Surgical Technique

smith&nephew

POLARSTEM®

Cementless and Cemented
Stem System



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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.

Introduction

The POLARSTEM® is based on a philosophy that has yielded excellent clinical results for over 20 years. It has been especially designed to avoid neck-insert impingements with either fixed or mobile inserts. The thin mirror-polished neck area increases the range of motion and reduces the risk of impingement and dislocation.

The stem design facilitates minimally invasive implantation using most kinds of current approaches. The simple surgical technique leads to reproducible results both with conventional and minimally invasive approaches.

It can be used for all kinds of femur morphologies. The range of stems allows the implant to suit any size of bone, reproducing the natural hip architecture.

The POLARSTEM range is composed of 9 standard femoral stems with a CCD angle of 135° and 8 lateralized stems with a CCD angle of 126°. These stems are available in a mirror polished cemented and cementless version with a titanium plasma/hydroxylapatite coating.

With regard to the third articulation the use of the POLARSTEM can only benefit the durability of the total Dual Mobility System.

Indications

Generally accepted indications for joint replacement include: Arthropathy due to degenerative disease, severe arthropathy due to advanced rheumatoid or osteoarthritis where conservative therapy or alternative treatments have failed or are considered unsuitable, a previous failed joint replacement and acute trauma.

- Advanced hip joint wear due to osteoarthritis, traumatic arthritis, rheumatoid arthritis or congenital hip dysplasia
- Fracture or avascular necrosis of the femoral head
- State after priori e.g. joint reconstruction, osteosynthesis, internal fixation, arthrodesis, hemiarthroplasty or total hip replacement
- Certain cases of ankylosis

Contraindications

Joint replacements may be contraindicated where the patient is overweight, where there is an infection, poor bone stock, severe deformity, drug abuse, overactivity, tumor, mental incapacity, muscle, nerve or vascular disease.

The following conditions are contraindications for total or hemihip replacement:

- Acute or chronic infections, local or systemic
- Severe muscle, nerve or vascular diseases that endanger the respective limb
- Lack of bone substance or defective bone quality that endangers the stable seating of the prosthesis
- Any concomitant disease that may jeopardize the implant function

Case Studies

Preoperative



Female, 72 years, coxarthrosis

Postoperative



Combination of POLARCUP° and cementless POLARSTEM°

Preoperative



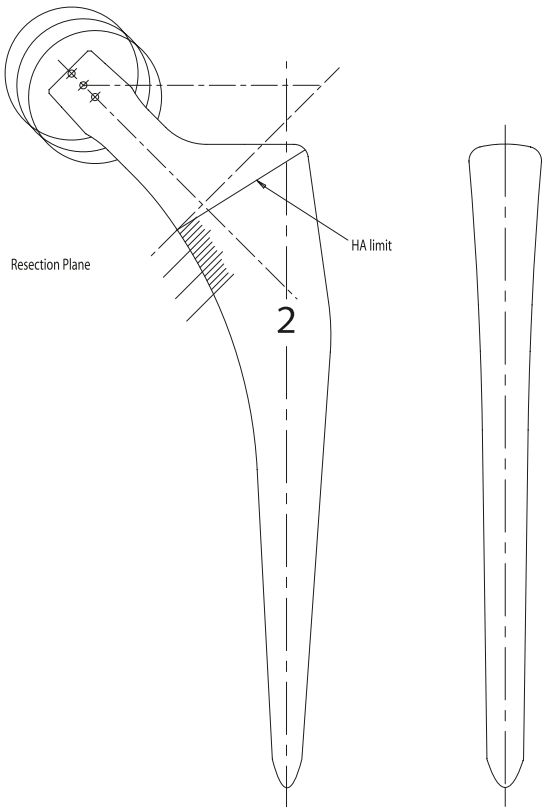
Male, 70 years, coxarthrosis

Postoperative



Combination of POLARCUP and cementless POLARSTEM

Preoperative Planning



Preoperative planning is essential. It allows both the size of the femoral and acetabular component to be determined.

Templating should define the reaming required for the restoration of the cup's center of rotation, while the height and angle of the neck resection determine the optimal length and offset, which is especially important in patients with leg length discrepancy.

Preoperative planning requires:

- X-rays
- Templates for the acetabular component and the stem

Standardized AP and lateral X-rays are essential to ensure accurate planning. The femur must be positioned in neutral rotation to produce orientation that matches the templates. An adequate length of the femoral diaphysis should be included on the X-rays. The correct stem size is determined by laying the stem template over the X-ray and selecting the optimum fit of the stem. The center of rotation of the femoral head is matched by selecting the appropriate neck length. The level of resection is shown by the template.

