

MRS-TITAN COMFORT

MODULAR REVISION SUPPORT CUP



SURGICAL TECHNIQUE



PETER BREHM
Die Präzision in Titan
für den Menschen

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MRS-TITAN COMFORT

PRODUCT DESCRIPTION



The modular revision cup system

For recent years now, there has been a disproportionate increase in revision arthroplasty of the hip. The ratio of replacements of the acetabular component to the femoral component is about 2:1.¹

Replacement of the acetabular component represents an exceptional challenge for the surgeon due to the need to reconstruct defects and achieve initial rigid fixation in the correct biomechanical position.

This was the setting in which an interdisciplinary research group of experts developed the MRS-TITAN Comfort.

This modern support shell system can be adapted to the intraoperative situation.

A specially developed patented mechanism with selectable positioning options allows optimal adjustment of cup inclination and anteversion. This flexibility allows the surgeon to systematically solve the individual physiologic problems that arise in revision procedures. The concept provides an intraoperative escape route with every step of the procedure.

The implant system was developed so that only a few individual, easy to use instruments are required for the operation.

¹Moskal JT, Shen FH, Brown TE (2002) The fate of stable femoral components retained during isolated acetabular revision: a six-to-twelve-year follow-up study. J Bone Joint Surgery [Am] 84: 250-255

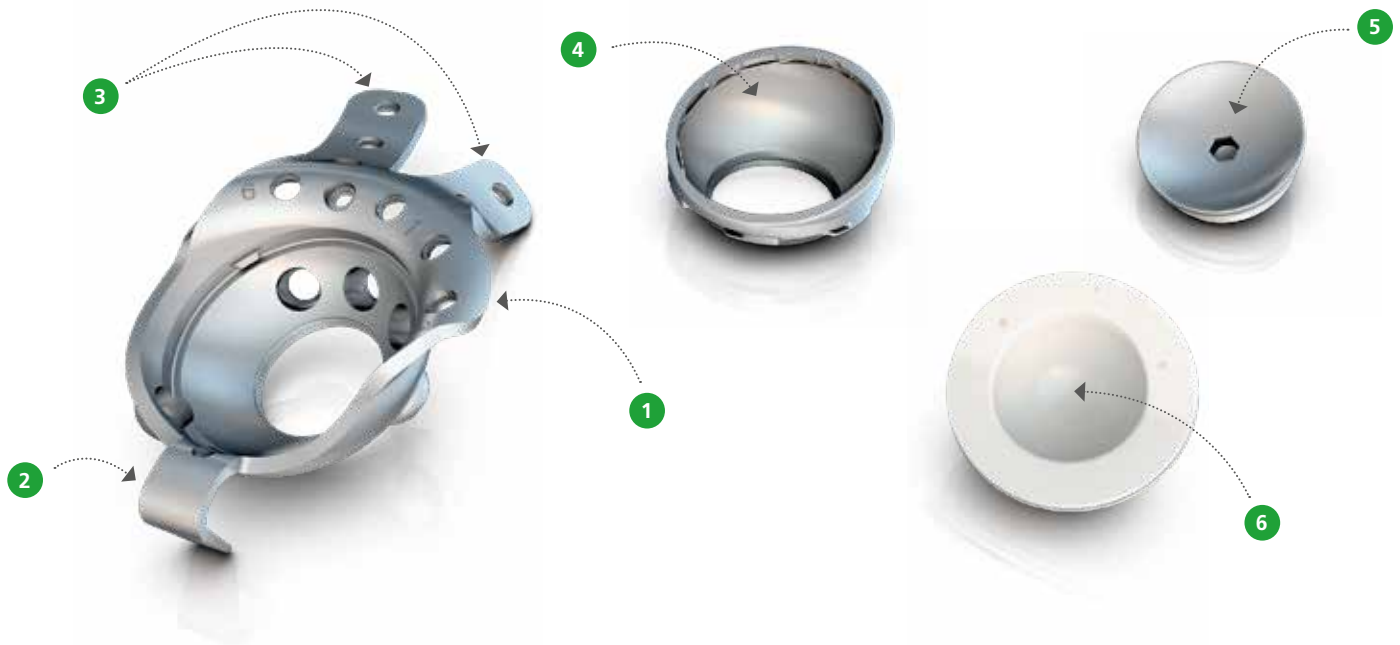
ADVANTAGES AT A GLANCE

- | Completely cementless implantation
- | Biologic defect reconstruction
- | Immediate stable fixation
- | Correct biomechanical position
- | Restoration of the physiologic joint geometry

Six selectable cup offset ring positions provide maximum flexibility for adjusting inclination and anteversion.



Design characteristics



1 Titanium shell

- | Support shell of pure titanium
- | Ti-VPS coated bone contact surface
- | Hemispheric body 3 mm thick
- | Anatomical implant (right and left variants)
- | Sizes 48-64 mm in 4 mm increments
- | Large central opening in support shell for augmentation of bone defects
- | Fully locking cup
- | Preformed anteversion of 15° (angle between shell and double strap)
- | Screw insertion angle variable over 30° range

2 Caudal hook

- | Individually bendable
- | Longitudinal section possible

3 Cranial straps

- | Versions: 0 mm, 45 mm, 60 mm
- | Increased fatigue strength
- | Individual anatomically adapted straps
- | Customizable
- | Flat head cancellous screws or strap screws (6.5 mm) may be used

4 Modular titanium cup

- | Six selectable positioning options
- | Angulation can be increased a further 40° once shell has been placed
- | Cementless fixation of the cup within the support shell

5 Safety screw

- | Intraoperative and postoperative corrections facilitated by controlled locking and releasing of the cup with the shell in situ

6 Acetabular insert

- | Open
- | High position
- | Liner secured by Circlip and radial teeth
- | Selectable liner position of the inlay
- | In addition to the PE inlay also available as ceramic

MRS-TITAN COMFORT

SURGICAL TECHNIQUE



Determining size

01

The complete implant must be removed to determine the size.

Removing the loosened implant

! NOTE

No special storage of the patient and no specially access for the implant are specified. The surgeon can freely select the preferred access, however must adhere to the specified steps and modify them for the selected access. To ensure a better overview, positioning the patient on his side is recommended.



02

Evaluating the pelvis

Broad exposure of the acetabulum is required for trouble-free implantation. The exposure should give the surgeon a clear view of the anatomic structures so that the operation can proceed smoothly and correctly.

Acetabular defects require careful intraoperative evaluation. The *TRIAL Liner / Impactor* can be used to assess the position, degree, and type of bone defect prior to reaming. It is important to determine the quantity, quality, and position of the remaining bone available for reconstruction.



Display of the acetabulum



03

A prerequisite for problem-free placement of the caudal hook is the clean presentation of the acetabulum, especially the acetabular fossa, incisura acetabuli and **ligamentum transversum**.

The fossa acetabuli is cleared out in the first step. The ligamentum transversum is then resected or bluntly detached, so that the hook can later be placed on the bone or in the incisura.

Preparing the implant bed

04

The floor and rim of the acetabulum are carefully debrided, to promote bony integration.

Reaming of the acetabulum invariably begins with either the smallest *Acetabular Reamer* or a *Acetabular Reamer* significantly smaller than the diameter of the acetabular floor. The diameter is successively increased.

Bone quality and defect type are again evaluated after reaming.

In order to achieve contact between the bottom of the shell and the bottom of the cup, it is often necessary to remove marginal osteophytes.



Assembly of the *Synthes-Adapter for Reamer*.

