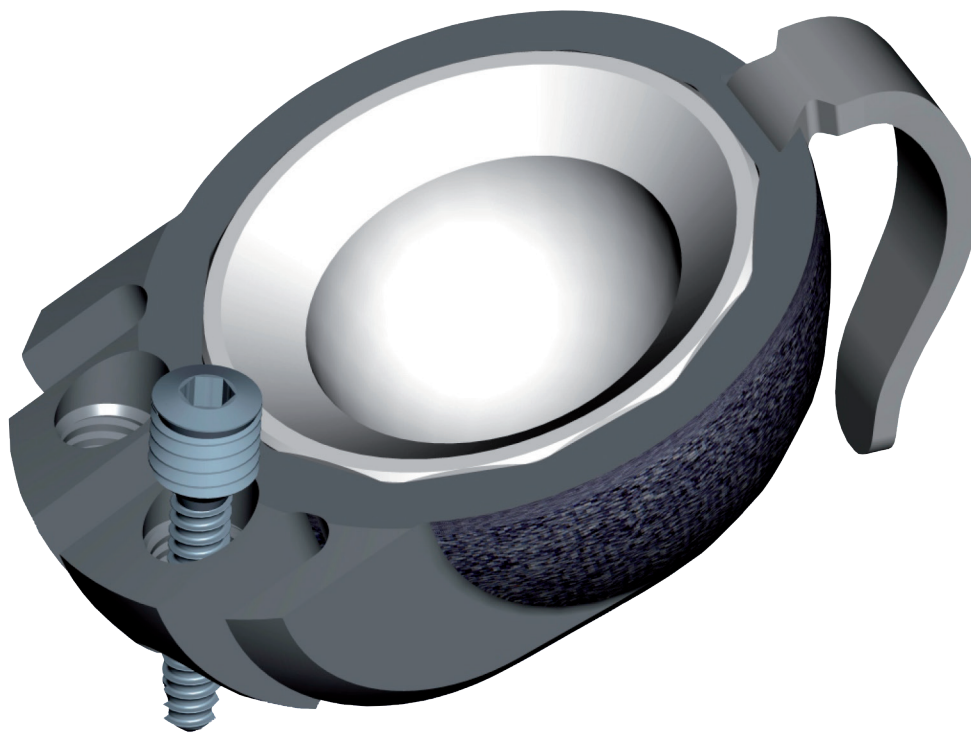




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Surgical Technique **Type TC Oval Cup - NEW TYPE**

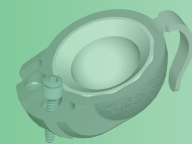


■ Content

■ Introduction	2
■ Range of Sizes	3-4
■ Instruments for Application of Cup	4
■ Surgical Technique	6 - 15

■ Introduction

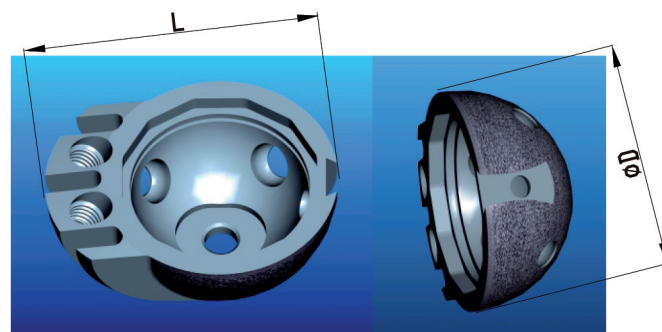
Type TC cups are intended for revision replacement surgery after a previous proximally migrating cup, as well as for primary implantation. This publication is intended as an instruction manual for this particular implant and instrumentarium. It is only intended for the implantation technique for this implant, and assumes that both the surgeon and remaining staff are thoroughly informed about general rules concerning hip replacement surgery. The goal of this publication is to provide doctors and scrub nurses with information for quick orientation and the correct use of individual elements of the instrumentarium, so that an optimal result is achieved, and last, but not least, to avoid unintended damage or breakage of the instrumentarium, or even the implant. Under no circumstances is this to be considered a textbook on surgical technique.



Range of Sizes

Oval TC cups are made of titanium (ISO 5832-3), and come in three sizes in terms of external diameter (D), and in two lengths (L). Oval TC cups consist of a cup and articulation insert type S.F./N or S.F./10, and are implanted without using bone cement. Each cup is supplied with a bottom plug screw and plug screws for cup shell openings, and with a wire security spring that is already inserted into a groove in the shell.

