Surgical Technique

smith&nephew

SL-PLUS◇ MIA

Cementless Femoral Hip System

SL-PLUS◇ MIA

Table of Contents

Nota Bene

The technique description herein is made available to the healthcare professional to illustrate the authors' suggested treatment for the uncomplicated procedure. In the final analysis, the preferred treatment is that which addresses the needs of the patient.

Indications

Femora of almost all morphologies can be treated with the SL-PLUS® MIA prosthesis. However, in some femora with extreme curvatures (e.g. after angulation osteotomies), corrective osteotomy should be considered before proceeding with prosthesis insertion. Indications include:

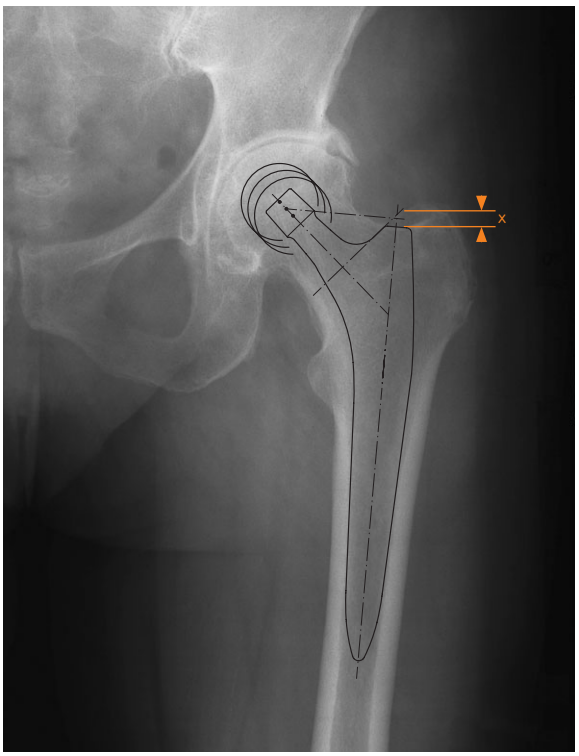
- Advanced wear of the hip joint due to degenerative, posttraumatic or rheumatoid arthritis
- Fracture or avascular necrosis of the femoral head
- Condition of the hip joint following previous operations (e.g. osteosynthesis, joint reconstruction, arthrodesis, hemiarthroplasty, or total hip prosthesis)

Contraindications

- Acute or chronic infections (local or systemic)
- Diseases of the muscular, nervous, or vascular systems that seriously involve the operative extremity
- Femora with structural defects or poor bone quality affecting the stability of the prosthesis
- Any concomitant disease which may endanger the implant's function
- Revision THR in the presence of extensive bone defects

Preoperative Planning

Preoperative planning is recommended to properly choose the size and orientation of the prosthesis. The offset and neck length achieved with the SL-PLUS◇ MIA prosthesis are determined by overlaying X-ray templates (enlarged by 15%) on plain radiographs (AP and axial views).



To determine the appropriate entry point for access of instruments to the medullary canal, it is recommended that the surgeon draw the femoral shaft axis on the AP radiograph and extend it proximally. This line indicates how far laterally it is necessary to place the box chisel to open up the canal. This entry point is easy to locate during surgery.

It is also helpful to define the position of the SL-PLUS MIA stem within the canal. This is defined by the distance from the shoulder of the stem to the greater and lesser trochanters, and can serve as an additional intraoperative check of correct stem placement.

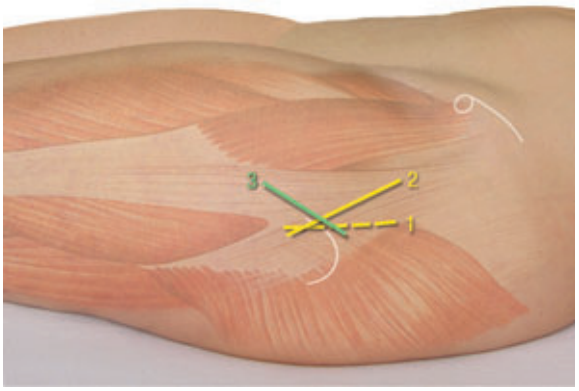
For implantation of an SL-PLUS MIA stem, both the basic SL-PLUS instrument case (No. 110450) and the appropriate SL-PLUS MIA instrument set are required.

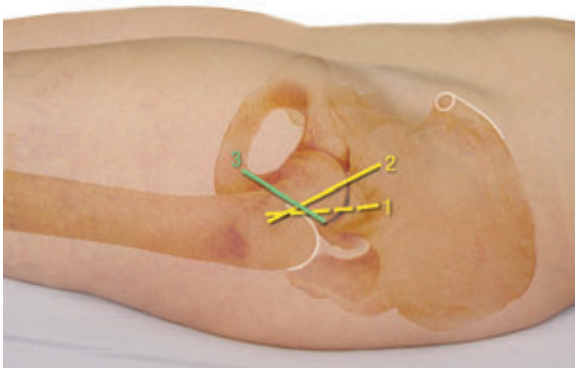
Note

This technique was developed by Professor Dr. G. Pflüger and his colleagues at the Evangelisches Krankenhaus in Vienna for the anterolateral, minimally invasive approach performed in the supine position.

Users of other (minimally invasive) approaches are requested to also consult the following operative instructions: posterolateral approach (Lit. No. 1426); anterior approach (Lit. No. 1494).