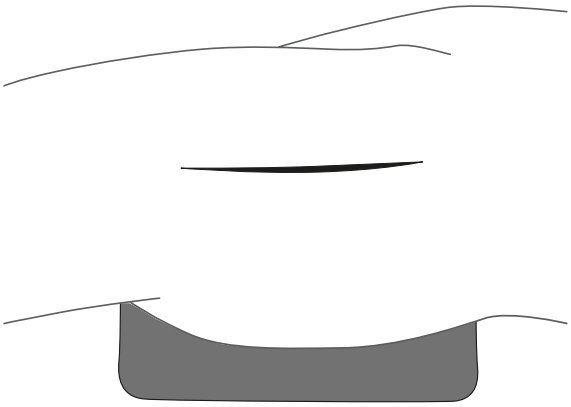
Warnings and precaution

- HA-coated implants must not be implanted with cement
- Ceramic heads are sensitive to shock. Any part which is exposed to shock should not be used
- If a ceramic head breaks, it is essential to change the PE cup or insert too
- When changing the head on a femoral stem which is still in place, it is imperative to use a BIOLOX® OPTION or metal head

Surgical Technique

The same instruments can be used for both cementless and cemented stem versions.

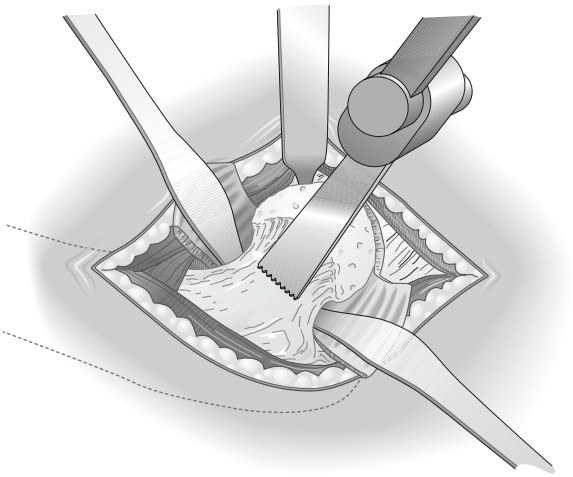
Position of patient and approach



For the purpose of this description a lateral approach is chosen. Surgery is performed with the patient in an extended supine lateral position.

The surgeon's preference will dictate whether to use an anterolateral, lateral, posterolateral or posterior approach. The skin incision and muscle detachment will depend on the approach chosen. All implants and instruments also suit a minimally invasive approach.

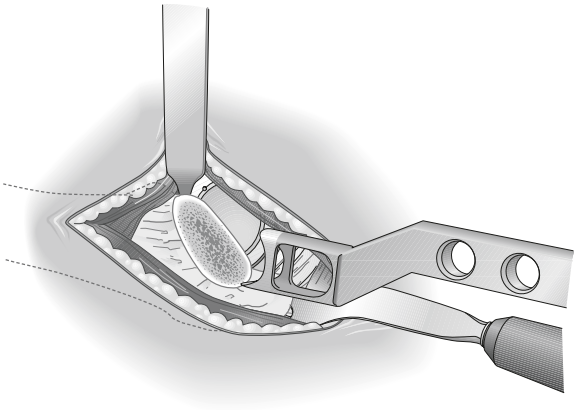
Removal of the femoral head



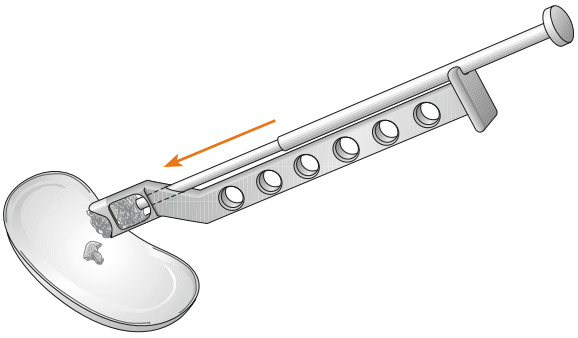
Laterally, the osteotomy commences at the trochanteric fossa (perpendicular to the neck axis), while medially it ends approximately a finger breadth above the lesser trochanter. The height of neck resection may be modified in the presence of abnormal anatomy as determined by preoperative templating and intraoperative measurements. The osteotomy can be performed before or after dislocation of the femoral head.

The acetabulum is replaced in a routine manner, conventionally or with a minimally invasive approach.