Cups are marked with two marks: one mark (D) indicating the diameter of the distal wider part; and a second mark (L) indicating the length of the cup in its longest diameter. The difference between the marks characterizes „ovality“, which is either 12 or 18. The cup's proximal part has a smaller diameter, and it is therefore necessary to prepare it with a smaller reamer (according to the recommendation - table on page 7).

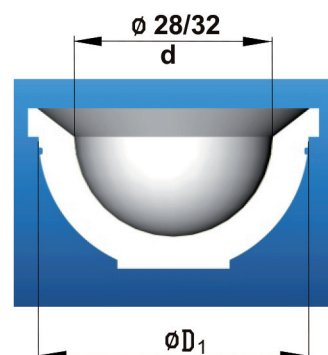


D/L/ [Ovality] (mm)	Reference Number
50/62 [12]	333805
50/68 [18]	333806
56/68 [12]	333815
56/74 [18]	333816
64/76 [12]	333825
64/82 [18]	333826

Combination of Sizes of Cup Shell and Cup Insert

D/L/ [Ovality] (mm)	D ₁ /28 - N, 10 (mm)	D ₁ /32 - N, 10 (mm)
50/62 [12] 50/68 [18]	46/28-N, 46/28 -10	
56/68 [12] 56/74 [18]	52/28-N, 52/28 -10	52/32-N, 52/32 -10
64/76 [12] 64/82 [18]	60/28-N, 60/28 -10	60/32-N, 60/32 -10

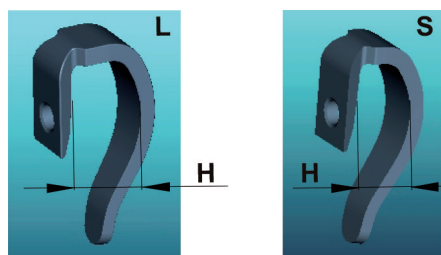
Cup Insert N (Symmetrical)



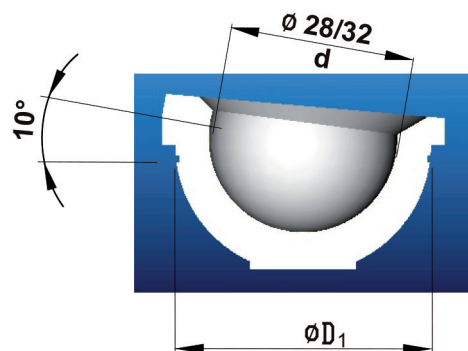
Size of Insert øD ₁ /...	Reference Number
46/28-N	332502
52/28-N	332508
52/32-N	332608
60/28-N	332516
60/32-N	332616

Distal Hook

Distal Hook	H (mm)	Reference Number
typ S	8,5	333840
typ L	10,5	333842



Cup Insert 10° (Asymmetrical)



Size of Insert øD ₁ /...	Reference Number
46/28-10	332532
52/28-10	332538
52/32-10	332638
60/28-10	332546
60/32-10	332646

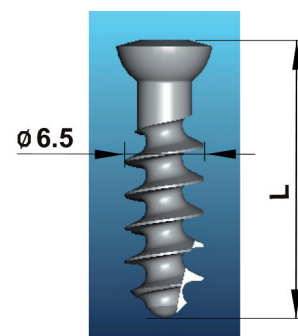
■ Screws (Ti6A14V alloy)

Cortical screws with a low head with a 3.5 mm hexagon are supplied in eight lengths, from 15 to 55 mm. Screws feature a self-tapping tip.

Cancellous screws with a low head with a 3.5 mm hexagon are supplied in six lengths, from 25 to 55 mm. Screws feature a self-tapping tip.

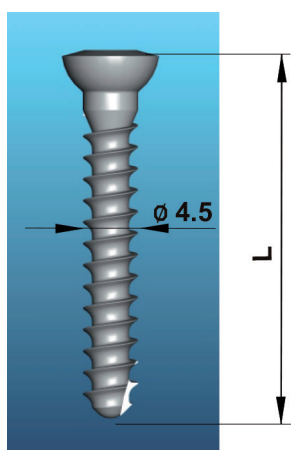
Locking screws with a 3.5 mm hexagon are supplied in six lengths, from 25 to 55 mm. Screws feature a self-tapping tip.

