

QUADRA® SYSTEM

A NEW GENERATION



Surgical Technique

Hip

Knee

Spine

Navigation

INTRODUCTION

This document describes the Surgical Technique for the Quadra® System. The Quadra® System consists of:

- *Quadra®-S: cementless stem in Titanium-Niobium alloy with sand-blasting treatment.*
- *Quadra®-H: cementless stem in Titanium-Niobium alloy with hydroxyapatite (HA) coating.*
- *Quadra®-C: cemented stem in high nitrogen stainless steel.*

This document describes the Surgical Technique for both Manual and Motorised Versions using broach handle procedures to implant the Quadra® stem. For the Motorised Version using a motorised broach and dedicated instruments please refer to the specific surgical technique.

Please read the instructions for use carefully and, should you have any questions concerning product compatibility, please contact your Medacta® representative.



Quadra®-H

Quadra®-S

Quadra®-C

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1 INDICATIONS OF USE

The Quadra® System is designed to be used in total or partial hip arthroplasty, for primary or revision surgery. Total hip arthroplasty is suitable in the following cases:

- Severely painful and/or disabled joint as a result of arthrosis, traumatic arthritis, rheumatoid polyarthritis or congenital hip dysplasia
- Avascular necrosis of the femoral head
- Acute traumatic fracture of the femoral head or neck
- Failure of previous hip surgery: joint reconstruction, internal fixation, arthrodesis, partial hip arthroplasty, hip resurfacing replacement or total hip arthroplasty

Partial hip arthroplasty is suitable in the following cases:

- Acute traumatic fracture of the femoral head or neck
- Non-union of femoral neck fracture
- Avascular necrosis of the femoral head
- Primary pathology involving the femoral head but with a non deformed acetabulum

2 CONTRAINDICATIONS

The Quadra® System contraindications are the standard contraindications for total or partial hip arthroplasty:

- Acute, systemic or chronic infection
- Skeletal immaturity
- Severe muscular, neurological, vascular deficiency or other pathologies of the affected limb that may compromise the functionality of the implant
- Bone condition that may compromise the stability of the implant

Mental or neuromuscular disorders may create unacceptable risks to the patient and can cause postoperative complications.

It is the surgeon's responsibility to ensure that the patient has no known allergies to the materials used.

3 PRE-OPERATIVE PLANNING

Careful pre-operative planning is essential. It will help the surgeon to pre-select the femoral implant size in order to restore an architecture corresponding to the operated patient's anatomy. In addition, using the set of X-ray templates to the scale of 1.15:1 (with an X-ray of the same magnification), it will be possible to determine:

- The implant size
- The level of the neck cut
- The neck length
- The prosthetic rotation centre

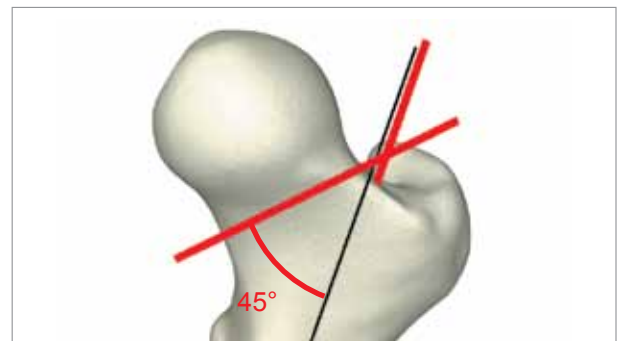
NOTICE: the final implant will be selected intra-operatively due to possible discrepancies between actual conditions and templating.

4 SURGICAL APPROACH

The choice of surgical approach is up to the surgeon. The instrumentation has been developed for a posterior approach. Specific instrumentation for the anterior approach is available upon request (for further information see the AMIS® dedicated surgical technique).

5 FEMORAL NECK OSTEOTOMY

The level of the neck cut is determined during pre-operative planning using the X-ray templates. The femoral neck osteotomy is at an angle of 45° to the diaphyseal axis of the femur. The resection is performed with an oscillating saw, taking care to maintain the 45° angle. The femoral head is removed using an extractor.