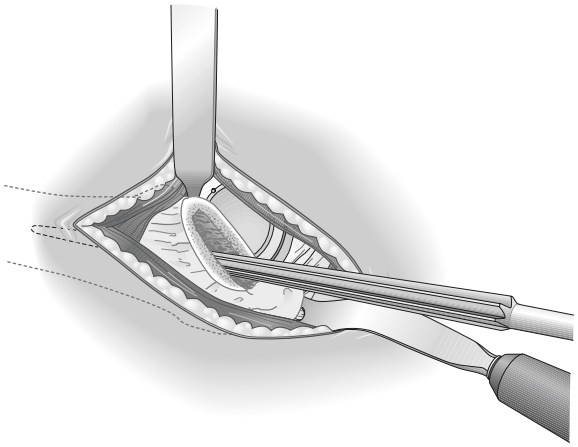
Preparation of the femur



The opening of the medullary cavity is performed with the offset box chisel – allowing the correct anteversion required for the implant – starting as close as possible to the greater trochanter base to allow good varus-valgus positioning.



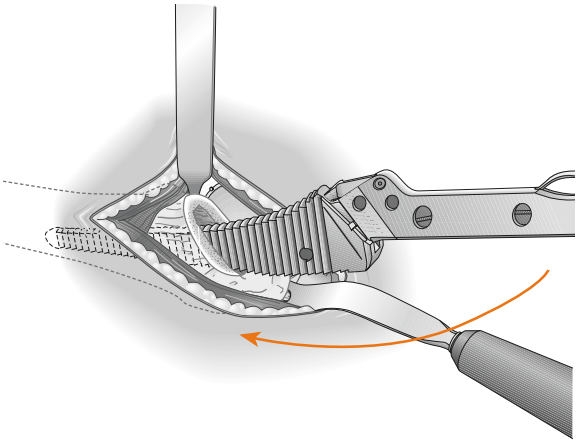
The instrument is delivered with a thin rod, allowing the easy removal of extracted bone.



The femoral reamer is then introduced in the medullary canal. It allows the canal axis to be located using endosteum.

Note

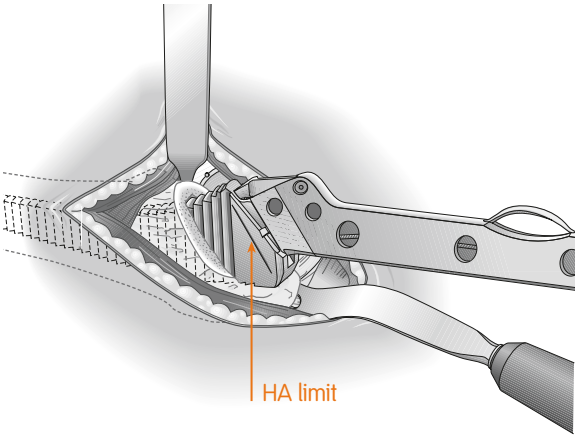
After introduction, we recommend turning the reamer counter clockwise to compact the cancellous bone. If the length of the reamer introduced does not seem to be sufficient, it then can be turned clockwise to penetrate further. Please remove any (excess) bone as required.



Starting with the smallest size (“0”) of the detachable rasp, serial broaching is then continued with sequentially larger rasps, until the appropriate rasp is fully seated (especially in rotation).

Note

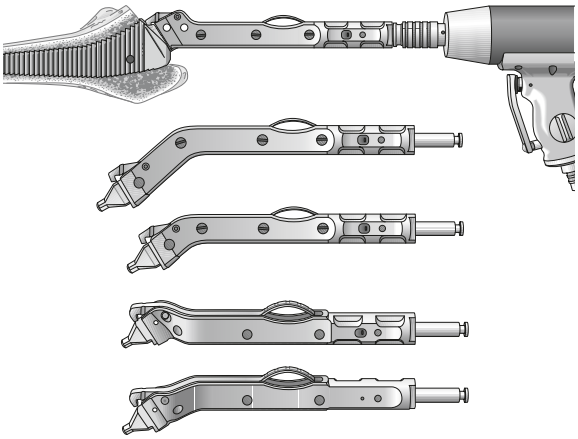
We recommend a good congruence between the first rasp used (size “0”), and the internal curve of the calcar, as a good proximal fitting will optimize stability.



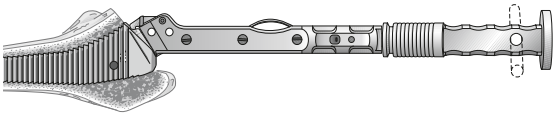
The level of the HA coating is indicated on the rasp.

Note

We recommend that the HA-coated part of the stem is completely covered by the femur.