Skin incision



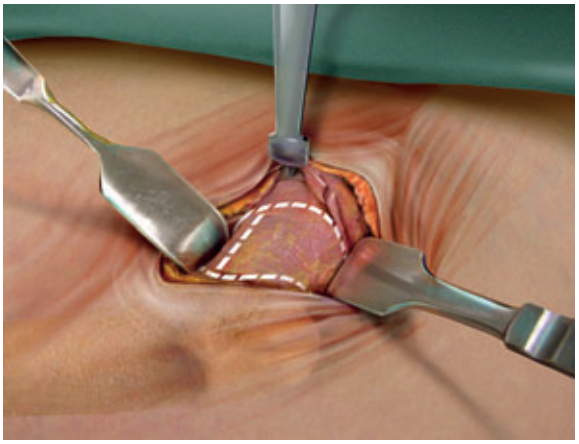


Previous clinical experience has shown that the SL-PLUS◇ MIA stem may be successfully implanted via several skin incisions, including:

- A longitudinal incision along the anterior edge of the greater trochanter, extending from $^{2}/_{3}$ proximally to $^{1}/_{3}$ distally to the tip of the trochanter (Line 1)
- An oblique incision extending from the anterior edge of the greater trochanter in the direction of the anterior superior iliac spine (Line 2)
- A reverse oblique incision approximating the intertrochanteric line (Line 3)

The fascial incision extends from the upper edge of the tip of the trochanter in the direction of the anterior superior iliac spine. Dorsal incision of the iliotibial band is optionally possible.

Capsular incision and dissection

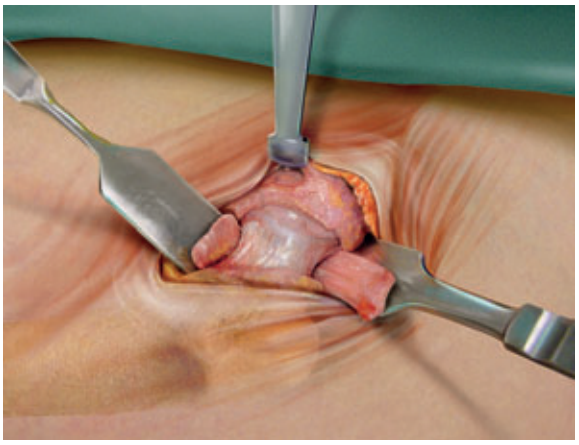


After blunt lateral entry between the tensor fasciae latae and gluteus medius/minimus, the raspatory is used to dissect along the femoral neck.

Sharp lateral retractors and a blunt medial Hohmann retractor are used during the surgical exposure. The arc of the rectus tendon is visualized, underpinned, incised, and released from its capsule.

The femoral neck is exposed via an H-shaped incision of the joint capsule, consisting of:

- a longitudinal incision, placed as far medially as possible, and extending from the acetabular margin to the intertrochanteric line and
- a proximal transverse incision of the acetabular labrum, extending around the acetabular margin from approximately the nine o'clock to the three o'clock position and
- a distal transverse incision distal extending along the intertrochanteric line.

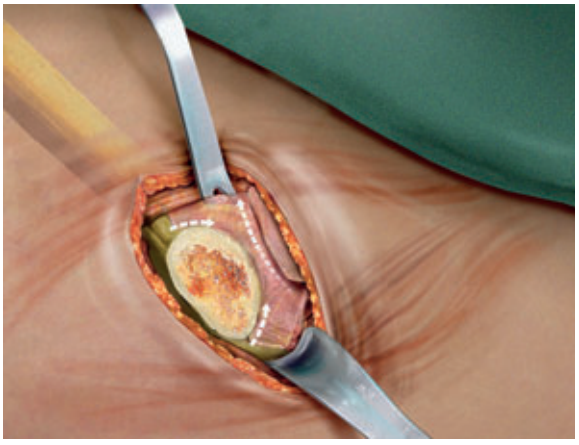


After the wing-like opening of the joint capsule, additional dissection of the capsule can be performed by extending the distal incision in the direction of the lesser trochanter and the proximal incision medially and/or laterally.

Two blunt Hohmann retractors are positioned intra-articularly. Problematic osteophytes on the acetabular rim are removed.

The technique used for the neck resection depends on the patient (coxa vara/valga) and is selected by the surgeon (single-incision or double-incision technique).

Capsule release



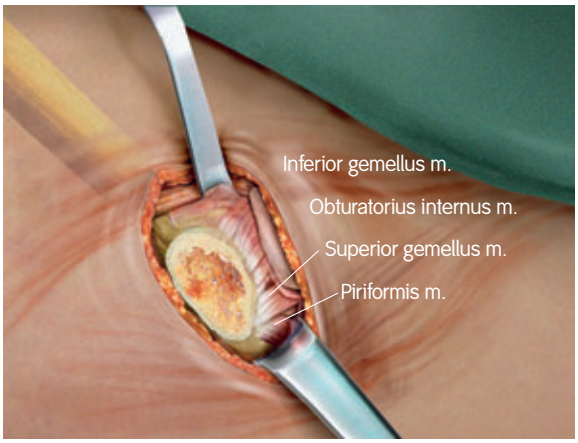
In order to facilitate alignment of the cup, an additional release of the posterior capsule is performed with the leg in the "Figure 4" position.

The knee of the operative leg is flexed, allowing it to be placed under the extended contralateral leg. In this position, the operative hip is placed in approx. 30–40° of adduction and 90° external rotation.

The proximal femur is mobilized with two hooks: one placed lateral to the trochanter and the other placed on the medial side of the neck of the femur.

Capsule releases have to be carried out in the direction of the lesser trochanter and the trochanteric fossa to the trochanteric tip. Additional capsular release can also be carried out on the caudal rim of the acetabulum.