Cancellous Screw



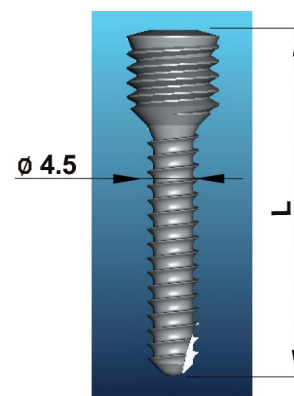
L (mm)	Reference Number
25	331950
30	331952
35	331954
40	331956
45	331958
55	331962

Cortical Screw



L (mm)	Reference Number
15	331906
20	331908
25	331910
30	331912
35	331914
40	331916
45	331918
55	331922

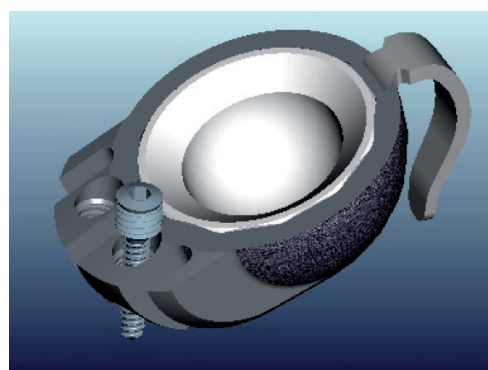
Locking Screw

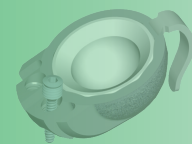


L (mm)	Reference Number
25	331970
30	331972
35	331974
40	331976
45	331978
55	331980

■ Complete TC Cup Set

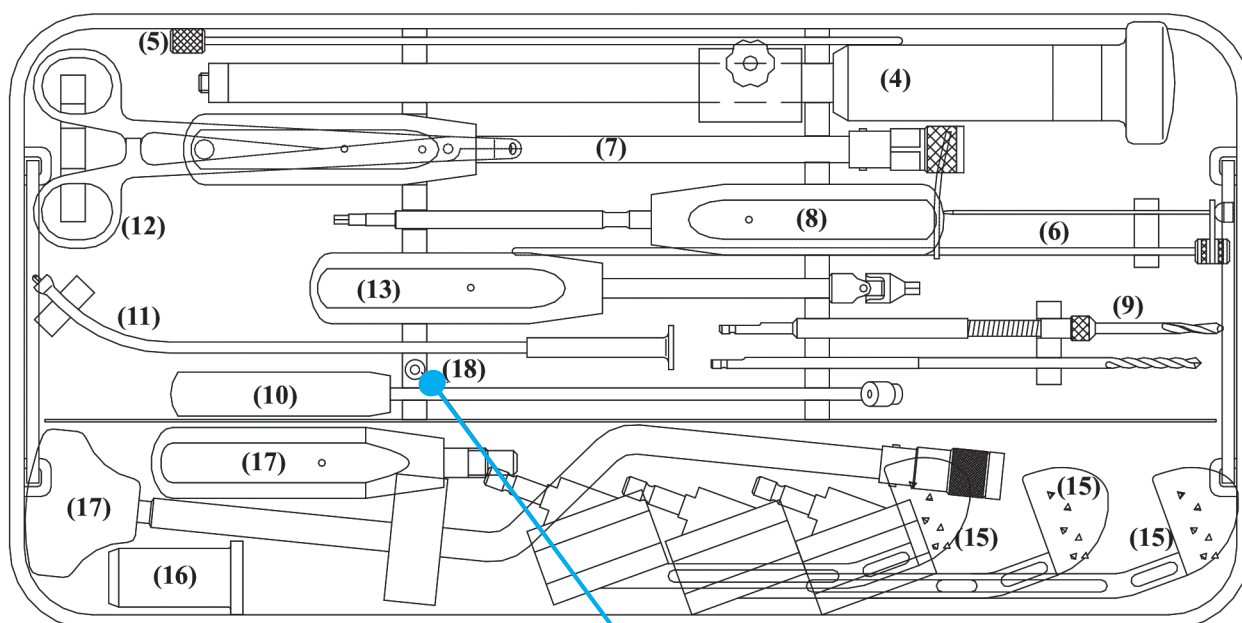
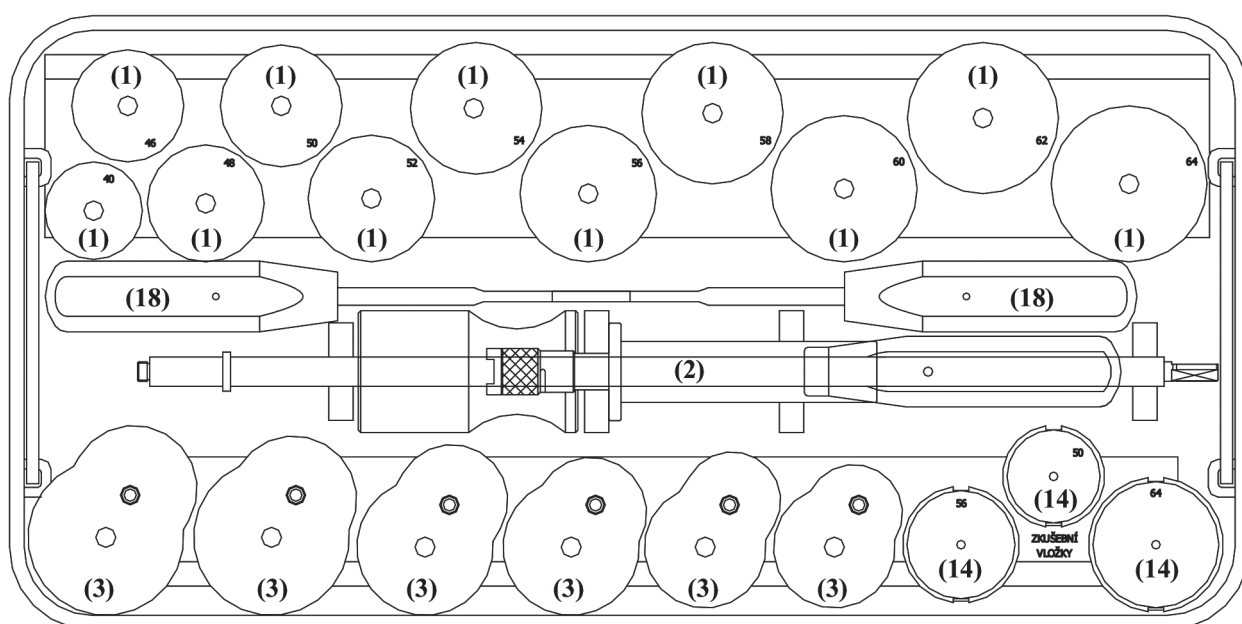
Complete sets for total hip joint replacement consist of the femoral component (stem), head and acetabular component (cup), supplemented with some type of fixation screws, or possibly a distal hook. In TEP sets, it is possible to combine any size of stem and cup, although there must be a head with corresponding parameters according to the manufacturer's instructions, specified in the particular package inserts. Heads must have an external diameter corresponding to the insert's articulation surface diameter (\varnothing 28, 32 mm), and must be equipped with the corresponding cone.





