Helios®
MODULAR | HIP | SYSTEM

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In the last 12 years, the indications for total hip prosthetic replacement have changed considerably. The number of cases of pertrochanteric femoral fractures with simultaneous coxarthrosis, the number of pathological and periprosthetic femoral fractures, and the number of septic and aseptic prosthetic loosenings have all increased constantly over time.

The modularity and flexibility of the Helios® range of products covers a broad spectrum of indications in the field of traumatologic and orthopaedic endoprostheses.

The modular stems offer considerable flexibility of choice for guaranteeing adequate distal and/or proximal fixation between implant and bone. Although there are no clinical studies indicating superior results with modular stems versus monoblock or single-piece stems, the intrasurgical flexibility afforded by the variety of diameters, stem lengths, types of fixation, proximal stem size and orientation, make it possible to establish a stable hip system.

(Jones RE. Clin Orthop 2004 Mar (420): 142-7)

PREOPERATIVE PLANNING

X-rays of the entire femur are required, or digital X-rays, to determine the required length of the Helios® stem.

The X-ray templates (fig. 1) are used to determine the size of the metaphyseal component, the length of the stem and the diameter of the diaphyseal component.

Determination of implant size:
- stem length depends on the position and size of the bone defect.
- the templates of the metaphyseal and diaphyseal component are aligned.

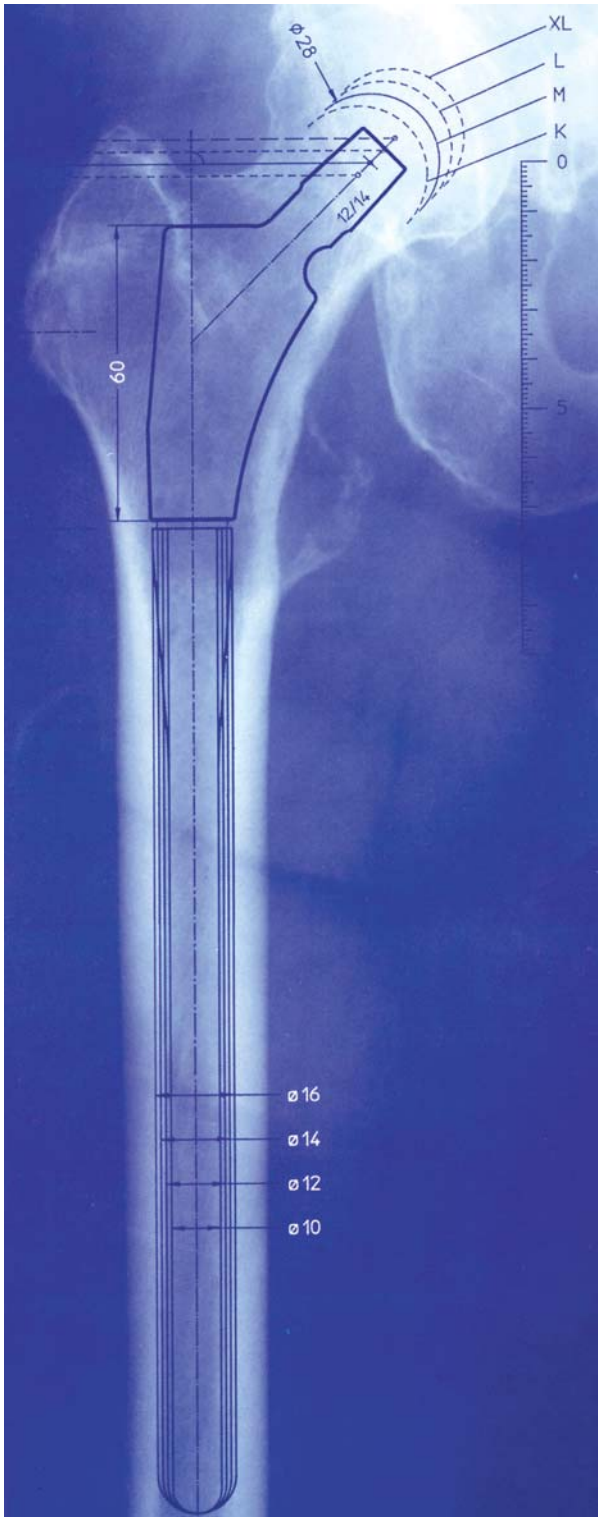


fig. 1

Required instrumentation

- X-ray template
- X-rays:
  - Pelvis A/P
  - Femur A/P and Lateral

SURGICAL APPROACH AND OSTEOTOMY

fig.2

fig.3

No specific surgical approach is required for the implantation of the Helios® stem.