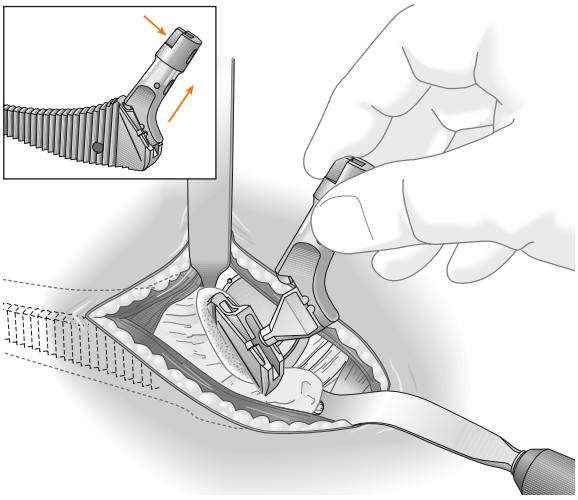


The detachable rasps can be used with most of the Smith & Nephew Orthopaedics adapters. Different offset versions are available to accommodate the selected surgical approach and / or patient size.

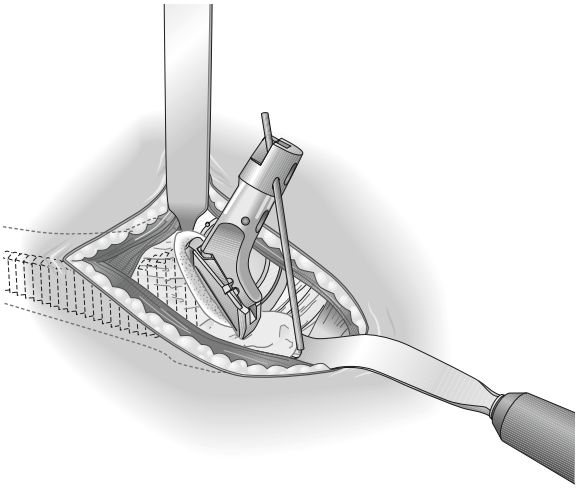


All adapters can be used with the IMT power tool “Woodpecker” or with the rasp-adapter handle. Anteversion can be checked at this level using a rod through the extremity of the handle.

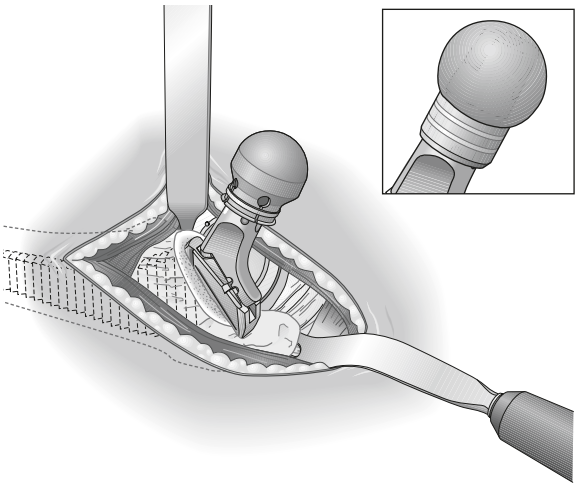
Trial reduction



Once the appropriate trial rasp size is in place, the adapter is removed and the trial neck (standard or lateralized) is placed on the rasp.



At this stage, a rod (50 mm or 100 mm) can be introduced through the trial neck to check the level of the stem compared to the greater trochanter.



After removal of the rod, a trial head is placed on the trial neck. Trial reduction is then performed to assess height, stability and absence of neck-shell impingement before inserting the final femoral component.

Remove the trial head, trial neck and trial rasp.

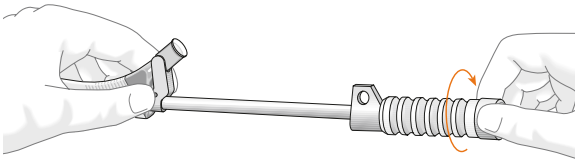
Note

To also allow trial reduction with the corresponding POLARCUP® insert, the 22 mm and 28 mm trial ball heads are cylindrical at their equator.

Stem insertion

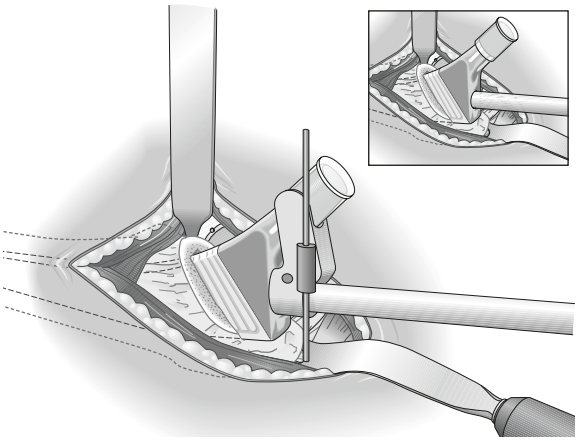
We recommend that the plastic taper protection is not removed until the stem is in its final position and the ball head is about to be attached to the cone.