6 FEMORAL PREPARATION

For access to the medullary canal, the thigh is held in the position that provides the best exposure of the diaphyseal axis, depending on the selected approach.

To avoid undersizing and varus positions of the stem, a box chisel is applied opposite the digital fossa of the femoral neck.

Guide the chisel with a slight anteversion: this step is essential for the correct application of the broach and implant.

This removes a block of cancellous bone.



If needed, the endomedullary cancellous bone can be reamed using the metaphyseal reamer assembled with the T shaped handle.

Check the axis and ensure cortical continuity.



It is recommended to make a slight recess in the neck base or in the trochanteric overhang, if necessary to allow room for the shoulder of the broach and stem.

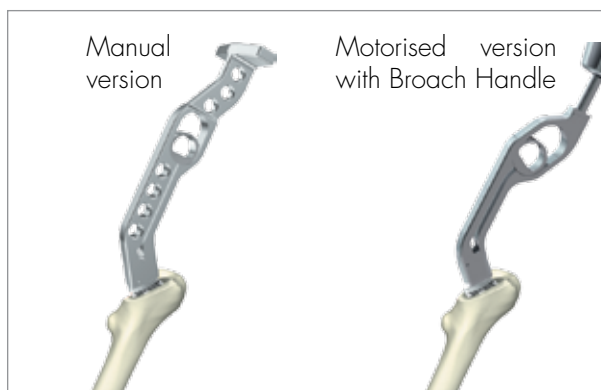
The femoral diaphysis is prepared using modular broaches.

Manual version:

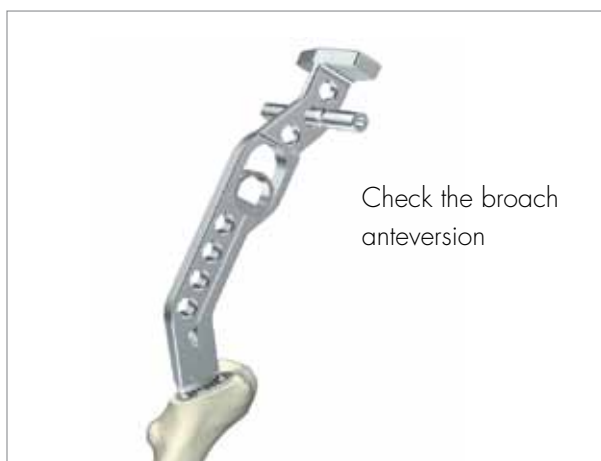
Assemble the broach on the Manual Broach Handle.

Motorised version with Broach Handle:

Assemble the broach with the Motorised Broach Handle and the Motor IMT.

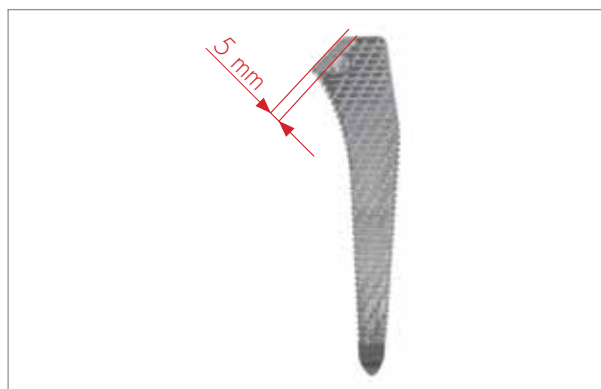


Broaches of increasing sizes are introduced until complete locking; the first broach determines the position of the following broaches. Check the broach anteversion.



The broaches must be inserted to the optimum level determined by the 45° cut. Never force impaction.