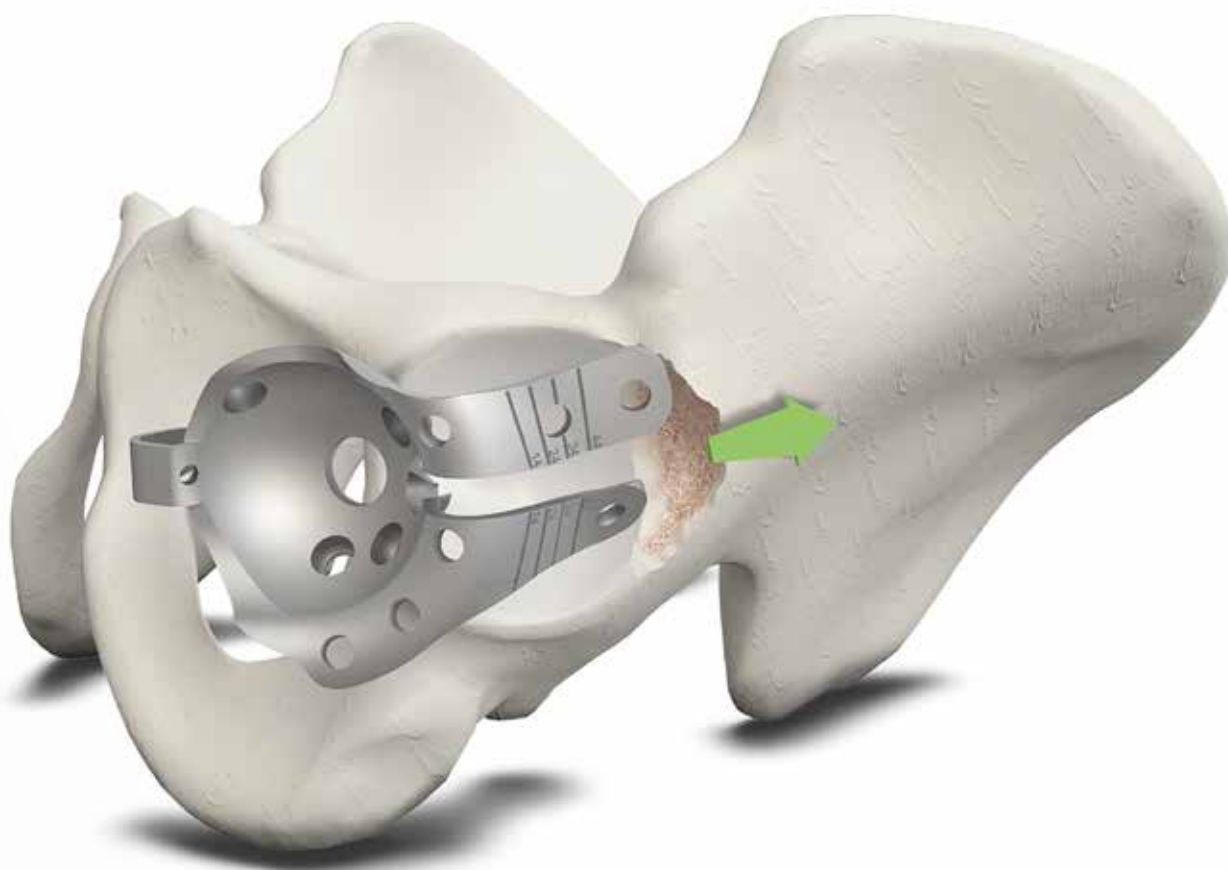
Placing the TRIAL shell

05

The *TRIAL Shell* with the same diameter as the last Acetabular Reamer is used. The *TRIAL Shell* is placed in the prepared acetabulum by hand. The caudal hook and the straps are shaped by hand to fit to the acetabulum. This determines the optimum position and shape of the definitive implant.

The shell should have bone contact in the area of the hook.

Next the required amount and size of the bone graft is determined.



Transferring the shape of the trial implant to the definitive implant

06

Adjust the Titanium Shell -Coated

The Titanium Shell -Coated is then shaped with the *Bending Forceps* or *Bending Devices* to conform to the local anatomy.

The *TRIAL Cup* serves as a pattern.

! NOTE

Do not place the *Bending Device* under the acetabular roof, because this can change the position of the Adjustment Pin.



07

! NOTE

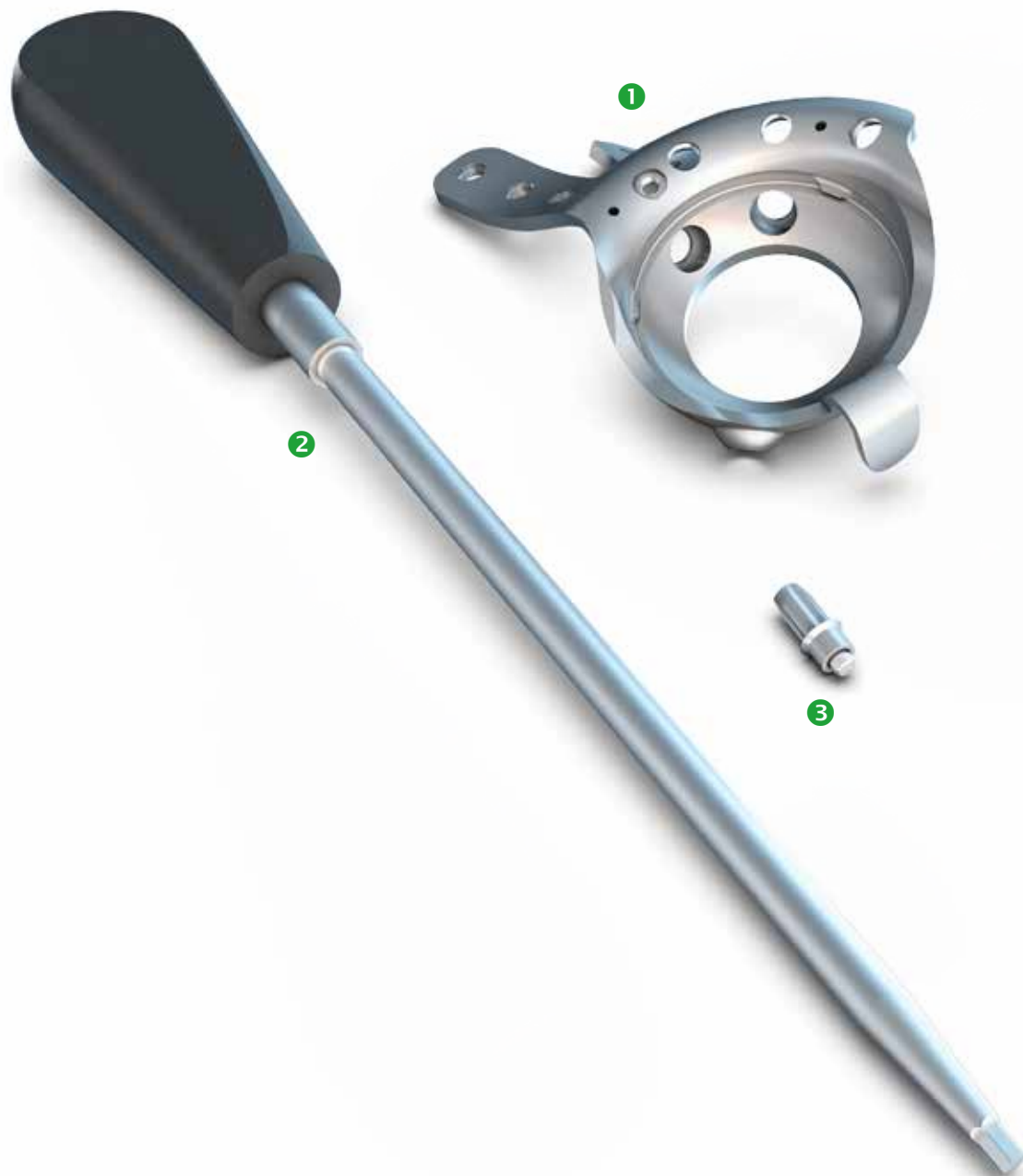
Avoid manipulating the implants frequently and intensely.



Placing the Titanium Shell -Coated

08

- ① Titanium Shell -Coated
- ② Socket Head Wrench SW 3,5
- ③ Adjustment Pin



Placing the Titanium Shell -Coated

09

Preparing the Titanium Shell -Coated

The *Adjustment Pin* is screwed into the threaded hole in the dome of the implant before the Titanium Shell -Coated is placed. Make sure that the pin is placed precisely and then tightened with the *Socket Head Wrench SW 3,5*.



10

Placing the Titanium Shell -Coated

The caudal hook is inserted into the obturator foramen and must be placed securely around the incisura acetabuli. The cup should have bone contact in the area of the hook. The Titanium Shell -Coated can also be impacted with the *TRIAL Liner / Impactor*.