Cementless stem



The insertion of the femoral component is performed using the stem holder with wings, screwed directly on the stem.

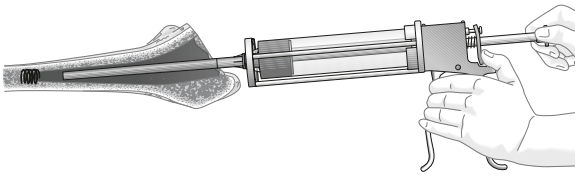
The edge of the HA coating indicates the required penetration level of the stem.



Alternatively the stem impactor without wings can be used.

A gauge – fixed by a pin – can be added at this stage on the stem holder to again check the position of the prosthesis compared to the greater trochanter.

Cemented stem

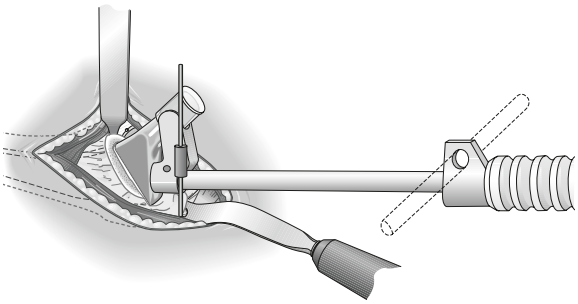


The IM canal should always be plugged using either autogenic bone slurry or a standard IM plug.

Cement is then prepared, using a cement syringe filled retrograde in the IM canal following the cement manufacturer's instructions and according to surgeon's preferences.

We recommend that the cement mantle starts 10 to 15 mm below the distal point of the stem.

The 2 stem-locking options



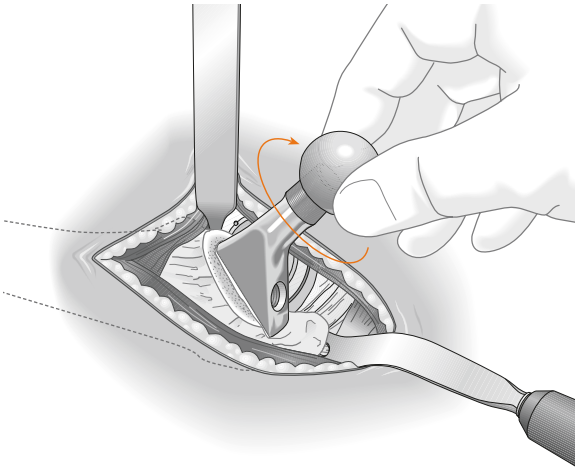
To perform an implantation according to the **self-locking principle,** the **same size as the last rasp used** is selected.

To obtain a **complete surrounding cement mantle, the size below the last or before the last rasp used is selected.**

The stem is inserted using the stem holder and pressed into the cement.

If necessary, the stem can be rotationally guided using the stem holder with wings. Anteversion can be checked using the anteversion rod. Slight pressure needs to be applied until the cement is hardened.

Ball head introduction

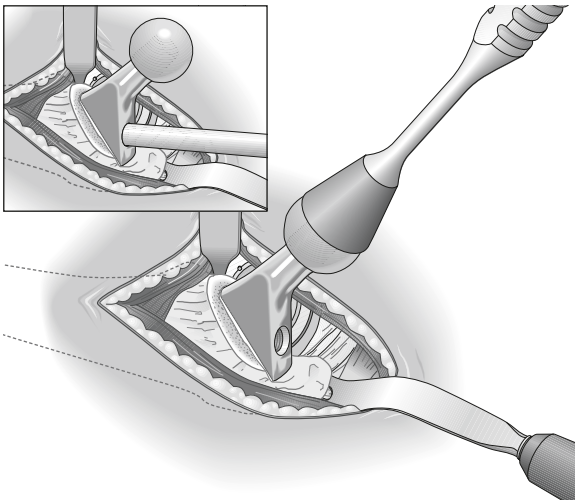


The plastic taper protection is removed.

Before positioning the definitive ball head, clean the stem cone carefully by hand (first with water, then dry). Then attach the ball head on the cone with slight rotation.

Note

The ball head must not simply be pressed on manually. Ceramic heads must never be impacted using a metal instrument.



The ball head is slightly impacted using a plastic impactor. The joint is then reduced, manipulated and the functions are retested.