When used in application to primary arthroplasty, femoral neck osteotomy is performed (45º, approximately 2 cm above the lesser trochanter), attempting to obtain the largest possible part of Adam's arch (fig. 2 and 3).

In the case of revision surgery, and before commencing the specific Helios® stem surgical technique, the revision stem is explanted and the bone bed is carefully cleaned.

If the extracted stem was fixed using cement, the surgeon must make sure that it has been completely removed and cleaned from the bone bed.

Required instrumentation

- Oscillating saw
- Retractors
- Sharp spoon
- Cement removal instrumentation
- Stem extraction instrumentation

PREPARATION OF THE FEMORAL CANAL

Aperture of the medullary canal is carried out with a trocar, sharp spoon or drill bit.

Insertion is made of the ball tip guide wire, with which the first phases of the surgical procedure are carried out (fig. 4).

In the event of fracture, the guide is useful for bridging the fracture, and for guiding the cannulated prosthesis through the fracture focus – reducing the risk of diaphyseal perforation or the creation of false routes.

fig.4

Required instrumentation

- Trocar
- Sharp spoon
- Ball tip guide wire
- Handpiece for guide wire

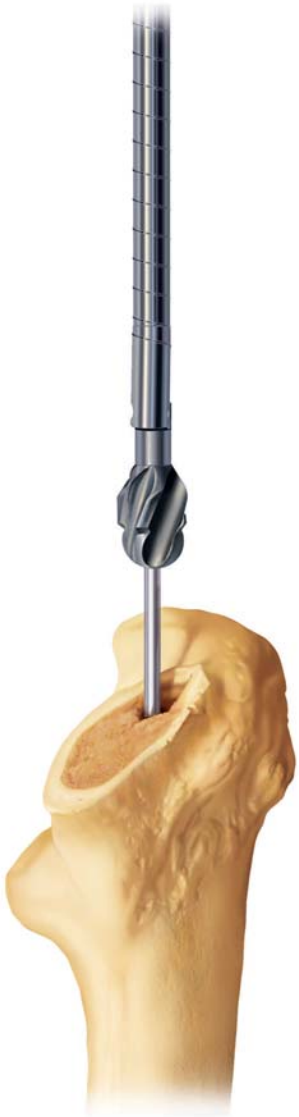


fig.5

Progressively ream the canal, introducing the flexible reamers through the guide wire until contact with the cortical bone is perceived (fig.5).

The last reamer diameter corresponds to the diameter of the diaphyseal component if the planned length of the latter is 120 or 160 mm.

If the use of a diaphyseal component longer than 160 mm has been planned, and depending on the physiological anterior curvature of the femur, it may prove necessary to continue reaming the canal 0.5 to 1 mm more.

Note: *the olive at the tip of the guide is essential, since it allows the recovery of pieces in the event of reamer head detachment, or rupture.*

Once reaming has been completed, the ball tip guide is replaced by a smooth guide wire.

The metaphyseal rasp with silver neck is used when employing the Helios® Interlok® metaphyseal component, while the metaphyseal rasp with golden neck is used if the metaphyseal component to be implanted is coated with Plasmapatita® (Plasma spray + Hydroxyapatite) (fig. 6).

fig.6

Required instrumentation

- Ball tip guide wire
- Flexible reamers (9-20 mm)
- Motor

The smaller metaphyseal rasp is threaded onto the diaphyseal rasp with a diameter smaller than the one of the last flexible reamer used, and the global set is assembled onto the universal impactor.

The canal is prepared, gradually increasing the diameter of the diaphyseal rasps connected to the smaller metaphyseal rasp (40 mm), until good contact is achieved with cortical bone in the femoral diaphyseal zone (fig. 7).