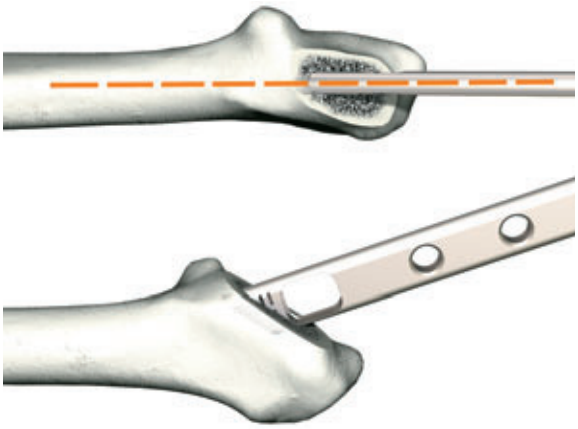
Preparation of the femur stem insertion



The leg is hyperextended and adducted approx. 30–40°, and placed in 90° of external rotation, with the operative leg positioned under the opposite leg, in the “Figure 4” position.

In very muscular or obese patients, patients with a valgus femoral neck, or in cases where the proximal femur sits deep to the skin surface, further release of the posterior capsule or release of the piriformis tendon may be necessary to allow adequate mobilization of the femur prior to preparation of the implantation site.

Entry into the medullary cavity



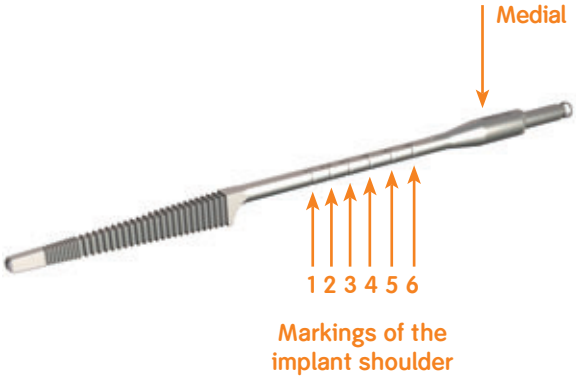
With the lower thigh kept in a horizontal position, the box chisel is placed close to the posterior cortex at the resection level. The box chisel should be introduced along the femoral axis and a small square block of bone is removed. If the box chisel is not used to clear hard bone from the osteotomy site, fracture of the trochanter may occur during rasp insertion.

Driving the box chisel below the level of the resected bony surface should also be avoided.

The MIA curved rasp facilitates opening of the diaphyseal medullary cavity.

Further opening of the diaphyseal medullary cavity and probing of the diaphysis with corresponding awl is to be recommended.

Optional: Use of the pilot rasp



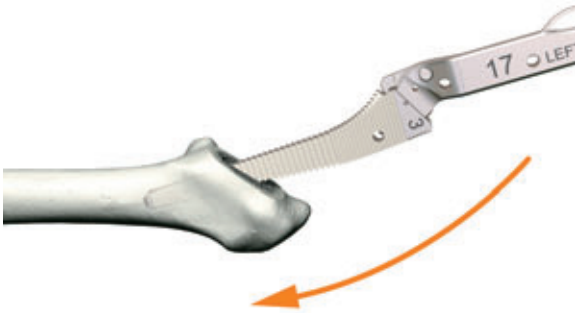
The MIA guide rasps are used to make neutral alignment of the rasp easier to achieve, thereby preventing varus positioning of the implant. The MIA guide rasp should be introduced into the canal in the desired degree of anteversion, matching the target rotation of the stem.

The rasp depth can be controlled using the line markings on the shaft. These markings correspond to the position of the shoulder for each stem size. During insertion of the MIA guide rasp, care should be taken to restrict its depth of insertion to one or two sizes higher than the shoulder position of the planned implant.

When placing the rasp onto the slap hammer or the rasping machine, please ensure that the side marked “MEDIAL” is indeed oriented medially. If the medial and lateral sides are inadvertently reversed, the rasp handle may impinge on the medial aspect of the greater trochanter, preventing neutral alignment.

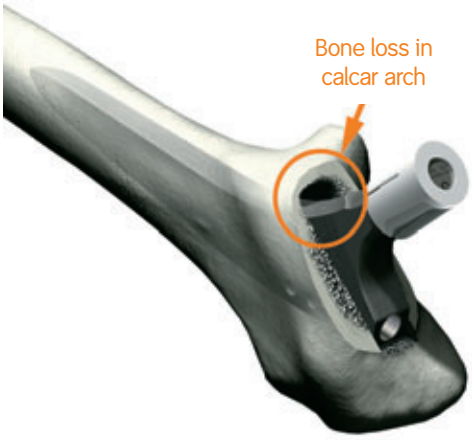
For correct stem alignment, the rasp must be seated in alignment with the canal axis. Please note that any deviation of the rasp from this axis may lead to varus positioning of the final implant during stem insertion.

After the MIA guide rasp has been introduced to the desired depth, the detachable rasps are used to create an implantation site of the correct size and alignment for the femoral implant. This procedure is described below.



The rasp cuts longitudinal grooves within the femoral cortex. The goal of canal preparation is to make the area of contact between the prosthesis and the cortex as large as possible. By gradually extending the depth of rasping within the medullary cavity, the area of contact increases, along with the resistance to advancement of the rasp in the canal. Once the rasp is fully engaged within cortical bone, the pitch of the hammer blows increases and traces of pale cortical bone appear within the cutting teeth along the corner edges. To ensure correct sizing of the stem it is critical that the surgeon establishes the expected size of implant through preoperative planning prior to the surgical procedure.

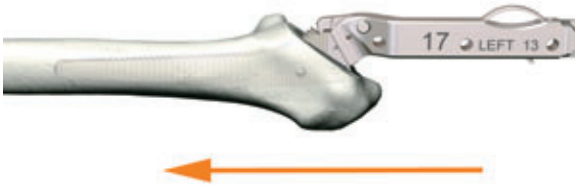
The initial rasp must be size 01 when preparing the canal for implants of size 4 or smaller. For larger implants (size 5 or greater), the surgeon may start with a rasp of size 1.