! NOTE

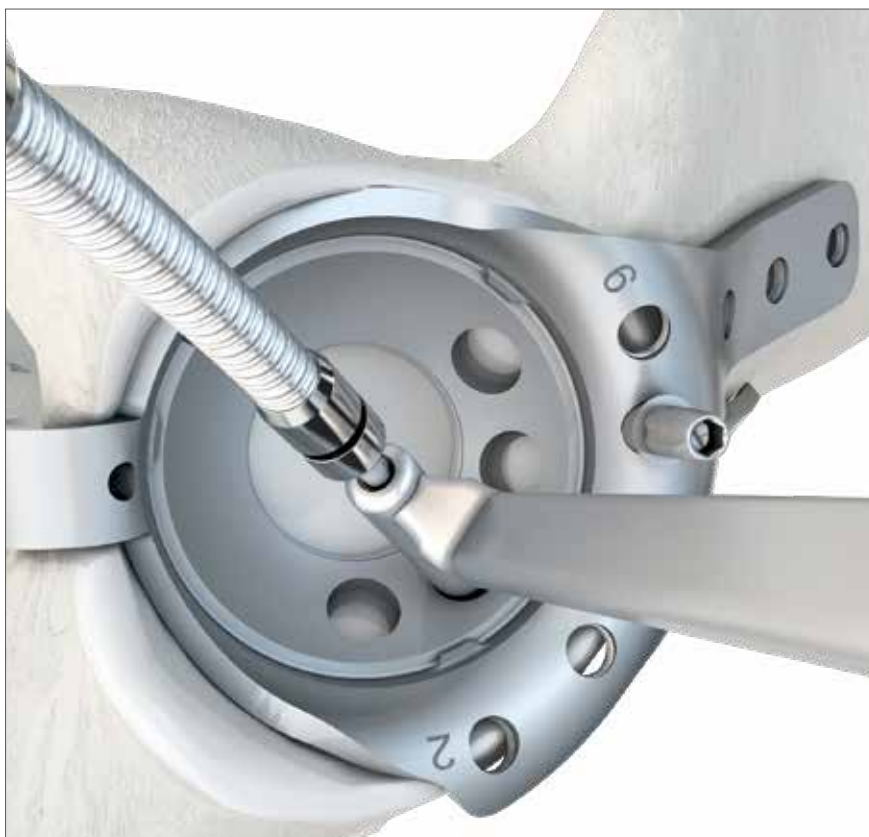
When setting the caudal hook, the *Socket Head Wrench SW 3,5* can be inserted in the hole of the caudal hook.

The *TRIAL Liner / Impactor* can be used for impacting the Titanium Shell -Coated.

The size of *TRIAL Liner / Impactor* is calculated as follows: Diameter of the TRIAL Shell minus 6 mm (twice the component thickness of the titanium shell)



Securing the Titanium Shell -Coated



11

Predrill

A flexible drill and a drilling guide are used to drill pilot holes in the ilium for the Titanium Flat-head Spongiosa Screws. The holes are drilled in the direction of stress transfer into the hip.

! NOTE

- ! Use only Titanium Flat-head Spongiosa Screws for the inner row.
- ! Always use the suitable *drilling guide 3.2 mm dia. or 4.5 mm dia.* for drilling!

For pre-drilling the screws of the inner row, use the short leg with the rounded drill guide.

Serrated side: Drill holes in the acetabular roof and acetabular strap.

Rounded end: Drill holes in the inside of the cup.



12

Determine screw length

A measuring gauge is used to determine the length of the Titanium Flat-head Spongiosa Screws.

Securing the Titanium Shell -Coated

13

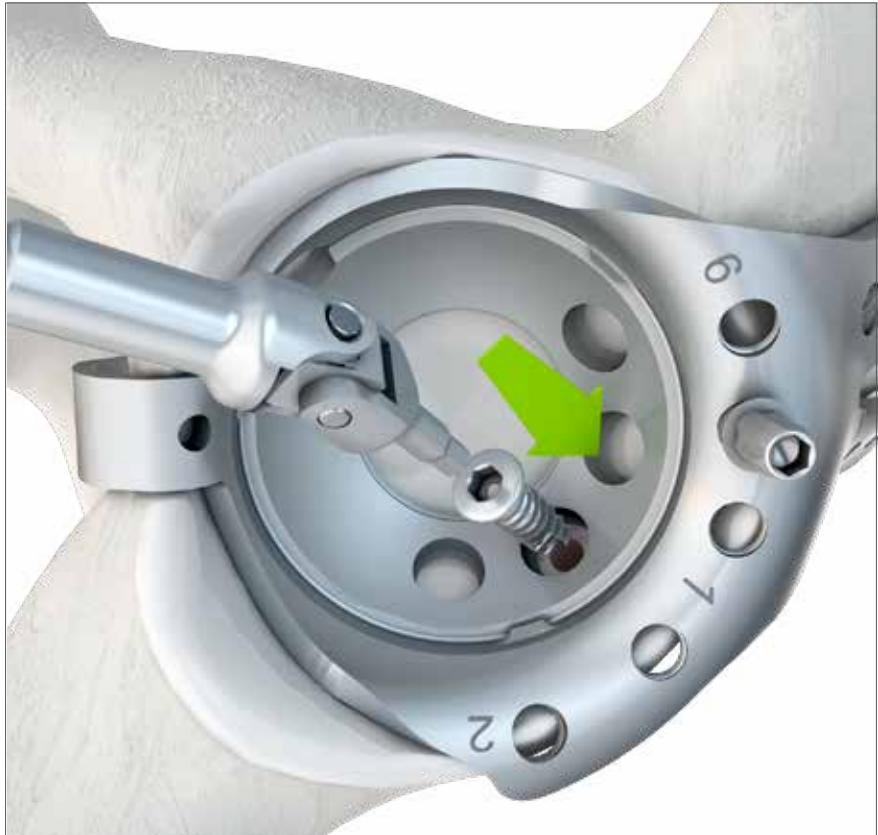
Set screws

First, Titanium Flat-head Spongiosa Screws are inserted into the inner row of drill holes (❶).

These screws are essential to the long-term stability of the implant system. In order to achieve rigid fixation with an interference fit, it is recommended to insert two Titanium Flat-head Spongiosa Screws.

! NOTE

In order not to impair the locking mechanism of the Titanium acetabular cup, the set Titanium Flat-head Spongiosa Screws of the inner row must be completely recessed in the Titanium Shell -Coated.