■ Instruments for Application of Oval TC Cup

The instrumentarium is placed on two trays, allowing instruments to be properly arranged and sorted during operations, as well as for their proper preparation, sterilisation and storage. The tray arrangement is shown in the following images.

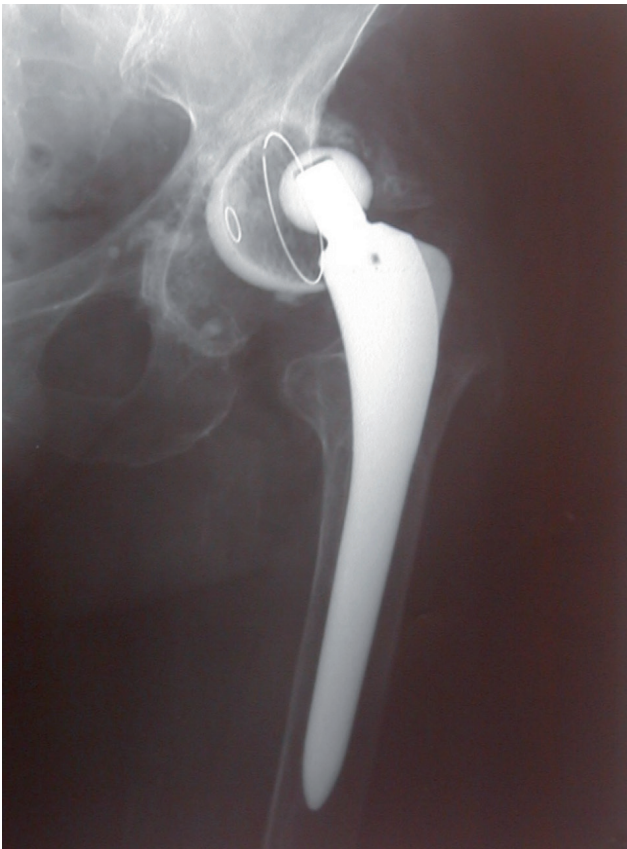


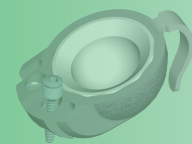
New (18) - Drilling Sleeve 3.2

■ Implant Indications

This implant is intended for implantation into a non-spherical acetabula, mainly due to the extent of the impaired spherical shape according to Paprosky type 2A, 2B, 2C and 3A.

Patients with clear infectious damage to the hip TEP, with a fracture in the area of the acetabulum, or a dissociation of pelvis of Paprosky type 3B are not suitable for this type of oval cup in its current version.