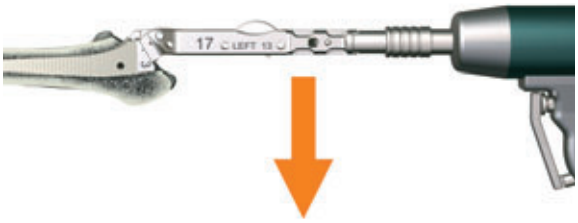
At the start of the rasping process, the rasp must not be inserted below the level of the estimated final position of the implant. It is extremely important to understand that the femoral osteotomy has no relationship to the final position. There is a tendency for surgeons to implant the starting smaller size rasps too deeply into the femur. This will result in an excessive enlargement of the implantation site and lead to gaps around the medial aspect of the final implant position.

The subsequent rasp is introduced into the cavity along a slightly arc-shaped path until resistance is felt. The rasp is then driven laterally and distally into the femur with the help of a manual slap hammer or a power-driven rasping machine. This process is repeated with sequential rasp sizes until the final rasp is seated at an acceptable depth and further up-sizing is not possible. When using the double offset adapters (Art. No. 600923/600924), care should be taken to select the instruments corresponding to the side of the operative extremity.

Because the first rasp determines the position of all subsequent rasps, proper orientation of the first rasp is necessary to ensure correct positioning of the femoral stem.



Attention should be paid to the anteversion and varus/valgus alignment of the rasping machine with respect to the femoral axis. Insertion of the rasps or the stem in a varus inclination increases the risk of perforation and fracture of the lateral cortex of the femur.

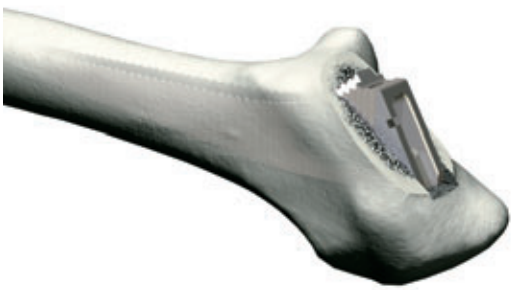


Rasping is carried out using the slap hammer or the rasping machine. The weight of these instruments helps to ensure the longitudinal alignment of the rasp within the femur. It is important that a lateral force is continuously applied to the rasping machine to ensure that the rasp moves in line with the axis of the canal and does not seat in a varus position.

Unlike the SL-PLUS® stem, the SL-PLUS® MIA rasp does not enter and exit the canal along the femoral axis, but rather along a curved arc.

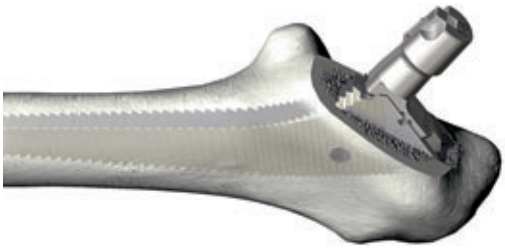
The shoulder of the rasp corresponds to the height of the implant, measured at the shoulder of the prosthesis and should correspond to the preoperatively determined distance to the greater trochanter (marked x).

In rare situations, the prosthesis size determined intraoperatively is in disagreement with the size derived from preoperative templating. If this difference is two sizes or more, the rasp may not have reached the necessary depth because of incorrect angulation or the presence of an obstacle within the canal. In such cases, the implanted prosthesis is too small to provide stable long-term fixation. In these situations, intraoperative fluoroscopy or an intraoperative radiograph should be obtained to evaluate the obstruction.

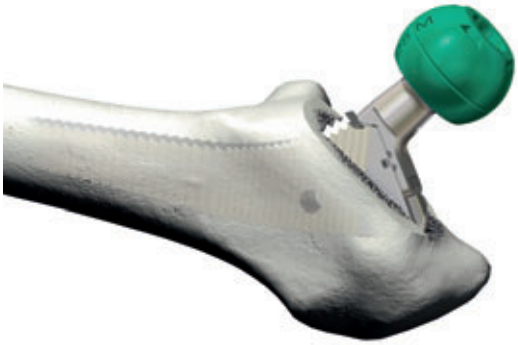


The offset adapter is removed from the detachable rasp.

Trial reposition



The modular neck is attached to the detachable rasp manually.



The trial ball head can be attached to the modular neck in advance or in situ.

In each case, there is a standard modular neck for the detachable rasps of sizes 01–0, 1–6 and 7–12. The “lateral” modular necks are available to suit the detachable rasps of sizes 1–6 and 7–12.

Care should be taken that the modular neck is correctly seated on matching surface of the detachable rasp and engages properly.

The joint is repositioned and leg length, soft-tissue tension, and range of motion are checked by the surgeon. During the initial operations, it is recommended that the surgeon obtain AP and lateral intraoperative radiographs to verify the size and position of the rasp within the femur.

If necessary, the trial ball head and/or the modular neck (standard or lateral) should be changed until a satisfactory result is achieved.

The modular neck can be uncoupled either by hand or with a Kocher clamp from the detachable rasp.