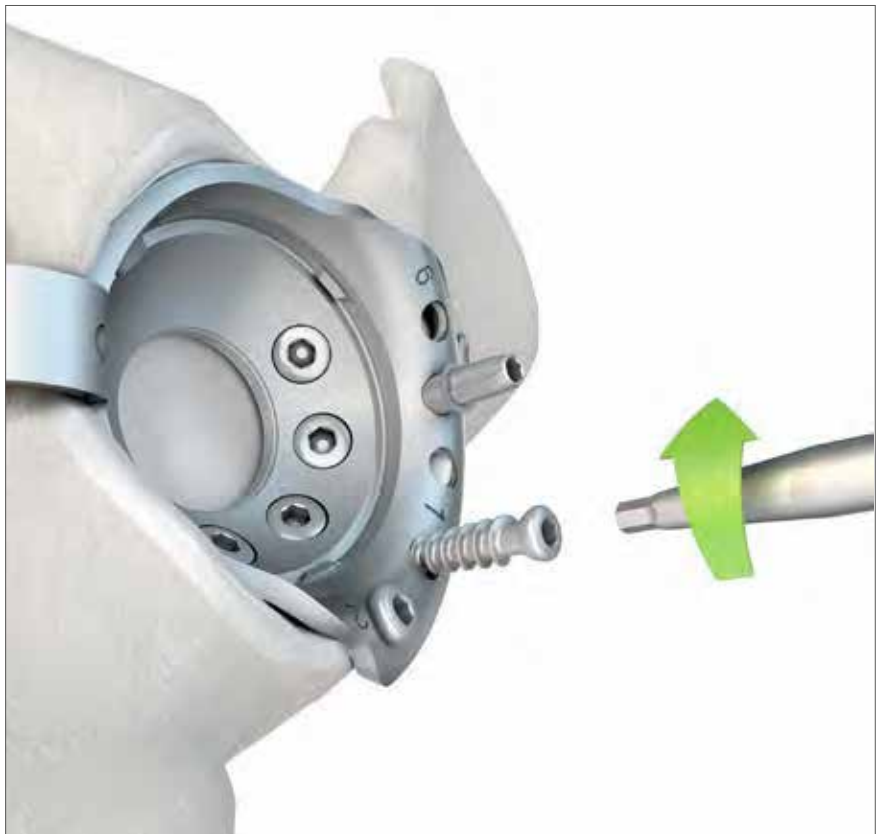
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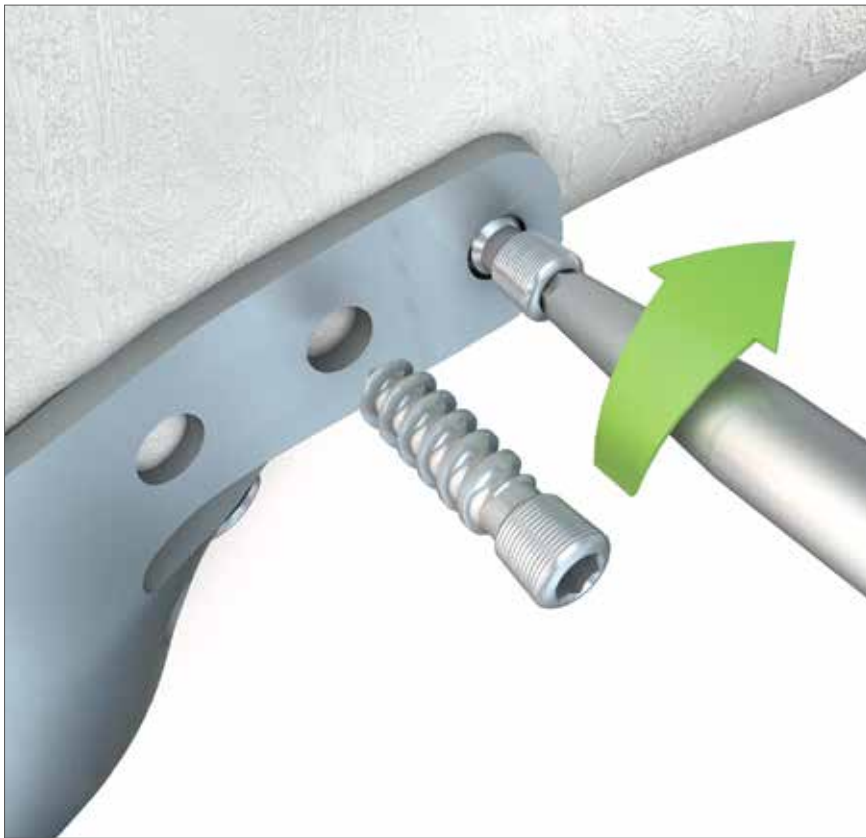
Then the Titanium Flat-head Spongiosa Screws are inserted into the rim of the implant or into the strap wherever there is bone beneath the implant.

! NOTE

Fixing the implant only using the straps is not sufficient. In order to anchor the entire system it has to:

- | Show bone contact in the area of the hook.
- | The caudal hook is inserted into the Foramen obturatum and securely placed around the incisura acetabuli.
- | At least one dome screw (screw of the inner row) must be securely anchored in the intact Os Illium.





! NOTE

Both Titanium Flat-head Spongiosa Screws and Support Strap Screws can be used to fix the straps.

The final step is to tighten all screws.

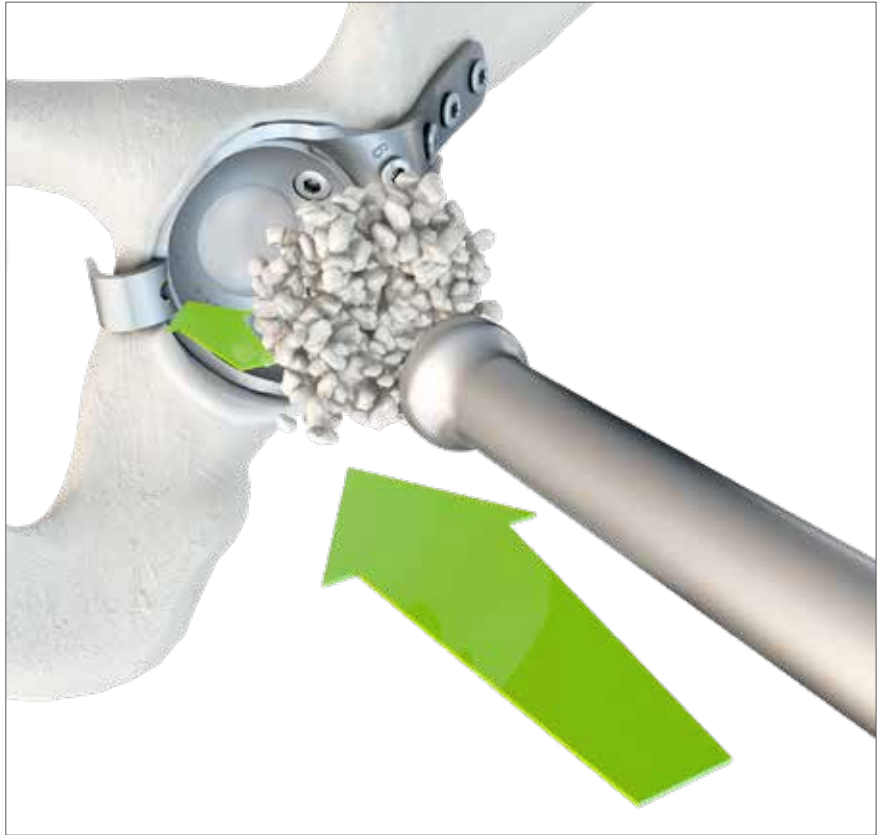
Bone reconstruction

15

The central opening in the floor of the shell permits defect filling by impaction grafting. The graft material is compressed with the *Impactor*.

! NOTE

Only use the *Impactor* and *Test Indenter* provided by PETER BREHM GmbH to ensure the central thread is not damaged.



16

Using the test indenter

Projecting bone prevents correct insertion of the Safety Screw -Coated. For this reason the *test indenter* must be used to verify correct depth and achieve definitive compression.

! NOTE

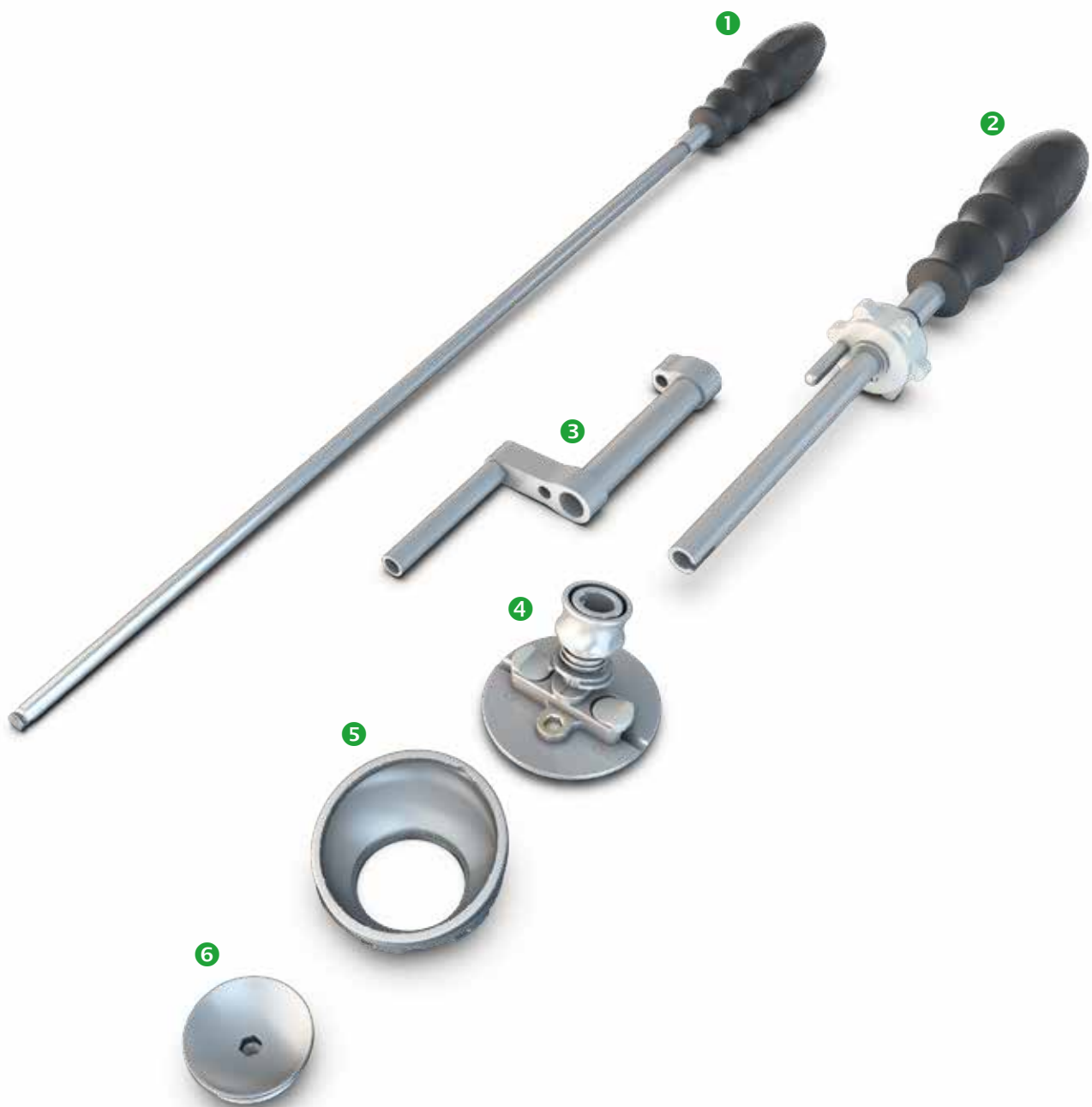
Make sure that the bayonet coupling and the thread for the Safety Screw -coated of the Titanium Shell -coated is free of residues



