4</sub>·x2H<sub>2</sub>O)

**BioloX<sup>®</sup> delta** - Aluminum oxide composite ceramics (Al<sub>2</sub>O<sub>3</sub> / ISO 6474)

**ISODUR<sub>F</sub>** - Cobalt-Chromium forged alloy (CoCr29Mo / ISO 5832-12)

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

## VI. Implant and Instrument Overview



### Tray 1

ND613R	Perforated tray for tray 1
TE928	Graphics template for tray 1
JH217R	Tray lid
ND644R	Awl narrow
ND645R	Awl wide
ND656R	Extraction instrument for 12/14 trunnion
NF180R	Rasp handle straight, lateral approach

### Metha Rasps

Size	0	1	2	3	4
	NF060R	NF061R	NF182R	NF183R	NF184R
Size		5	6	7	
		NF185R	NF086R	NF087R	

### Metha Rasp Trial Neck Adapters

	120°	130°	135°	140°
7.5° L Ante R Retro			ND714R	ND724R
0°	ND718R	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
XL	+8	NG299	NG309	NG329



### 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	Impaction/extraction handle
NG930R	Non-modular impactor
ND401R	Stem impactor
ND646R	Modular neck extractor
NF141R	Rasp handle offset, right-anterior, left-posterior
NF142R	Rasp handle offset, left-posterior, right-anterior
ND060	Impaction instrument for heads (or substitute ND050)

### Container

JK486	Container Lid
JN444	Container

### Optional Instrument (Order separately)

NF140R	Rasp handle angled, direct anterior approach
NF144R	Rasp handle curved, posterior approach
NF138R	Rasp handle, offset, left-direct anterior
NF139R	Rasp handle, offset, right-direct anterior
ND654R	Awl narrow, direct anterior
ND672R	Awl wide, direct anterior
ND607R	Resection guide

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Notes



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