Surgical Technique

General Rules

Surgery using oval TC cups may be performed employing any approach that the surgeon deems appropriate.

Before any surgery using oval cups, it is necessary to conduct pre-op planning, which allows for determining the size of implant. Planning the size of implant is performed using manufacturer-supplied templates. These templates are placed on X-ray images with the same magnification.

The surgical technique and surgical procedure differ according to the chosen approach. It is possible to recommend Bauer's approach; in some cases, we can achieve a good result with a modified Watson-Jones approach.

Since oval TC cups enable the filling of defects in a press-fit manner, it should be remembered to use the correct diameter of reamer for preparing the distal and proximal parts of defects. For better orientation, there is a table showing the correct correlation between the reamers used for acetabulum preparation and introduced implants.

The size of the prepared bed should always be checked during procedures using a template! In some cases (if we want to place cups with a smaller overlap), we can enlarge the size of the prepared bed with the recommended reamer free-hand, or use a reamer with a greater diameter.

1. Preparation of Acetabulum

We remove loose components and thoroughly remove all foreign bodies and remnants of necrotic tissue.

We inspect the extent of the defect and verify the acetabulum edges.

Reamer Diameter		Cup Size	
Distally	Proximally	Size	Ovality
Ø 48	Ø 40	50/62 50/68	12 18
Ø 54	Ø 46	56/68 56/74	12 18
Ø 62	Ø 52	64/76 64/82	12 18

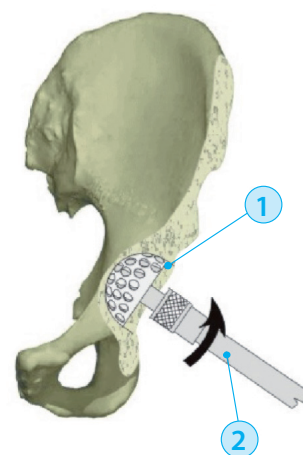


Fig. 1

Using a plastic template **3** placed on a holder for the shaped template **7**, we determine the approximate size of TC cup and corresponding size of reamer (Fig. 2).

The wall and bottom of the acetabulum are gradually adjusted. In the distal area of the defect, a rotation reamer **1** is used, connected to an extension **2** up to 2 mm smaller than the cup's distal diameter (Fig. 1). Based on the evaluation using the plastic template **3**, the reamer indicated in the table is used for preparing the superior acetabulum. A size 40 reamer is used for a size 50 implant, a size 46 reamer for a size 56 implant, and a size 52 reamer for a size 64 implant!

In most cases, revitalization of the bone itself is sufficient, because the shapes of implants fill most defects well. If it is necessary to prepare the bed accurately, we use a reamer guide **2**. Remember that the goal is to create beds according to the actual shape of such TC cups, so that wedge-shaped ribs on the edges can be cut to the bone, and implants should also be inserted into the bone bed with a mild overlap (PRESS FIT) (Fig. 3).

Note:

The size of the prepared bed can always be checked during procedures using a template! Using the template opening, it is also possible to check correct fitting to the bottom of the acetabulum (Fig. 2). In some cases (if we want to place cups with a smaller overlap), we can deepen the prepared bed with a recommended reamer free-hand, or use a reamer with a greater diameter.