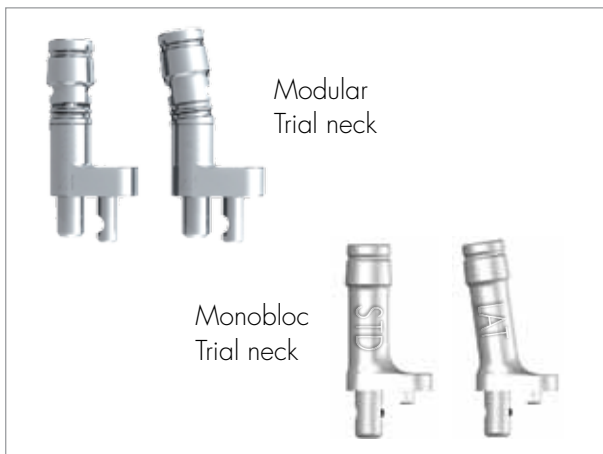
NOTICE: The size 8, 9 and 10 broaches must not be inserted beyond the black laser mark located 5 mm from the top of the broach.



The final broach should be rotationally stable to assure stability of the implant.

7 TRIALS

After completely locking the broach in the diaphysis, the broach handle can then be removed. A trial neck, standard or lateralised, is fitted to the broach.



NOTICE: for Quadra® short neck stems (sizes OSN, 1SN, 2SN, 3SN): require and use dedicated necks for trial tests. Modular trial necks for short neck stems are coloured blue.

To lock the trial necks to the broach press onto the socket; to unlock pull the neck.



Trial heads of different diameters and heights are available to perform the trial reductions.



TRICK
To make head insertion easier wet the head before insertion.

A trial head is fitted to the trial neck by pushing it onto the taper. To remove a trial head, simply pull it.



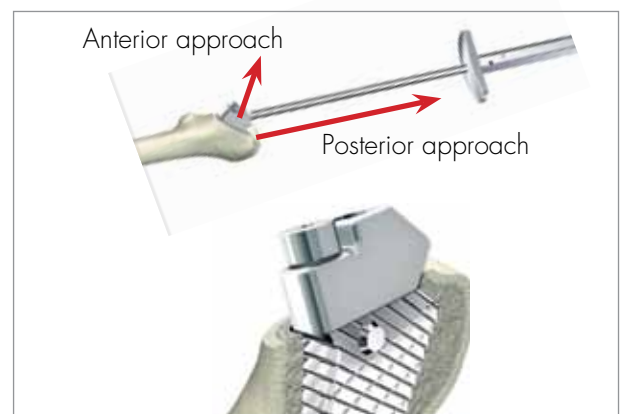
TRICK
If the trial head is difficult to remove from the trial neck, wet the Trial Head-Trial Neck assembly. Turn and gently pull the trial head in order to remove it.

After placement of the trial or final acetabular component, the trial reduction is performed with the help of the Head Impactor.

NOTICE: The Head Impactor must only be used for head impaction and not for the correction of the acetabular shell position.

After checking and testing mobility, joint stability and lower limb length, remove the broach.

TRICK
An extraction system can be used if the broach is difficult to remove. Firstly, screw the broach extractor into the broach. Depending on the selected approach, screw the screwed stem extractor M8 onto the broach extractor. Pull out the broach.



8 FINAL IMPLANTS

8.1 Cementless implant

Insert the final prosthesis into position. The final prosthesis size corresponds to the size of the last trial stem or manual broach.



! WARNING

Take care not to damage the taper's micro-thread while positioning the final implant.

The anteversion of the stem is guided by the quadrangular recess left in the femur by the broaches.

! CAUTION

Under no circumstances should the implant anteversion be changed at this stage.

The stem is inserted to the limit corresponding to the test. Carefully perform the final impaction using a dedicated impactor.



The protective cap is removed from the taper. A further trial reduction can then be performed to determine the final neck length.

! CAUTION

The head sizes XL (for Ø 28 mm and Ø 32 mm) and XXL (for Ø 28 mm, Ø 32 mm and Ø 36 mm) have a collar. This may decrease the Range of Motion in comparison to shorter head sizes. Always perform a trial reduction with the chosen head.

The stem taper must be thoroughly cleaned before impacting the prosthetic head. Place in position the final head of the chosen size.