The offset adapter is linked with the detachable rasp. The detachable rasp is removed from the canal using the slap hammer or rasping machine. **Removal of the rasp, as with its introduction, must be performed along a curved arc to minimize disturbance of the bone bed and to avoid fractures of any overhanging bone in the trochanteric region.**

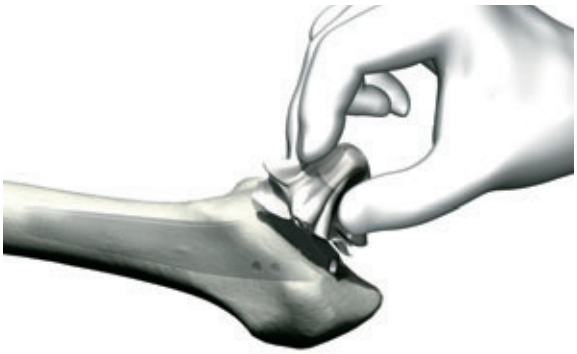
Implantation of the stem

The correct size SL-PLUS◇ MIA stem is introduced manually as deep as possible into the canal, and is then seated with the impactor, using appropriately measured strokes to minimize the risk of fracture of the femur.

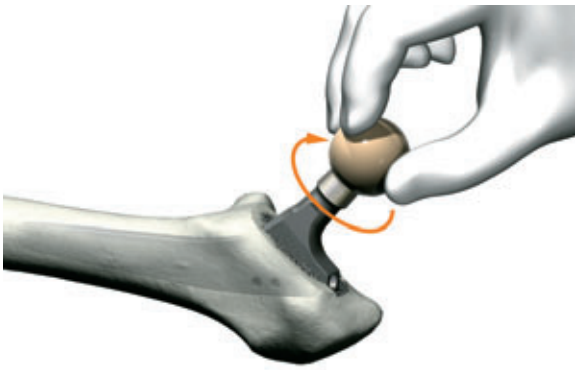
Pressing the stem in solely by hand is inadequate.

During impact, the protective cover remains positioned on the cone.

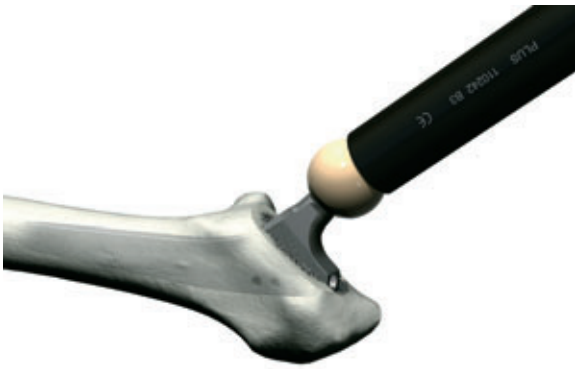
Once the stem is firmly seated, attempts to drive it further down the canal or to adjust its alignment within the femur cannot be performed without fracturing the bone.



Before repositioning the original ball head, the tapered trunnion is carefully cleaned by hand.



The ball head is then attached to the trunnion with a slight turning motion and permanently fixed with a blow delivered with the plastic hammer.



Metal objects must never be used to deliver impact to prosthetic heads. If a metal hammer is used, a plastic coupling or the head impactor must be used to protect the head from direct contact with the hammer.

Pressing the prosthetic head onto the trunnion solely by hand provides inadequate fixation.

Each femoral stem has a standard 12/14 trunnion to allow coupling with ceramic or metal heads supplied by Smith & Nephew Orthopaedics AG.

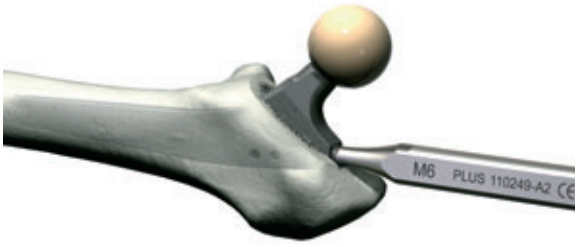
Wound closure

Reposition and check joint tension and mobility on all sides. Insert Redondrains, closure of the surgical wound. Place the leg in slight abduction and internal rotation in a foam-padded splint.

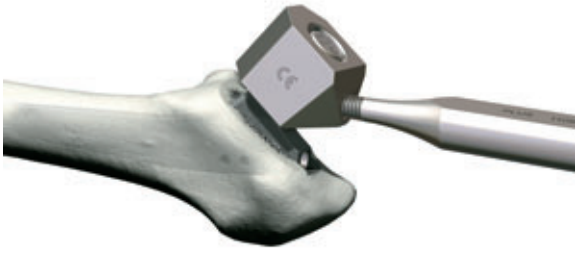
Postoperative Treatment

Postoperative rehabilitation should be completed in accordance with each hospital's own practices. The SL-PLUS® MIA stem, similar to the SL-PLUS stem, is immediately capable of bearing weight. The definitive osseointegration does not occur until 3 months postoperatively.

Explantation of the SL-PLUS MIA Stem



The SL-PLUS MIA stem can be removed using the extraction screw M6.



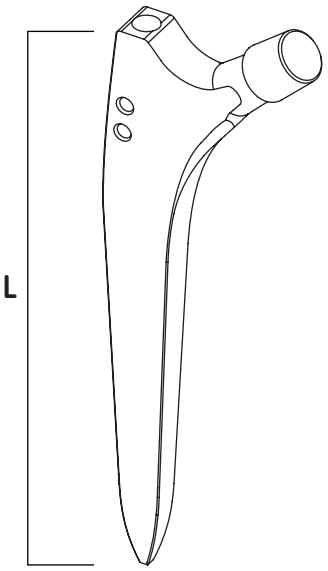
If this causes difficulties, the extraction screw M8 and an extractor block are available.

Attention

Ensure an axial alignment of extraction screw with internal thread.