Alternatively, trial reduction can also be performed with the stem impactor.

Note
If the POLARSTEM® is used with a POLARCUP®, the ball head must first be impacted in the cup's corresponding insert before reduction.

Wound closure

Reinsert the muscles. A subfascial and subcutaneous redon drain is inserted and it is recommended to close the skin with an intracutaneous skin suture for aesthetic reasons.

Postoperative Treatment

Depending on the patient's age and general state of health, mobilization starts either on the same day of the operation or on the day after. An immediate weight bearing of the operated leg is possible. For 48 hours a splint (foam) in slight abduction is recommended. The use of crutches can be helpful during the first days, although this is not mandatory.

The use of antibiotics and thrombosis prophylaxis as well as suture removal depend on the surgeon's preference.

References

Fiquet A, Noyer D
Polarsystem Dual Mobility hip prosthesis and minimally invasive surgery
Interactive Surgery (2006) 22: 1–5 Springer 2006

Khatib Y, Schwartz O, Mendes DG and Said M
Corail stem for total hip arthroplasty: 11 years of imaging follow-up
JBJS (BR) Vol 84–B, Issue SUPP III, 301

Vidalain JP, Artro Group
HA Coating. Ten Year Experience with the Corail system in primary THA
Acta Orthopaedica Belgica, Vol. 63 – Suppl. I – 1997

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 cleaned 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.

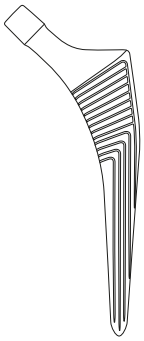
Implants

POLARSTEM® cementless

Material Ti-6Al-4V ISO 5832.3 Cone 12/14

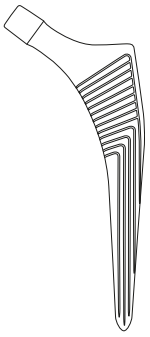
Standard CCD 135°

Art. No.	Size	Length (L)
11000328	0	125.5 mm
11000329	1	131.5 mm
11000330	2	135.5 mm
11000331	3	139.5 mm
11000332	4	143.5 mm
11000333	5	147.5 mm
11000334	6	151.5 mm
11000335	7	155.5 mm
11000336	8	159.5 mm



Lateralized CCD 126°

Art. No.	Size	Length (L)
11000337	1	131.5 mm
11000338	2	135.5 mm
11000339	3	139.5 mm
11000340	4	143.5 mm
11000341	5	147.5 mm
11000342	6	151.5 mm
11000343	7	155.5 mm
11000344	8	159.5 mm

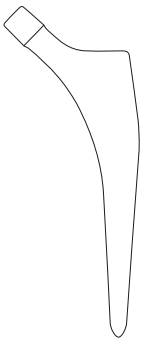


POLARSTEM cemented

Material M30NW ISO 5832.9 Cone 12/14

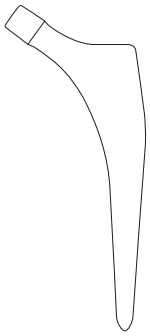
Standard CCD 135°

Art. No.	Size	Length (L)
04PS00	0	125.5 mm
04PS10	1	131.5 mm
04PS20	2	135.5 mm
04PS30	3	139.5 mm
04PS40	4	143.5 mm
04PS50	5	147.5 mm
04PS60	6	151.5 mm
04PS70	7	155.5 mm
04PS80	8	159.5 mm



Lateralized CCD 126°

Art. No.	Size	Length (L)
04PL10	1	131.5 mm
04PL20	2	135.5 mm
04PL30	3	139.5 mm
04PL40	4	143.5 mm
04PL50	5	147.5 mm
04PL60	6	151.5 mm
04PL70	7	155.5 mm
04PL80	8	159.5 mm



BIOLOX® OPTION is a registered trademark of CeramTec AG, Germany.