The more proximal portion of the femur is then prepared, gradually increasing the size of the metaphyseal rasp connected to the diaphyseal rasp selected in the previous step, until good contact is achieved with the cortical bone in that area.

Note: *the 120 mm diaphyseal rasps are only used when the definitive stem to be employed is of that length. In the case of longer stems, use if made of the 160 mm diaphyseal rasps.*

fig. 7

Required instrumentation

- Guide wire
- Mallet
- Metaphyseal and diaphyseal rasps
- Universal impactor

Once rasping has been completed, the impactor and smooth guide wire are removed and test reduction is carried out, leaving the last rasp used and adapting a trial head to it (fig. 8).

In this step it is advisable to perform a radiological position control using an image intensifier.

● fig.8

Required instrumentation

- Metaphyseal and diaphyseal rasps
- Trial heads
- Head impactor

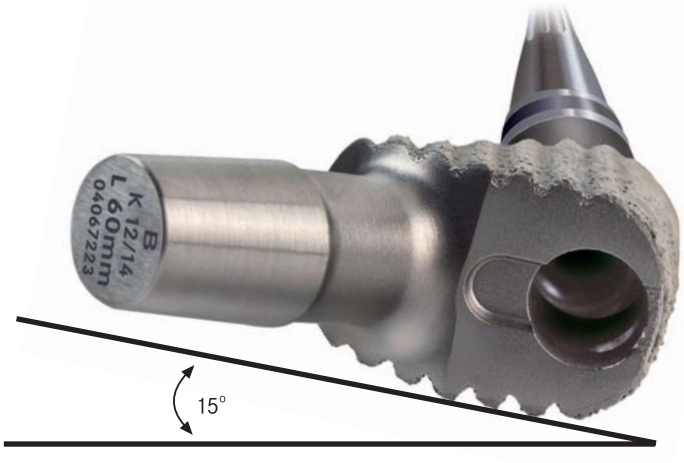
IMPLANT ASSEMBLY

In general, the modular prosthesis is assembled on the instrumentation table. Curved stems can be used for left (L) and right femurs (R). To this effect, the metaphyseal and diaphyseal components must be aligned, observing the marks located on their lateral portion.

When the lateral marks of the metaphyseal component (vertical line) and of the diaphyseal component (R/L) coincide, a physiological anteversion angle of 15º is obtained (fig 9 y 10).

The differences in anteversion angle can be adapted and adjusted freely according to the surgical needs.

● fig. 9



● fig. 10

fig. 11

1. Once the metaphyseal and diaphyseal components have been aligned, they are assembled manually. Special care is required to avoid the presence of any contamination of the conical junction (cleaning away blood, tissues, etc.).
2. The traction rod is positioned, centering it in the stem.
3. Once the rod has been fully threaded in place, it should be loosened a single turn. This will avoid locking on removing the rod once broken.
4. The sleeve for proximal part corresponding to the size of the metaphyseal component is inserted with the narrow end towards the implant, so that it slides within the groove of the metaphyseal component.
5. The hexagonal nut is threaded onto the sleeve for proximal part (fig. 11).
6. The implant is placed in the table support to which the sleeve has previously been added. The implant is protected from mechanical damage using surgical gauze (fig. 10).

7

The hexagonal nut is tightened with the ratchet wrench, applying rotary movements with the arm away from the body. The arm is to be kept perpendicular to the table, applying only small movements with the wrench (to 20º), until the traction rod ruptures (fig. 12).

Warning: The anchoring ruptures suddenly

Once the traction rod has ruptured, the nut is removed, along with the sleeve for proximal part and the broken piece of the rod (fig. 13).

Manually, or using the small fixed wrench, the part of the rod left within the stem is then removed.

● fig. 12

● fig. 13

Required instrumentation

- Traction rod
- Collared sleeve for proximal part (according to size)
- Hexagonal nut
- Table support
- Sleeve
- Ratchet wrench
- Fixed wrench

IMPLANT INSERTION

Implantation is carried out through the guide wire. The universal impactor is fitted to the stem, followed by insertion into the canal – impacting the stem with small tappings of the mallet (fig. 14).