Implants standard

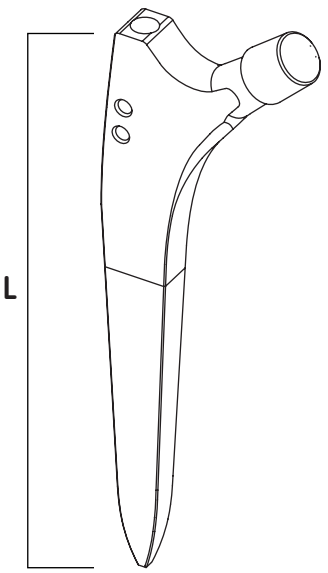
Art. No. Plus Orthopedics	Art. No. Smith & Nephew	Size	Length (L)
11000163	75001937	01	128 mm
11000164	75001938	0	132 mm
11000165	75001939	1	136 mm
11000166	75001940	2	140 mm
11000167	75001941	3	145 mm
11000168	75001942	4	150 mm
11000169	75001943	5	154 mm
11000170	75001944	6	158 mm
11000171	75001945	7	163 mm
11000172	75001946	8	168 mm
11000173	75001947	9	173 mm
11000174	75001948	10	178 mm
11000175	75001949	11	183 mm
11000176	75001950	12	188 mm



All sizes also available with INTEGRATION-PLUS◇ Ti-plasma/hydroxyapatite coating:

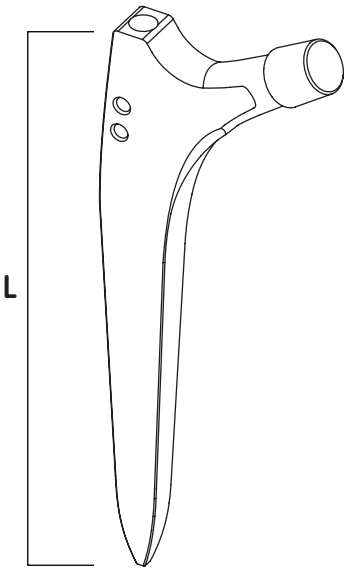
Art. No. Plus Orthopedics	Art. No. Smith & Nephew	Size	Length (L)
11000422	75000172	01	128 mm
11000423	75000173	0	132 mm
11000424	75000174	1	136 mm
11000425	75000175	2	140 mm
11000426	75000176	3	145 mm
11000427	75000177	4	150 mm
11000428	75000178	5	154 mm
11000429	75000179	6	158 mm
11000430	75000180	7	163 mm
11000431	75000181	8	168 mm
11000432	75000182	9	173 mm
11000433	75000183	10	178 mm
11000434	75000184	11	183 mm
11000435	75000185	12	188 mm

(Not registered for USA and Canada.)



Implants lateral

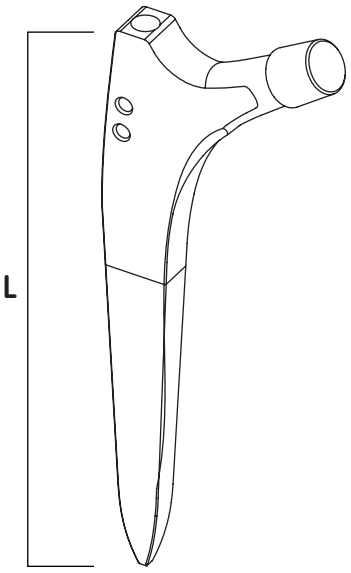
Art. No. Plus Orthopedics	Art. No. Smith & Nephew	Size	Length (L)
11000177	75001951	1	136 mm
11000178	75001952	2	140 mm
11000179	75001953	3	145 mm
11000180	75001954	4	150 mm
11000181	75001955	5	154 mm
11000182	75001956	6	158 mm
11000183	75001957	7	163 mm
11000184	75001958	8	168 mm
11000185	75001959	9	173 mm
11000186	75001960	10	178 mm
11000187	75001961	11	183 mm
11000188	75001962	12	188 mm



All sizes also available with INTEGRATION-PLUS◇ Ti-plasma/hydroxyapatite coating:

Art. No. Plus Orthopedics	Art. No. Smith & Nephew	Size	Length (L)
11000436	7500186	1	136 mm
11000437	7500187	2	140 mm
11000438	7500188	3	145 mm
11000439	7500189	4	150 mm
11000440	7500190	5	154 mm
11000441	7500191	6	158 mm
11000442	7500192	7	163 mm
11000443	7500193	8	168 mm
11000444	7500194	9	173 mm
11000445	7500195	10	178 mm
11000446	7500196	11	183 mm
11000447	7500197	12	188 mm

(Not registered for USA and Canada.)