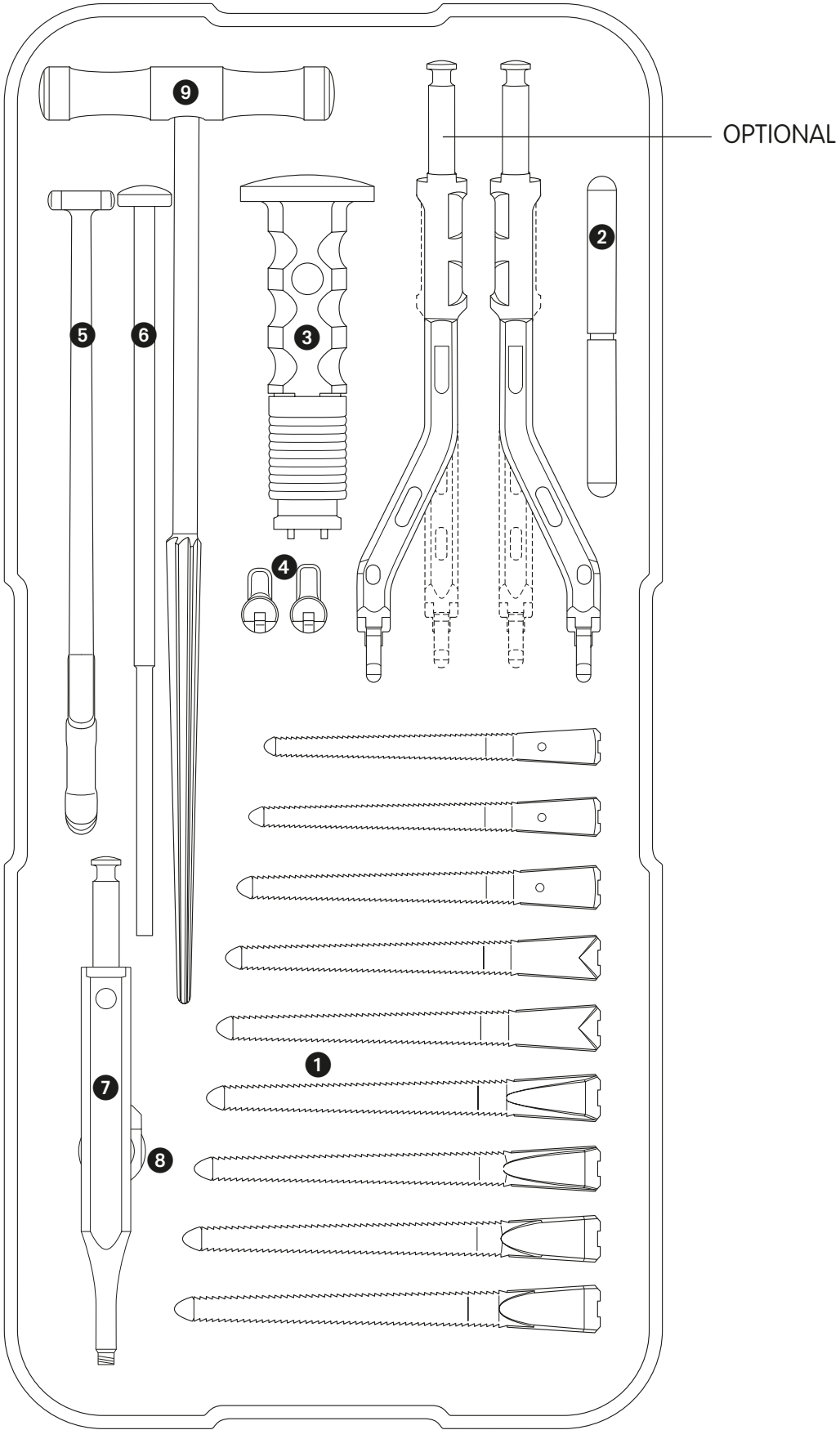
Instrumentation

Set No. 0942153

	Art. No.	Description	Size
	21000285	**Cover for POLARSTEM® Case**	
	21000286	**Basic Case**	
1	21000291	Detachable Rasp	0
	21000292	Detachable Rasp	1
	21000293	Detachable Rasp	2
	21000294	Detachable Rasp	3
	21000295	Detachable Rasp	4
	21000296	Detachable Rasp	5
	21000297	Detachable Rasp	6
	21000298	Detachable Rasp	7
	21000299	Detachable Rasp	8
2	21000301	Anteversion Rod	
3	21000339	Handle for Rasp Adaptor	
4	21000289	Trial Neck Standard	
	21000290	Trial Neck Lateralized	
5	21000341	Box Chisel	
6	21000342	Rod for Box Chisel	
7	110249	Extraction Screw M6	
8	21000354	Extraction Block	
9	21000343	Femoral Reamer	