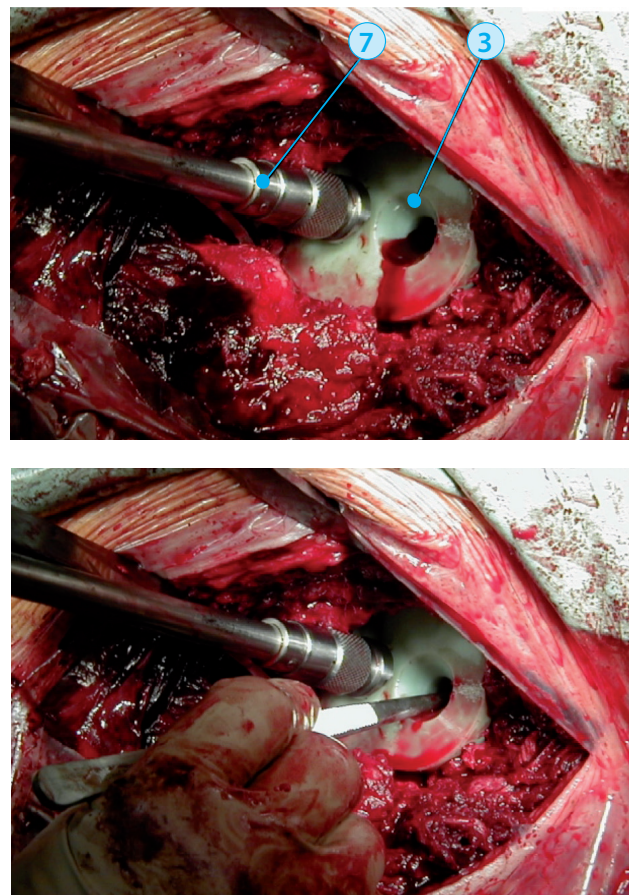


Fig. 2

Shape of Bone Bed

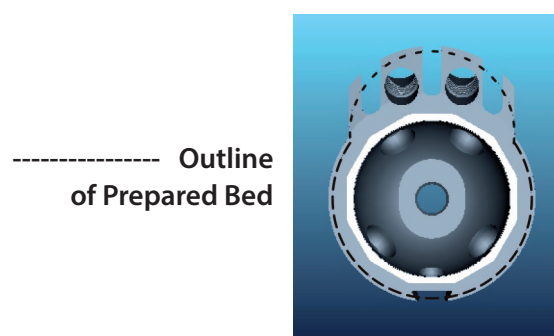
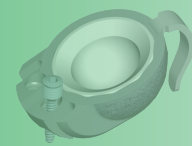


Fig. 3



2. Adjustment of Longitudinal Diameter of Acetabulum Using Reamer Guide

The plastic handle is removed from the grating reamer ② extension, and a plastic shell of a guide ⑬ slides over it so that its collar is directed towards the clamping end (Fig. 4). A grating reamer ① with corresponding transverse diameter to the TC cup ribs is clamped to the extension, i.e. a size 40 reamer is used for a size 50 cup, a size 46 reamer for a size 56 cup, and a size 52 reamer for a size 64 cup!

A reamer guide ⑮ with corresponding size (marking on Fig. 5a) is placed on a reamer guide holder with a handle ⑰ using a fast clamp, so that the arrow on the positioning device is directed towards the arrow on the cube (Fig. 5).

Screw the handle on the reamer guide holder ⑰ as required by the surgeon. The handle is tightened by turning the Gatex holder.

A reamer guide is placed on the reamed distal acetabulum, and an extension ② with a grating reamer and reamer guide ⑮ is inserted into the cube guide ⑮ through a cut in the cube (Fig. 5, 6 and 7).