Assembling the setting tool

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- ① Socket Head Wrench SW 5
- ② Setting Tool (right or left)
- ③ Guide
- ④ TRIAL Cup
- ⑤ Titanium Acetabular Cup with Circlip
- ⑥ Safety Screw -Coated



Assembling the setting instrument

18

Slide the *Guide* (1) over the handle of the *Setting Tool* (2).



Then the *TRIAL Cup* is attached to the *Setting Tool*.

The **marking** on the *TRIAL Cup* must align with the groove on the setting instrument.



Verify that the *Setting Tool* is for the proper side and that you are using the correct size of *Guide* and *TRIAL Cup*.



Then the *Socket Head Wrench SW 5* is inserted through the channel of the instrument.



Attaching the implants to the setting instrument

19

Attaching the Titanium Acetabular Cup with Circlip to the setting instrument

The Safety Screw -Coated is placed on the *Socket Head Wrench SW 5*.



Then the *Titanium Acetabular Cup with Circlip* is attached. The **markings** on the *MRS-Trial Cup* plate must align with those on the *Titanium Acetabular Cup with Circlip*.

The two locking levers are pressed together simultaneously as shown in the picture. Then the *Titanium Acetabular Cup with Circlip* is attached.



Completely assembled setting instrument including the *Titanium Acetabular Cup with Circlip* and *Safety Screw -Coated*.



Adjusting the cup offset ring

20

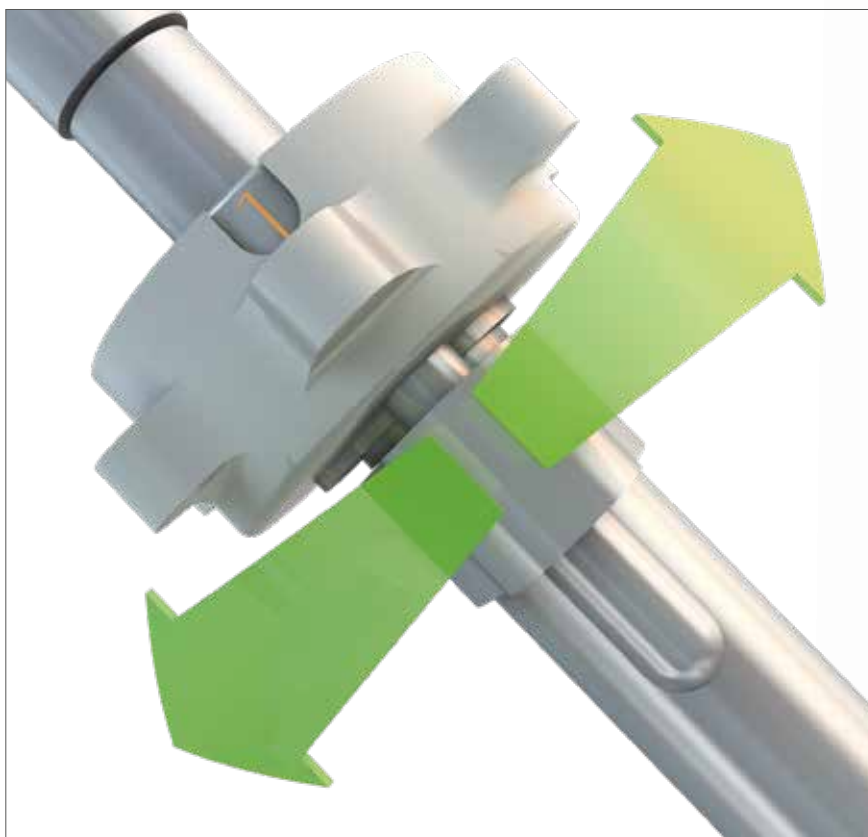
The numbers on the Titanium Shell -coated provide orientation for adjusting the position of the cup on the setting instrument.

Six selectable positioning options are available for placing the cup. Positions 3, 4, and 5 are not marked due to space constraints.

If no additional cup offset ring is required, position 4 can be used as neutral position.



The **position number** on the adjustment disk of the *Setting Tool* is set according to the desired position of the cup offset ring.





Placing the Titanium Acetabular Cup with Circlip

21

Inserting the Titanium Acetabular Cup with Circlip

The *Guide* of the setting instrument is slid completely over the attached *Adjustment Pin*.

Gentle pressure is applied to position the titanium cup on the floor of the shell. The instrument is rotated to the right to lock the cup in the bayonet connection.

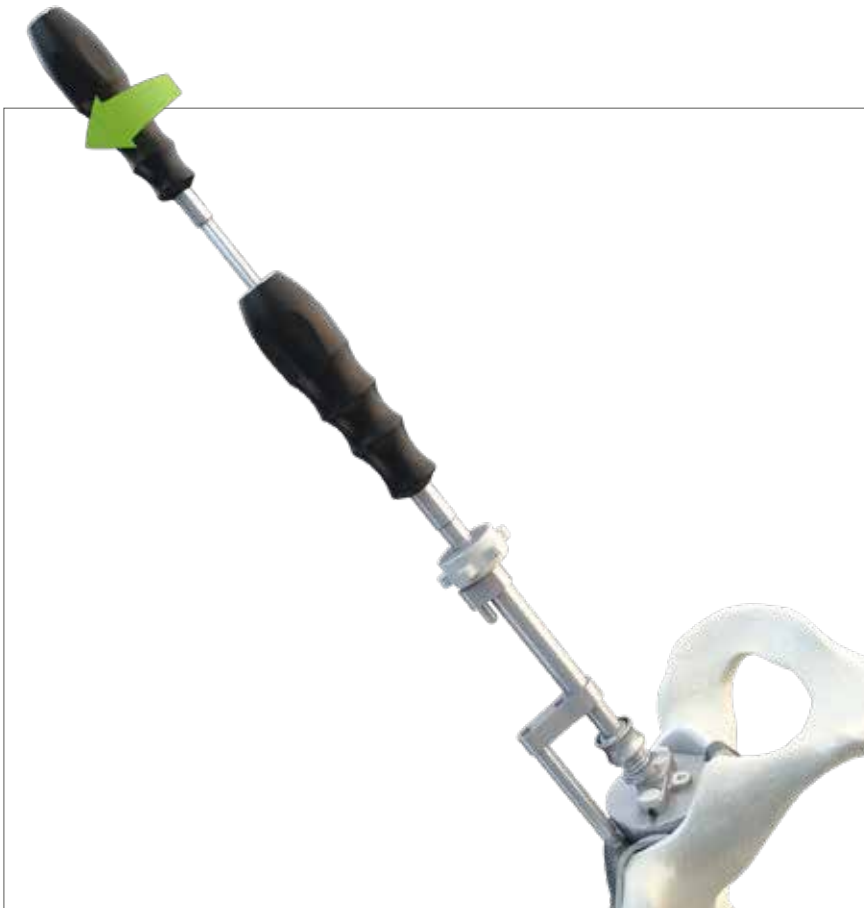


The display on the adjustment disk switches from a number to a green dot as the cup locks in place.