Instrumentation

SL-PLUS◇ MIA
Set No. 0942010

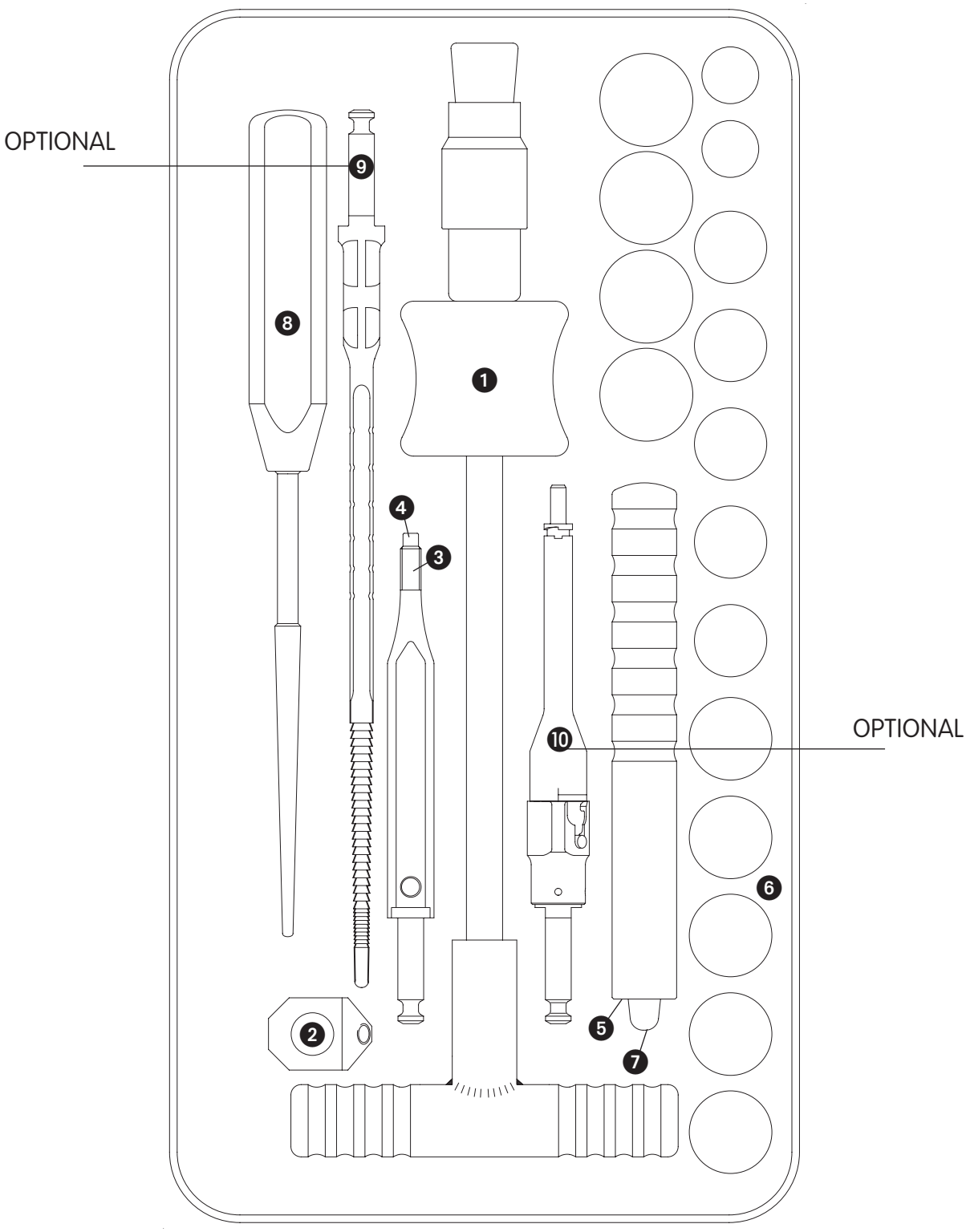
	Art. No. Plus Orthopedics	Art. No. Smith & Nephew	Description	Size
	110450	75002198	Case Basic Instruments	
❶	110901	75002319	Slap hammer	
❷	110902	75002320	Extraction block	
❸	110911	75002325	Extraction screw M8	
❹	110249	75002165	Extraction screw M6	
❺	110242	75002160	Head Impactor	
❻	160001	75004060	Trial ball head	28/S
	160002	75004061	Trial ball head	28/M
	160003	75004062	Trial ball head	28/L
	160004	75004063	Trial ball head	28/XL
	160005	75004064	Trial ball head	28/XXL
	160011	75004065	Trial ball head	32/S
	160012	75004066	Trial ball head	32/M
	160 013	75004067	Trial ball head	32/L
	160014	75004068	Trial ball head	32/XL
	160015	75004069	Trial ball head	32/XXL
	160016	75004070	Trial ball head	36/S
	160017	75004071	Trial ball head	36/M
	160018	75004072	Trial ball head	36/L
	160019	75004073	Trial ball head	36/XL
	160022	75004074	Trial ball head	22/M
	160023	75004075	Trial ball head	22/L
❼	600621	75007255	MIA Stem Impactor	
❽	21000138	75004495	MIA curved rasp	

Optional:

	Art. No. Plus Orthopedics	Art. No. Smith & Nephew	Description
❾	41000030	75006420	SL-PLUS MIA Guide Rasp

Optional for users of the SL-PLUS MIA stem and SL-PLUS stem:

	Art. Nr. Plus Orthopedics	Art. Nr. Smith & Nephew	Bezeichnung
❿	110500	75002203	Adapter for trial rasp (SL-PLUS standard)