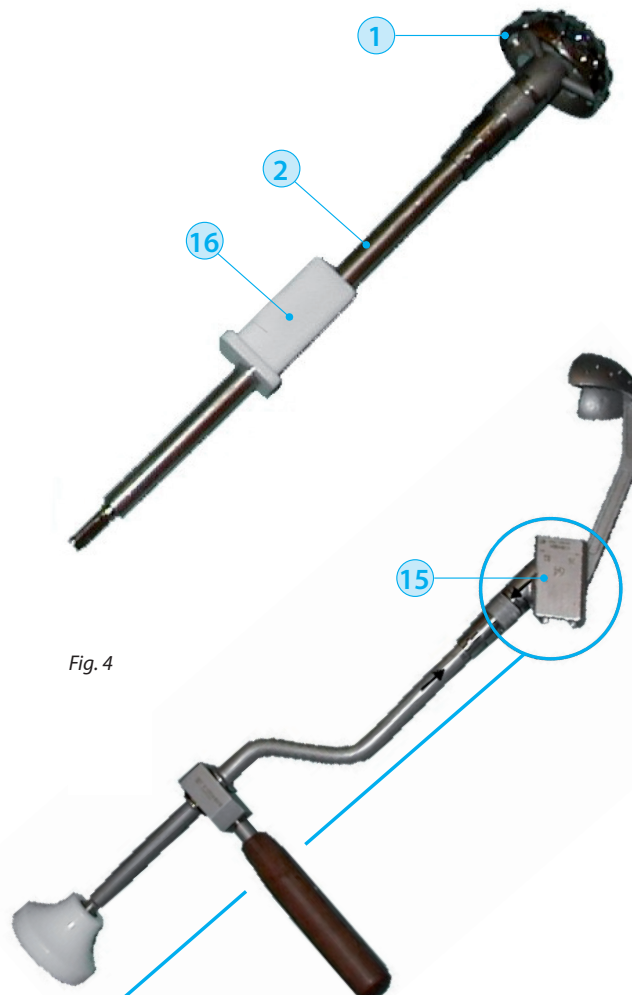


Fig. 4

Cupsizes	Reamer Diameter Proximally
50 (40)	
62	
68	

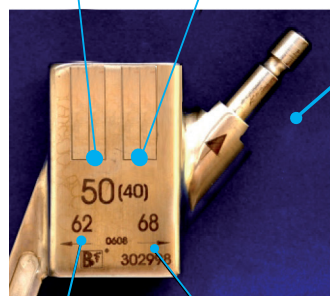


Fig. 5a

Cup 50/62 Ovality 12	Cup 50/68 Ovality 18
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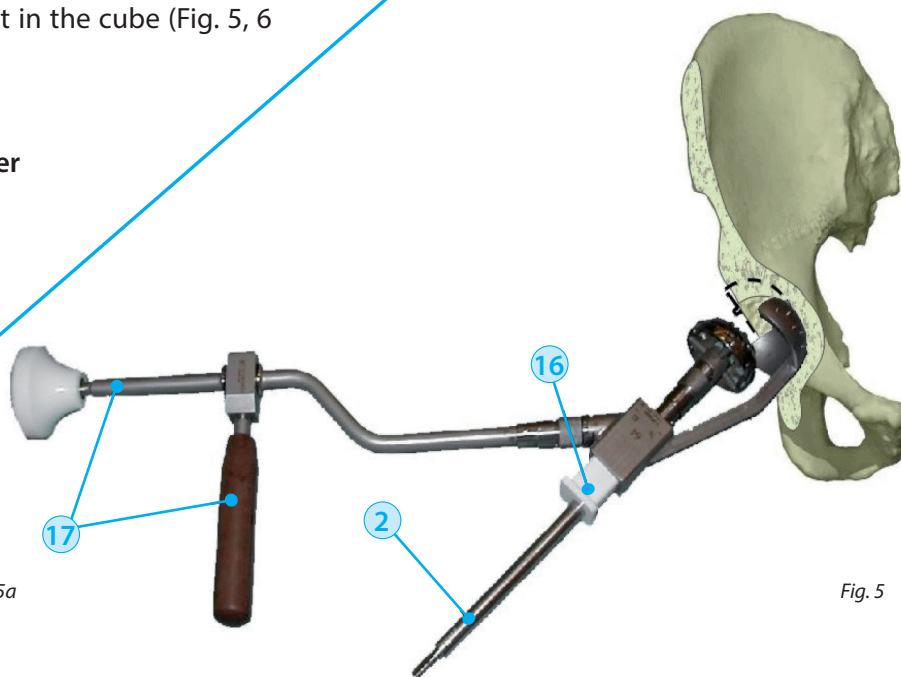


Fig. 5

A sleeve is inserted into the cube (16). The sleeve determines the correct longitudinal diameter of the TC cup. For a shorter longitudinal diameter TC cup (ovality 12), a sleeve (16) is inserted into the cube so that the extension (2) with the reamer is closer to the guide arm (15). For a longer longitudinal diameter TC cup (ovality 18), the sleeve (16) is turned 180° (Fig. 8). The correct position may be checked using the description on the reamer guide cube (15).

Caution:

The depth of reaming should be checked while reaming. In case of a greater depth of reaming than the reamed distal acetabulum that is intended as an area for guide support, there may occur contact between the reamer and the guide's supporting hemisphere! The guide enables under-reaming of approx. 5 mm. We can adjust the bone bed's lateral shape using a spoon.