! NOTE

Pull on the handle of the setting instrument to check. This method can be used to check whether the *Titanium Acetabular Cup with Circlip* is connected firmly to the *Titanium Shell -Coated*.





22

Securing the Titanium Acetabular Cup with Circlip

Then the Safety Screw -Coated is screwed in with the attached *Socket Head Wrench SW 5*. After the Safety Screw -Coated has been screwed in hand tight, the *Socket Head Wrench SW 5* is removed.



Release the setting instrument from the titanium cup by gently turning the setscrew to the left and then remove the instrument. Use the *Allen Key SW 5 Ballhead* for this.

The setting instrument can also be released from the implant by simultaneously pressing both locking levers.

Placing the Titanium Acetabular Cup with Circlip

! NOTE

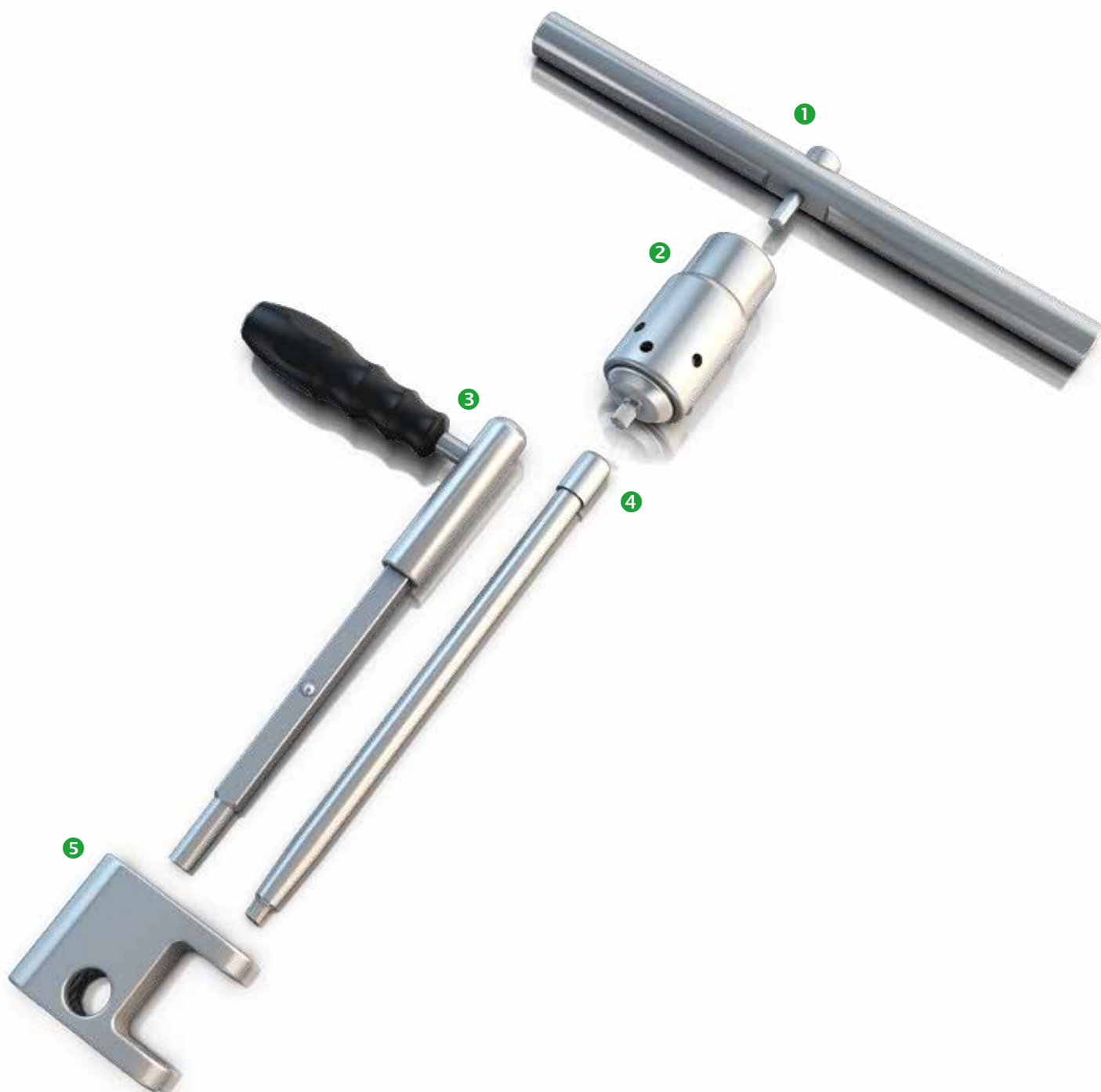
Make sure that there is no protrusion from safety screw to titanium cup



Tightening and securing the Titanium Acetabular Cup with Circlip

23

- ❶ Tommy Bar for Socket Head Wrench SW 6
- ❷ Torque Limiter 25±1 Nm
- ❸ Counter Holder Titan Cup
- ❹ Torque Limiter Inserter 25 Nm
- ❺ Guide for Counter Holder Ø 48 - Ø 76