To complete impaction of the Helios® stem and thus achieve maximum press-fit, the stem impactor can be used, applying axial force to the latter. The impactor is lodged within the groove of the metaphyseal component and insertion of the prosthesis is completed by applying small tappings with the mallet (fig. 15).

fig. 14

fig. 15

Required instrumentation

- Guide wire
- Mallet
- Universal impactor
- Stem impactor

IMPLANT LOOSENING

If necessary, the prosthesis components can be separated "in situ".

To this effect, the T-handle joined to the separation screw is threaded into the metaphyseal component and kept fixed, placing the countersupport on the stem cone.

This countersupport acts against the rotation forces that may develop on the bone during the separation process.

The tension is freed by threading the separation screw clockwise (fig. 16).

Nota: *Assembly of the definitive components can be made up to two times to ensure good functioning of the Morse-type junction.*

fig. 16

Required instrumentation

- T-handle
- Separation screw
- Countersupport

"IN SITU" TENSIONING

fig. 17

Both components of the Helios® prosthesis can be separated and tightened again in situ. It is preferable to perform tensioning in situ immediately before definitively impacting the diaphyseal component, once located in the correct position.

Warning: Make sure that the conical junction is not contaminated before tensioning (blood, fat, tissue, etc.).

1. Once the diaphyseal component has been inserted with the sliding mallet, and the conical junction has been checked for the absence of tissue and blood, the metaphyseal and diaphyseal components are aligned in the desired anatomical position, and then assembled manually.
2. The traction rod centered in the stem is then tightened.
3. Once the rod has been fully threaded in place, it should be loosened a single turn. This will avoid locking on removing the rod once broken.
4. The sleeve for proximal part corresponding to the size of the metaphyseal component is inserted with the narrow end towards the implant, so that it slides within the groove of the metaphyseal component (fig. 17).

5 The hexagonal nut is threaded onto the sleeve for proximal part, and the countersupport is positioned on the cone of the metaphyseal component, in contact with the sleeve for proximal part.

6 The ratchet wrench is placed over the hexagonal nut, and rotary movements are applied away from the body, fixing the rotation-proof countersupport and applying only slight movements of up to 20°, until the screw ruptures (fig. 18).

Note: Avoid the transmission of forces to the bone or to the patient. To this effect, do not apply rotary movements of over 20°, and avoid rotating movements with the countersupport.

Warning: The anchoring ruptures suddenly

7 Once the anchoring has ruptured, the nut is removed, along with the sleeve for proximal part and the broken piece of the rod.