! WARNING

Never use a metal hammer to fix the ceramic head. Use only the plastic head impactor provided for this purpose.

NOTICE: For further details about ceramic femoral heads, please refer to the instructions for use for ceramic femoral heads.

8.2 Cemented implant

Two different techniques can be used for the final implant positioning. Technique 1 produces a thick and complete cement mantle around the stem: the reamed femoral cavity is 1.4 mm larger than the implanted prosthesis. Technique 2 (line-to-line reaming) has a thinner cement mantle and produces a cavity which is the same size as the inserted prosthesis: after the cement insertion the prosthesis is implanted as a press-fit.^[1]

The table below should always be used for broach and stem selections.

^[1] Should the cement mantle around the femoral component be thick or thin? Skinner JA, Todo S, Taylor M, Wang JS, Pinskerova V, Scott G, *The Journal of Bone and Joint Surgery*: 85-B, n°1, January 2003.

TABLE FOR BROACH AND STEM SELECTION

Broach size	Stem size Tech 1	Stem size Tech 2
0	-	0
1	0	1
2	1	2
3	2	3
4	3	4
5	4	5
6	5	6
7	6	7
8	7	-

NOTICE: do not use broach sizes 9 and 10 because there are not stems of the corresponding size available. For the line-to-line reaming surgical technique (Tech 2) don't use the size 8 broach because there are not size 8 stems available.

CAUTION

Size 8 broach sticks out of the bone 5 mm. Trial tests to implant a size 7 stem with technique 1 must always be performed using Standard Short Trial Necks, in order to restore the correct stem dimensions.

Remove any loose, unsupportive, cancellous bone from the canal with a curette or canal brush. Close the distal canal with a medullary plug at least at 1 cm distal to the tip of the stem. Pay close attention to the choice of the distal plug to ensure it can resist the cement pressure. Clean the intramedullary canal with pulse lavage and dry it. Keep the canal packed until the cement is ready to be injected.



Using retrograde cementation, introduce the cement into the canal using a cement gun. Pressurise the cement column to allow the cement to interdigitate into the cancellous bone.

Introduce the femoral stem into the medullary canal until the optimal position, established during the trial step, has been reached.

Hold the stem securely in the correct position with the stem impactor until the cement has hardened in order to avoid the stem moving from its optimal position.



WARNING

Take care not to damage the taper's micro-thread whilst placing the final implant.

A further trial reduction can then be performed to determine the final neck length.

CAUTION

The head sizes XL (for Ø 28 mm and Ø 32 mm) and XXL (for Ø 28 mm, Ø 32 mm and Ø 36 mm) have a collar. This may decrease the Range of Motion in comparison to shorter head sizes. Always perform a trial reduction with the chosen head.

The stem taper must be thoroughly cleaned before impacting the prosthetic head. Place in position the final head of the chosen size.



WARNING

Never use a metal hammer to fix the ceramic head. Use only the plastic head impactor provided for this purpose.

NOTICE: For further details please refer to the instructions for use for ceramic femoral heads.

9 POSSIBLE IMPLANT COMBINATIONS

All Medacta implant combinations are represented in the table "Medacta® Hip product compatibility" (ref. 99.99.COM), available at www.medacta.com.

NOTICE: In the case of a ceramic-on-ceramic bearing it is compulsory to use compatible ceramic femoral heads and liners.