Tightening and securing the Titanium Acetabular Cup with Circlip

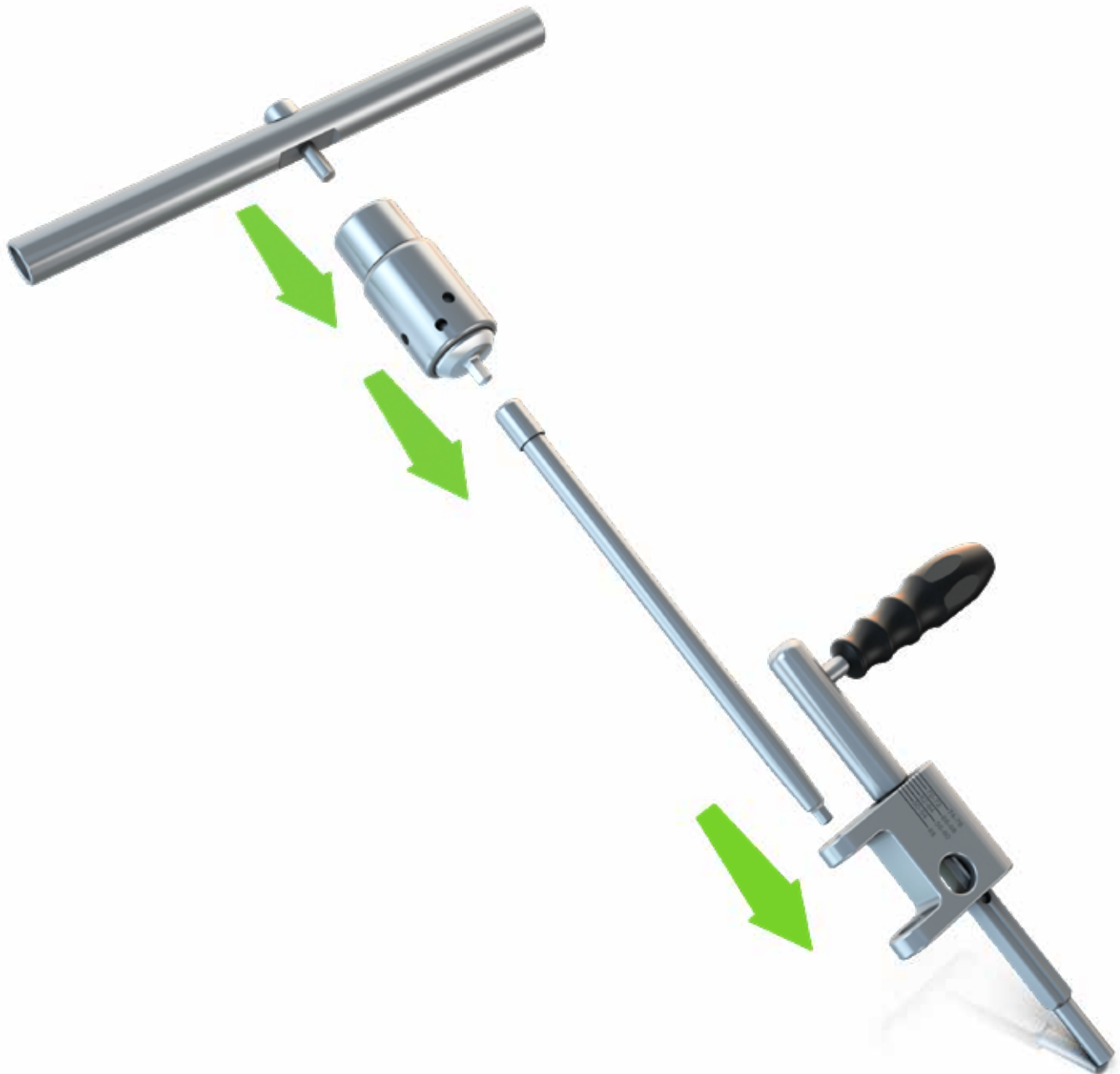
24

Attaching the Counter Holder Titan Cup to the Titanium Shell -Coated

To definitively tighten the Safety Screw -coated, the *Counter Holder Titan Cup* must first be inserted into the *Guide for Counter Holder Titan Cup 48 - 76 mm* (note proper size). The illustrations show the assembly procedure for the *Counter Holder Titan Cup* for cup sizes 56 - 60 mm as an example.



Finally the *Torque Limiter Inserter 25 Nm*, *Torque Limiter 25±1 Nm* and the *Tommy Bar for Socket Head Wrench SW 6* are attached to the instrument.



Tightening and securing the Titanium Acetabular Cup with Circlip

25

Tightening the Titanium Acetabular Cup with Circlip

The *Counter Holder Titan Cup* is placed over the *Adjustment Pin* and the *Torque Limiter Inserter 25 Nm* is introduced into the *Safety Screw -Coated*.

The *Counter Holder Titan Cup* and *Torque Limiter Inserter 25 Nm* must be placed precisely on the *Adjustment Pin* and in the *Safety Screw -Coated*.



Then the *Safety Screw -Coated* is tightened by immobilizing it with the *Counter Holder Titan Cup* and turning the *Tommy Bar for Socket Head Wrench SW 6*.

! NOTE

The torque must be triggered twice. The wrench will begin to slip when the defined torque of 25 ± 1 Nm is reached. Two people are required to tighten the construct.



Trial reduction



26

A trial reduction with a *TRIAL Insert* can now be performed to evaluate the inclination and anteversion settings for the Titanium Acetabular Cup with Circlip.

The following *TRIAL Inserts* are used for this purpose:

- I *TRIAL Insert*
- I *TRIAL Inserts 20°*

The *TRIAL Insert* is pressed by hand into the Titanium Acetabular Cup with Circlip at the desired position.

Afterwards there is the possibility, to perform a trial reduction.



27

Then the *TRIAL Insert* is pried back out of the Titanium Acetabular Cup with Circlip using the *Socket Wrench for TRIAL Insert*.

Placing the acetabular insert

28

The Acetabular Insert PE is inserted into the Titanium Acetabular Cup with Circlip by hand. Then it is fixed in place with the *Setting Tool* and a light tap with a hammer.

The offset of the dysplasia insert can be positioned as desired.

Then the *Adjustment Pin* is removed.



! NOTE

Ensure that the Acetabulum Insert lies flat on the acetabulum margin.



MRS-TITAN COMFORT

SUPPLEMENTARY SURGICAL TECHNIQUE



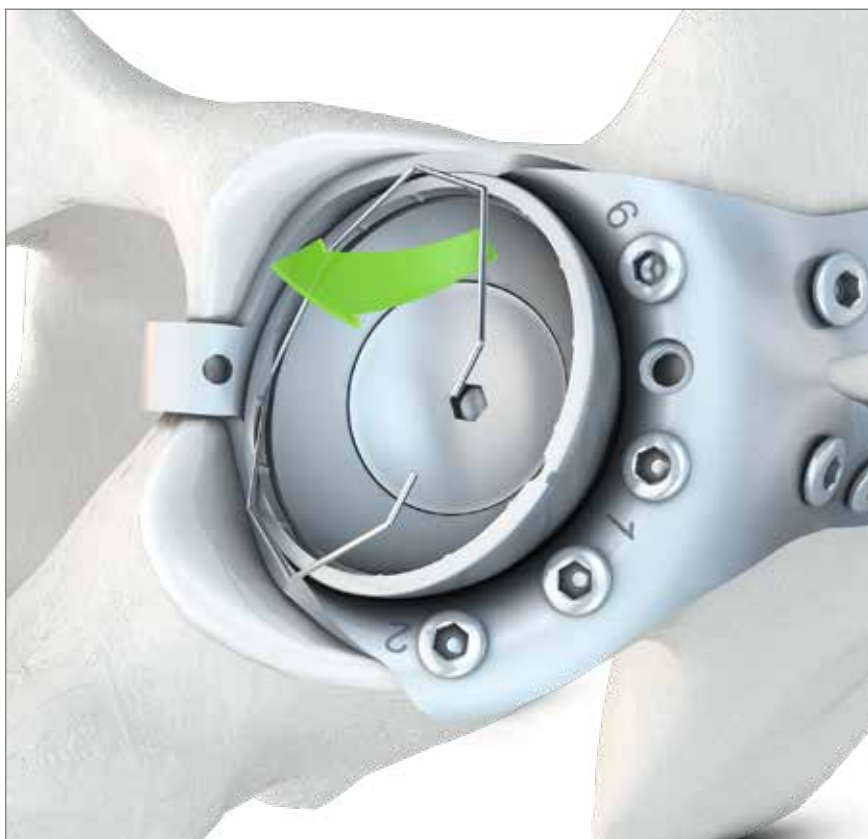
Replacing the acetabular insert

29

The first step is to remove the PE insert, then the Circlip is removed from the Titanium Acetabular Cup with a forceps. A new Circlip is placed in the recess by hand.

! NOTE

It is absolutely necessary to replace the Circlip of the Titanium Acetabular Cup when exchanging the Acetabular Insert.



The new Acetabular Insert is inserted as described under item 28.



Changing the position of the cup

30

The Acetabular Insert PE must be removed and the Safety Screw -Coated released to change the position of the cup.

The *Counterholder Titan Cup* is placed over the *Short Adjustment Pin*. The *Torque Limiter Inserter 25 Nm* is inserted into the hex socket and the *Tommy Bar for Socket Head Wrench SW 6* is attached to the instrument.



Changing the position of the cup

Then the Safety Screw -Coated is released and removed by immobilizing it with the Counter Holder and unscrewing it.

! NOTE

The Torque Limiter 25 ± 1 Nm must not be used to loosening the Safety Screw -Coated!