OPTIONAL
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OPTIONAL
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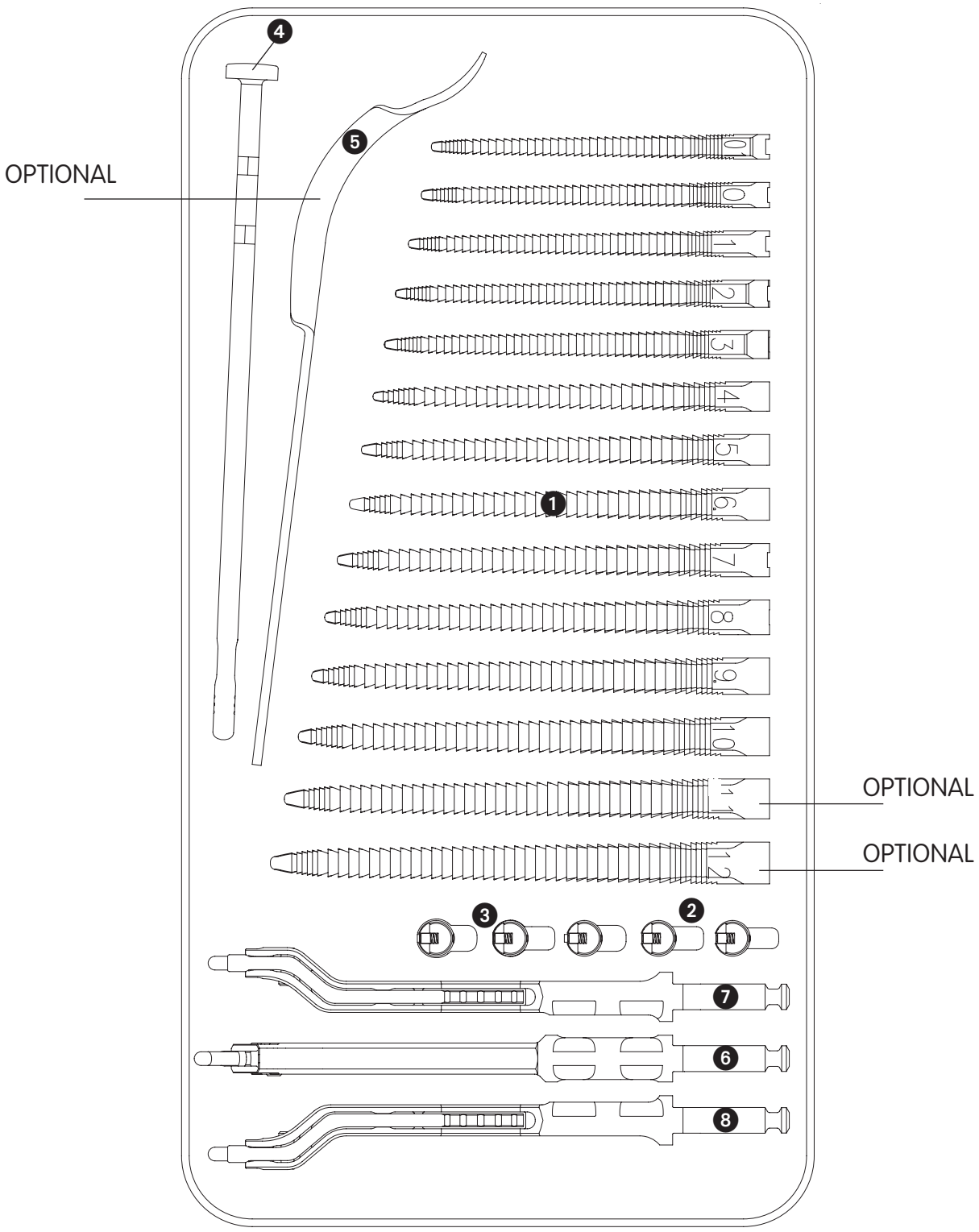
SL-PLUS® MIA Trial Broaches with Adapter 10 mm
Set No. 0943030

	Art. No. Plus Orthopedics	Art. No. Smith & Nephew	Description		Size
	990019	75007661	Cover		
	600930	75007312	MIA Instrument case for SL		
1	21000123	75004481	MIA Detachable rasp (Trial Broach)		01
	21000124	75004482	MIA Detachable rasp (Trial Broach)		0
	21000125	75004483	MIA Detachable rasp (Trial Broach)		1
	21000126	75004484	MIA Detachable rasp (Trial Broach)		2
	21000127	75004485	MIA Detachable rasp (Trial Broach)		3
	21000128	75004486	MIA Detachable rasp (Trial Broach)		4
	21000129	75004487	MIA Detachable rasp (Trial Broach)		5
	21000130	75004488	MIA Detachable rasp (Trial Broach)		6
	21000131	75004489	MIA Detachable rasp (Trial Broach)		7
	21000132	75004490	MIA Detachable rasp (Trial Broach)		8
	21000133	75004491	MIA Detachable rasp (Trial Broach)		9
	21000134	75004492	MIA Detachable rasp (Trial Broach)		10
2	21000253	75004603	MIA modular neck for detachable rasp		01–0 Std.
	21000254	75004604	MIA modular neck for detachable rasp		1–6 Std.
	21000255	75004605	MIA modular neck for detachable rasp		7–12 Std.
3	21000256	75004606	MIA modular neck for detachable rasp		1–6 Lat.
	21000257	75004607	MIA modular neck for detachable rasp		7–12 Lat.
4	41000029	75006419	MIA box chisel		
6	600922	75007309	MIA Offset Adapter		10 mm
7	600923	75007310	MIA Double Offset Adapter	left	17/13 mm
8	600924	75007311	MIA Double Offset Adapter	right	17/13 mm

SL-PLUS MIA optional instruments (Set No. 0942011):

	Art. No. Plus Orthopedics	Art. No. Smith & Nephew	Description	Size
	21000135	75004493	MIA Detachable rasp (Trial Broach)	11
	21000136	75004494	MIA Detachable rasp (Trial Broach)	12
5	SYS251374	75009352	Trochanter retractor	

	Art. No. Plus Orthopedics	Art. No. Smith & Nephew	Description	Size
	600920	75007307	Offset adapter	25 mm
SL-PLUS MIA Trial Broach with Offset adapter 25 mm, Set No. 0943032.				
	600921	75007308	Offset adapter	40 mm
SL-PLUS MIA Trial Broach with Offset adapter 40 mm, Set No. 0943033.				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Sterilization

Implants

All the implants described in this Surgical Technique are sterile when they are delivered by the manufacturer. Resterilization is not allowed.

Instruments

System components and instruments are not sterile when they are delivered. Before use, they must be cleanded by the usual methods in accordance with internal hospital regulations and sterilized in an autoclave in accordance with the legal regulations and guidelines applicable in the relevant country. (For detailed information please refer to leaflet Lit. No. 1363.)

The correct settings are given in the instructions for use issued by the autoclave manufacturer. Instrument manufacturers and dealers accept no responsibility for sterilization of products by the customer.

Notes

Notes

Manufacturer
Smith & Nephew Orthopaedics AG
Erlenstrasse 4a
6343 Rotkreuz
Switzerland

For further information please contact
our local sales office.
www.smith-nephew.com

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