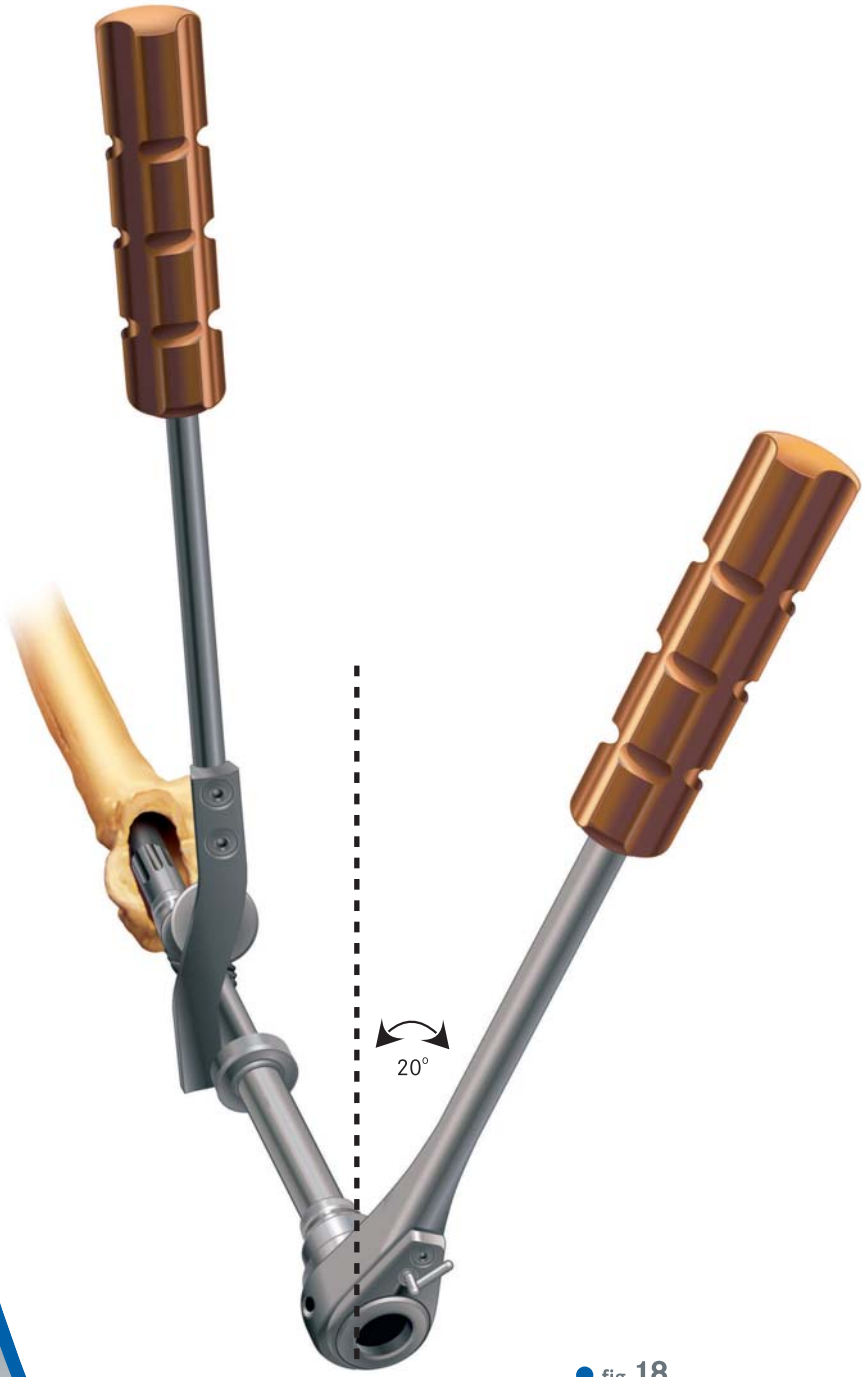


fig. 18

Required instrumentation

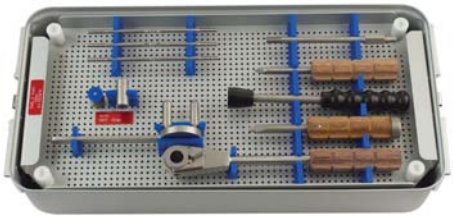
- T-handle
- Traction rod
- Collared sleeve for proximal part (according to size)
- Hexagonal nut
- Countersupport
- Ratchet wrench
- Fixed wrench

OPTIONAL INTERLOCKING

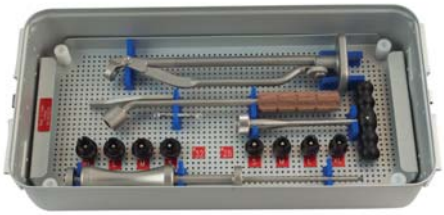
From the 12 mm diameter onwards, the stems measuring 200 mm or more in length offer the possibility of static or dynamic interlocking using titanium screws with a diameter of 4.5 mm.

fig. 19

61-5000215 Helios® general instrumentation



Ref.: 61-502215
Tray 1 complete Helios® general instrumentation



Ref.: 61-503215
Tray 2 complete Helios® general instrumentation

Reference	Description	Quantity
H6100014	Aesculap containers 2 heights	1
61-504215	**Tray 1 Helios® general instrumentation (empty)**	1
99I319.01	Traction rod	3
99I524.01	Hexagonal nut	1
99I320.01	Assembly table support	1
99I320.02	Sleeve for assembly table support	1
62-103000	Ratchet wrench	1
99I502.02	Stem impactor	1