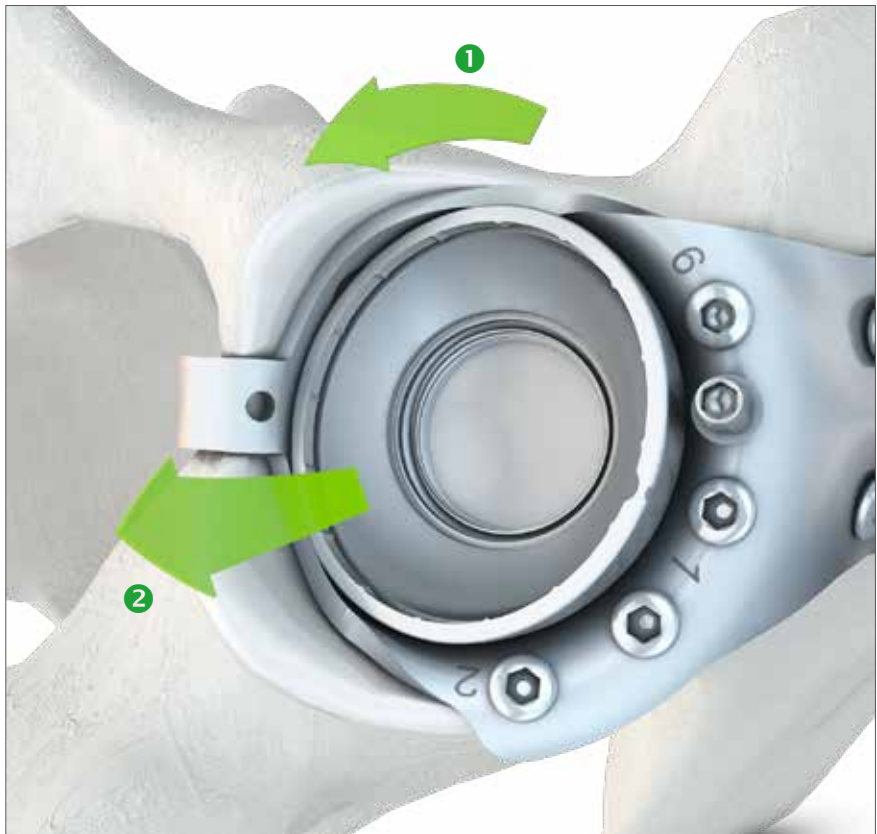
31

The Titanium Acetabular Cup is released from the bayonet connection by turning it by hand gently to the left. (❶). After that the cup can be removed from the shell (❷).

Then the Titanium Acetabular Cup with Circlip is placed, screwed in, and secured as described under item 19 ff.

! NOTE

It is absolutely necessary to replace the Circlip of the Titanium Acetabular Cup when exchanging the insert.



MRS-TITAN Comfort with cemented Polyethylene cup

32



Safety Screw -coated



Sealing -Coated

In addition to completely cementless fixation, the MRS-TITAN Comfort acetabular cup system offers the option of cementing a Vektor-PE Pfanne or Müller-PE-Pfanne from PETER BREHM GmbH into the Titanium Shell -Coated. It does not matter whether the shell is open or closed.

! NOTE

- | Do not use the Sealing -Coated as a safety screw for cementless treatment.
- | Use the Sealing -Coated only for cemented treatment.



The Sealing -Coated seal can be applied in one of four ways if the Titanium Shell -Coated is to be sealed.

- ❶ With the setting instrument, which in this case is fitted with the Sealing -Coated only.

MRS-TITAN Comfort with cemented Polyethylene cup

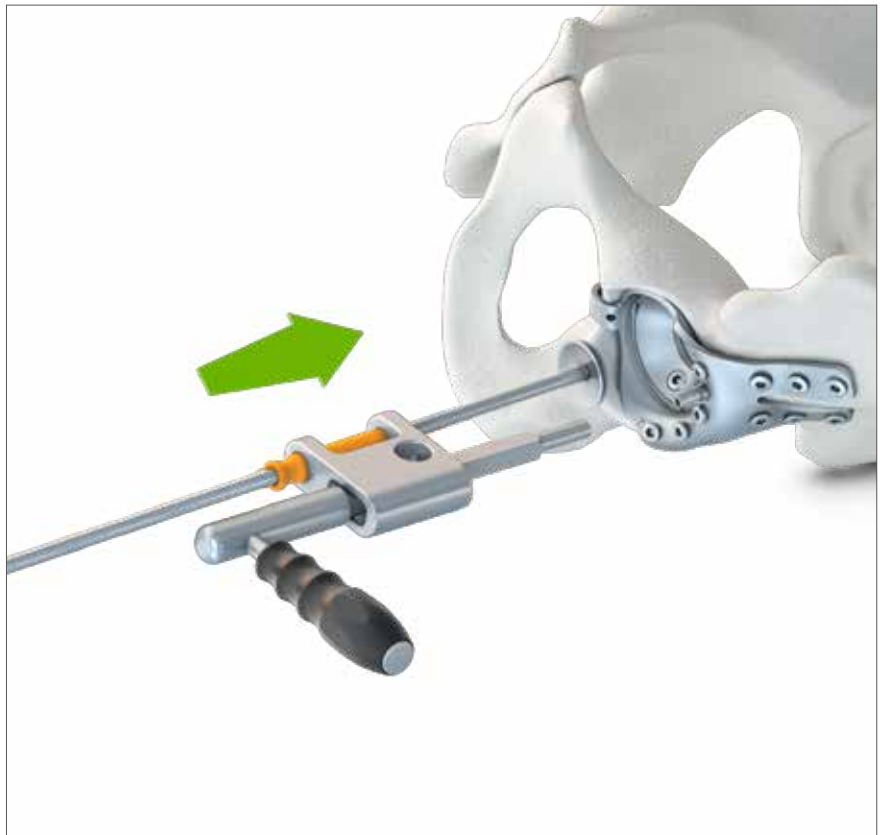
② With the interlock instrument:
As shown here, use the **Guide Insert SW 5** and the Socket Head Wrench SW 5.

③ Alternatively, the *Torque Limiter Inserter 25 Nm* may be used with the *Tommy Bar for Socket Head Wrench SW 6*.

④ The Sealing -Coated can also be inserted by hand.

! NOTE

It is sufficient if the Sealing -Coated is secured hand-tight prior to cementing.



33

Selecting the size of the cemented Polyethylene cup

The *TRIAL Liner / Impactor* can be used to determine the optimum outer diameter for the cemented polyethylene cup.

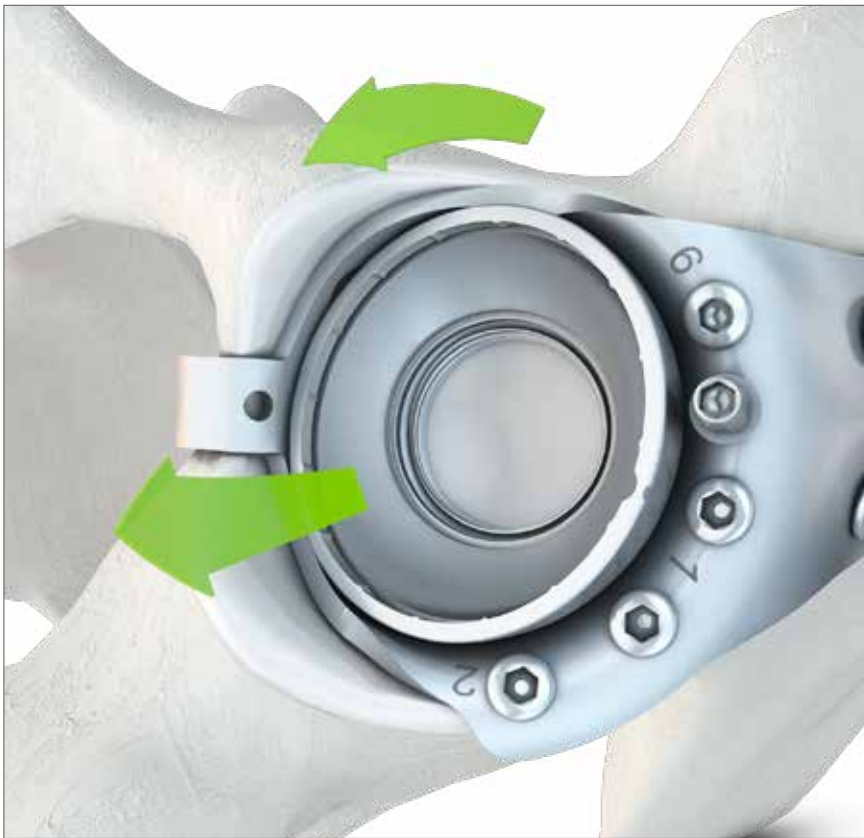
! NOTE

The size of a PE acetabulum requiring cement is calculated as follows:

Diameter of the Titanium Acetabular Cup minus 6 mm (twice the component thickness) minus twice the desired cement mantle thickness.



Removal



34

When the Titanium Shell -Coated is removed, the Titanium Acetabular Cup with Circlip and Safety Screw -Coated must be removed as well. (See items 30 and 31)

Then the screws that secure the Titanium Shell -Coated can be removed.

For explantation, always request instruments from PETER BREHM GmbH!



Notes

This image shows a full page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for writing. There are no margins, text, or other markings on the page.

! NOTE

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