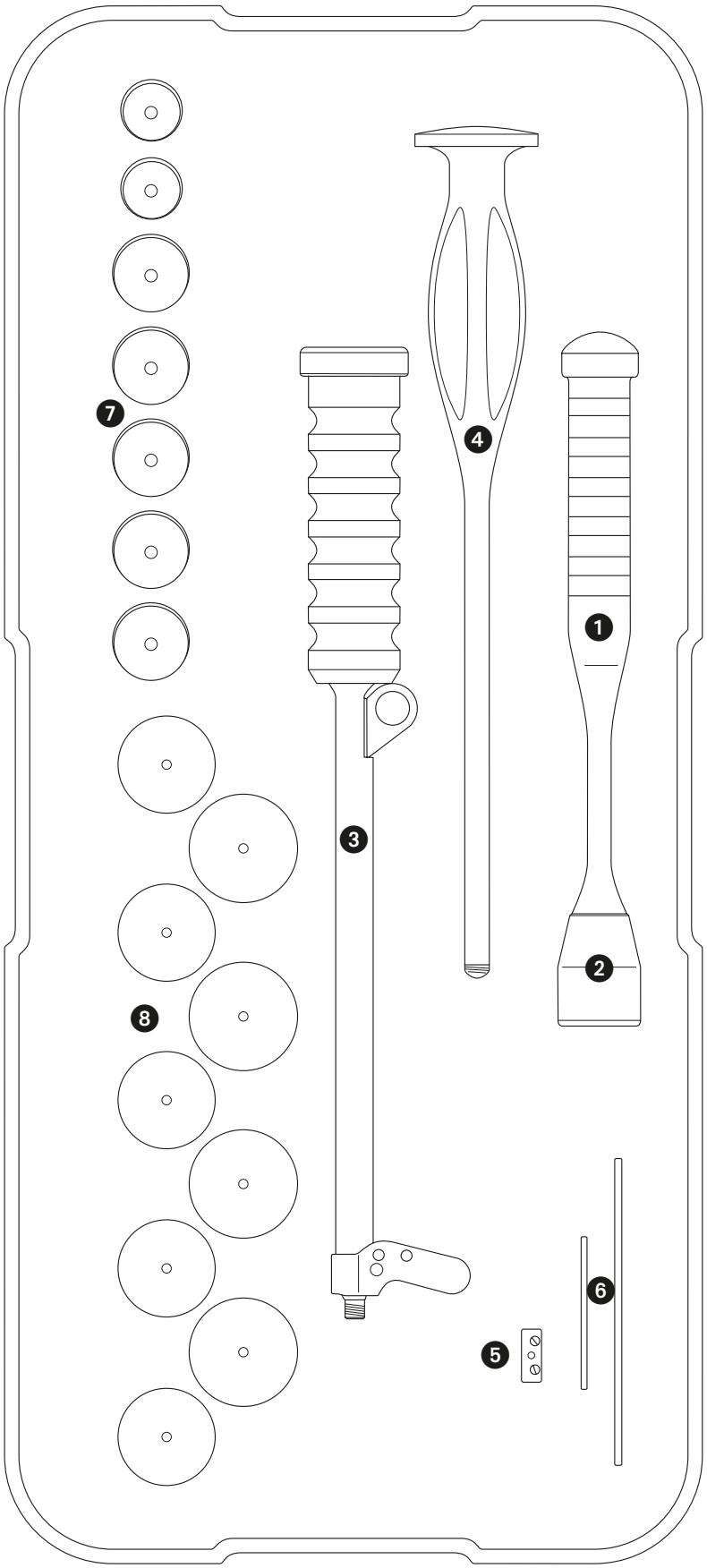
Optional Rasp Adaptors:

Art. No.	(Set Nr.)	Description	Size
600920	(0942154)	Offset Adaptor	25 mm
600921	(0942156)	Offset Adaptor	40 mm
600922	(0942157)	Offset Adaptor	10 mm
600923	(0942159)	Double Offset Adaptor, left	17 mm
600924	(0942159)	Double Offset Adaptor, right	17 mm


OPTIONAL
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Set No. 0942153

	Art. No.	Description	Size
	21000353	**Tray to Basic Case 21000286**	
❶	21000344	Ball Head Impactor	
❷	21000345	Modular Head for 21000344	
❸	21000300	Stem Positioner	
❹	21000355	Stem Impactor	
❺	21000287	CCD Gauge	
❻	21000288	Pin for CCD Gauge	50 mm
	21000340	Pin for CCD Gauge	100 mm
❼	21000346	Trial Head	22 M
	21000347	Trial Head	22 L
	21000348	Trial Head	28 S
	21000349	Trial Head	28 M
	21000350	Trial Head	28 L
	21000351	Trial Head	28 XL
	21000352	Trial Head	28 XXL
❽	160011	Trial Ball Head	32 S
	160012	Trial Ball Head	32 M
	160013	Trial Ball Head	32 L
	160014	Trial Ball Head	32 XL
	160015	Trial Ball Head	32 XXL
	160016	Trial Ball Head	36 S
	160017	Trial Ball Head	36 M
	160018	Trial Ball Head	36 L
	160019	Trial Ball Head	36 XL


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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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