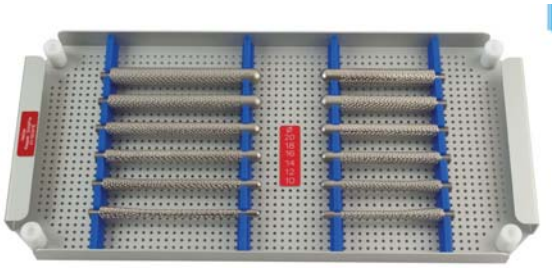
Reference	Description	Quantity
87-211-00000	Head impactor handle	1
87-410-32250	Head impactor extremity	1
99I504.01	Trocar	1
99I318.01	Separation screw	1
61-505215	**Tray 2 Helios® general instrumentation (empty)**	1
99I500.20	Universal impactor / extractor	1
99I321.01	Countersupport	1
99I525.01	Fixed wrench 3.5 E/C	1
87-451-00270	AO T-handle	1

Reference	Description	Quantity
63-011228	Trial head 28 mm short	1
63-021228	Trial head 28 mm standard	1
63-031228	Trial head 28 mm large	1
63-041228	Trial head 28 mm extra-large	1
63-011232	Trial head 32 mm short	1
63-021232	Trial head 32 mm standard	1
63-031232	Trial head 32 mm large	1
63-041232	Trial head 32 mm extra-large	1

99I322.02	Sliding mallet	1

99I507.01	Tommy bar for Helios®	1

61-500515 Helios® complete diaphyseal instrumentation

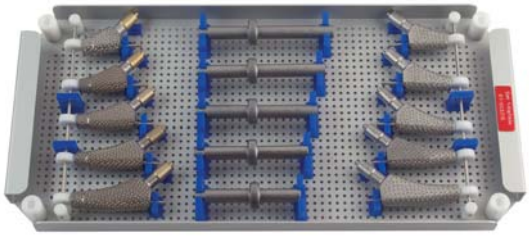


Ref.: 61-503415
Tray complete Helios® complet diaphyseal rasps

Reference	Description	Quantity
H6100015	Aesculap container	1
61-504415	Helios® diaphyseal rasp tray	1

99I331.13	Rasp / Trial diaphyseal component 10 x 120 mm	1
99I331.14	Rasp / Trial diaphyseal component 10 x 160 mm	1
99I331.23	Rasp / Trial diaphyseal component 12 x 120 mm	1
99I331.24	Rasp / Trial diaphyseal component 12 x 160 mm	1
99I331.43	Rasp / Trial diaphyseal component 14 x 120 mm	1
99I331.44	Rasp / Trial diaphyseal component 14 x 160 mm	1
99I331.63	Rasp / Trial diaphyseal component 16 x 120 mm	1
99I331.64	Rasp / Trial diaphyseal component 16 x 160 mm	1
99I331.83	Rasp / Trial diaphyseal component 18 x 120 mm	1
99I331.84	Rasp / Trial diaphyseal component 18 x 160 mm	1
99I331.93	Rasp / Trial diaphyseal component 20 x 120 mm	1
99I331.94	Rasp / Trial diaphyseal component 20 x 160 mm	1

61-500315 Helios® complete metaphyseal instrumentation



Ref.: 61-503315
Tray complete Helios® metaphyseal rasps

Reference	Description	Quantity
H6100015	Aesculap container	1
61-502315	Helios® metaphyseal rasp tray (empty)	1
99I310.05	Rasp / Trial metaphyseal component interlok® 40 mm	1
99I310.06	Rasp / Trial metaphyseal component interlok® 50 mm	1
99I310.07	Rasp / Trial metaphyseal component interlok® 60 mm	1
99I310.08	Rasp / Trial metaphyseal component interlok® 70 mm	1
99I310.10	Rasp / Trial metaphyseal component interlok® 80 mm	1
99I317.15	Sleeve for proximal part 40 mm	1
99I317.16	Sleeve for proximal part 50 mm	1
99I317.17	Sleeve for proximal part 60 mm	1
99I317.18	Sleeve for proximal part 70 mm	1
99I317.20	Sleeve for proximal part 80 mm	1
99I311.05	Rasp / Trial metaphyseal component plasma + HA 40 mm	1
99I311.06	Rasp / Trial metaphyseal component plasma + HA 50 mm	1
99I311.07	Rasp / Trial metaphyseal component plasma + HA 60 mm	1
99I311.08	Rasp / Trial metaphyseal component plasma + HA 70 mm	1
99I311.10	Rasp / Trial metaphyseal component plasma + HA 80 mm	1

NOTES