10 IMPLANTS NOMENCLATURE

SAND BLASTED STEMS (QUADRA®-S)			HA COATED STEMS (QUADRA®-H)			CEMENTED STEMS (QUADRA®-C)		
Standard	Size	Lateralized	Standard	Size	Lateralized	Standard	Size	Lateralized
01.12.99SN	00SN ^{II}	-	01.12.98SN	00SN ^{II}	-	-	-	-
01.12.00SN	0SN	-	01.12.20SN	0SN	-	-	-	-
01.12.01SN	1SN	01.12.11SN	01.12.21SN	1SN	01.12.31SN	-	-	-
01.12.02SN	2SN	01.12.12SN	01.12.22SN	2SN	01.12.32SN	-	-	-
01.12.03SN	3SN	01.12.13SN	01.12.23SN	3SN	01.12.33SN	-	-	-
01.12.000	0	-	01.12.020	0	-	01.12.040	0 ^I	-
01.12.001	1	01.12.011	01.12.021	1	01.12.031	01.12.041	1	-
01.12.002	2	01.12.012	01.12.022	2	01.12.032	01.12.042	2	-
01.12.003	3	01.12.013	01.12.023	3	01.12.033	01.12.043	3	-
01.12.004	4	01.12.014	01.12.024	4	01.12.034	01.12.044	4	-
01.12.005	5	01.12.015	01.12.025	5	01.12.035	01.12.045	5	-
01.12.006	6	01.12.016	01.12.026	6	01.12.036	01.12.046	6	-
01.12.007	7	01.12.017	01.12.027	7	01.12.037	01.12.047	7	-
01.12.008	8	-	01.12.028	8	-	-	-	-
01.12.009	9	-	01.12.029	9	-	-	-	-
01.12.010	10 ^{II}	-	01.12.030	10 ^{II}	-	-	-	-

^I Limited use body mass not exceeding 65 kg

^{II} On request

SN = Short Neck



HEADS

Diameter	Size	Stainless steel	CoCr	CeramTec BIOLOX® <i>delta</i>	CeramTec BIOLOX® Option
Ø 22 mm	S	01.25.130	01.25.124	-	-
Ø 22 mm	M	25055.2203	01.25.123	-	-
Ø 28 mm	S	25055.2801	01.25.011	38.49.7175.445.00	38.49.7176.935.81
Ø 28 mm	M	25055.2803	01.25.012	38.49.7175.455.00	38.49.7176.935.82
Ø 28 mm	L	25055.2805	01.25.013	38.49.7175.465.00	38.49.7176.935.85
Ø 28 mm	XL	25055.2807	01.25.014	-	38.49.7176.935.84
Ø 28 mm	XXL	25055.2810	01.25.015	-	-
Ø 32 mm	S	25055.3201	01.25.021	38.49.7175.665.00	38.49.7176.945.81
Ø 32 mm	M	25055.3203	01.25.022	38.49.7175.675.00	38.49.7176.945.82
Ø 32 mm	L	25055.3205	01.25.023	38.49.7175.685.00	38.49.7176.945.85
Ø 32 mm	XL	25055.3207	01.25.024	38.49.7181.345.00	38.49.7176.945.84
Ø 32 mm	XXL	25055.3210	01.25.025	-	-
Ø 36 mm	S	-	01.25.030	38.49.7179.275.00	38.49.7176.965.81
Ø 36 mm	M	-	01.25.031	38.49.7179.285.00	38.49.7176.965.82
Ø 36 mm	L	-	01.25.032	38.49.7179.295.00	38.49.7176.965.85
Ø 36 mm	XL	-	01.25.033	38.49.7175.925.00	38.49.7176.965.84
Ø 36 mm	XXL	-	01.25.034	-	-
Ø 40 mm	S	-	-	38.49.7179.885.00	38.49.7179.815.81
Ø 40 mm	M	-	-	38.49.7179.895.00	38.49.7179.815.82
Ø 40 mm	L	-	-	38.49.7179.905.00	38.49.7179.815.85
Ø 40 mm	XL	-	-	38.49.7179.915.00	38.49.7179.815.84
Ø 40 mm	XXL	-	-	-	-

^{||} On request

^{|||} Specific for revision cases

NOTE FOR STERILISATION

The instrumentation is not sterile upon delivery. It must be cleaned before use and sterilised in an autoclave respecting the regulations of the country, EU directives where applicable and following the instruction for use of the autoclave manufacturer.

For detailed instructions please refer to the document "Recommendations for cleaning decontamination and sterilization of Medacta® International reusable orthopaedic devices" available at www.medacta.com.

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