Fig. 6

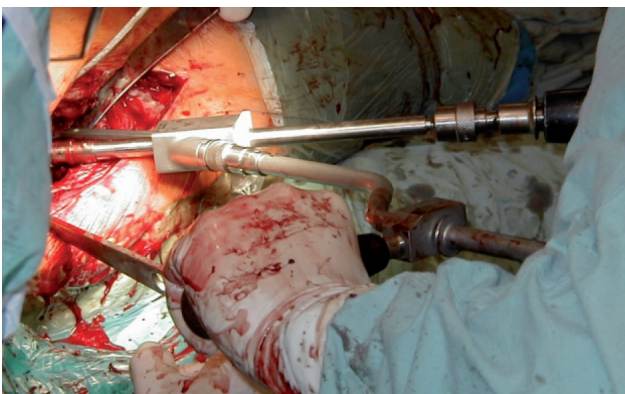


Fig. 7

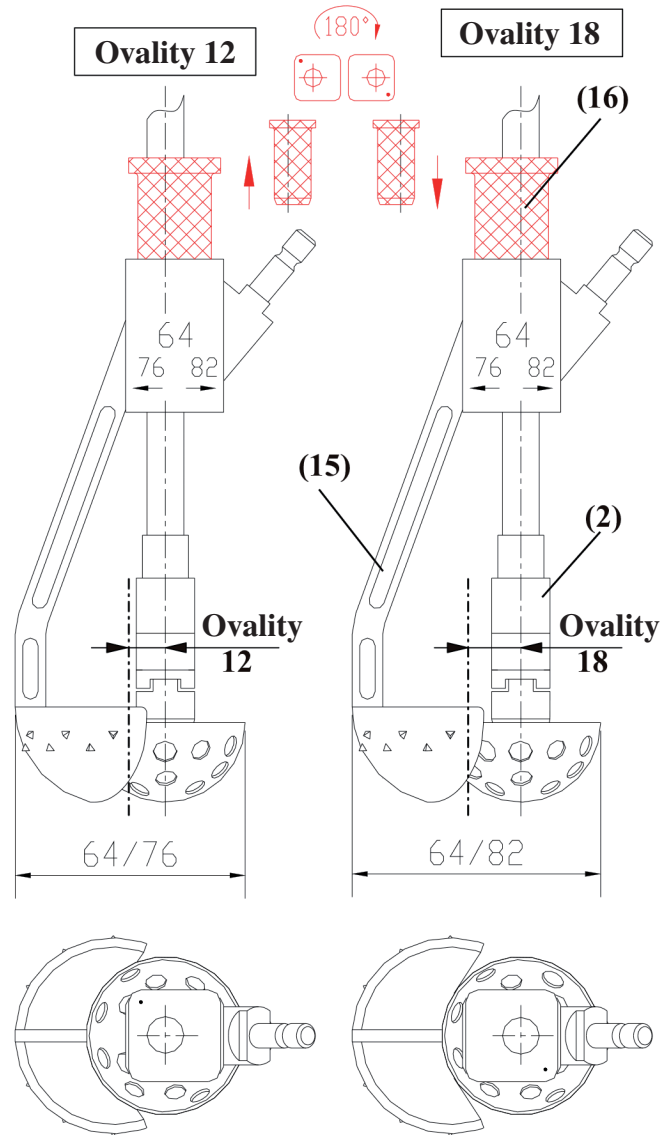
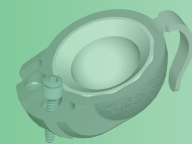


Fig. 8



3. Introduction of Cup Shell

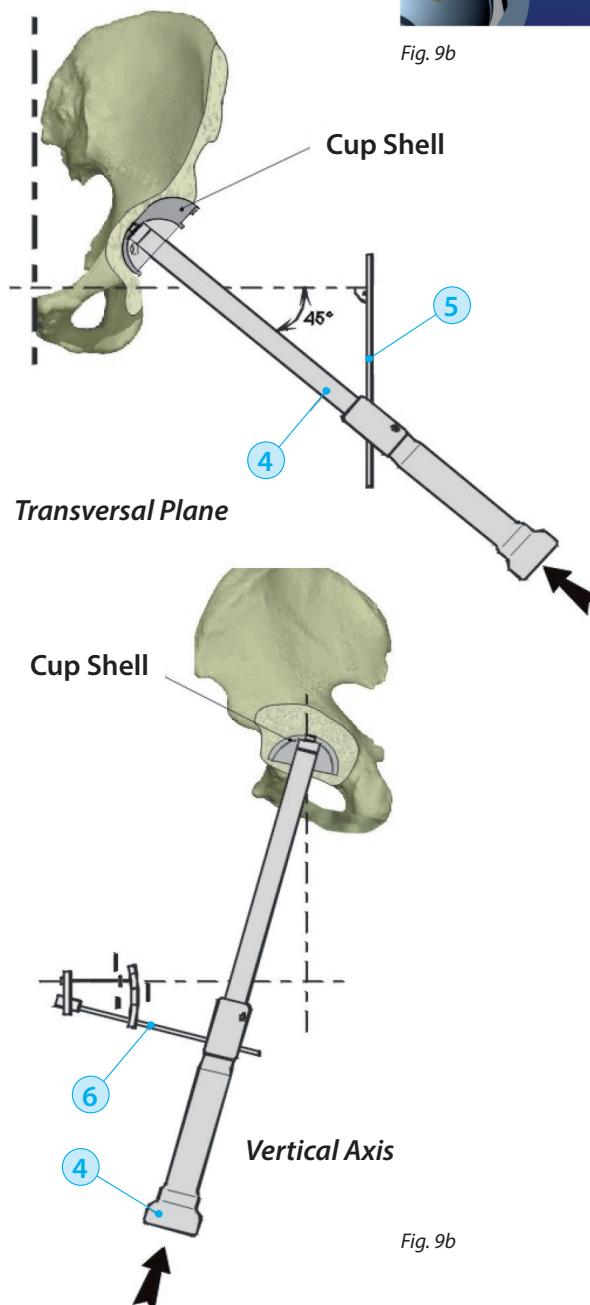
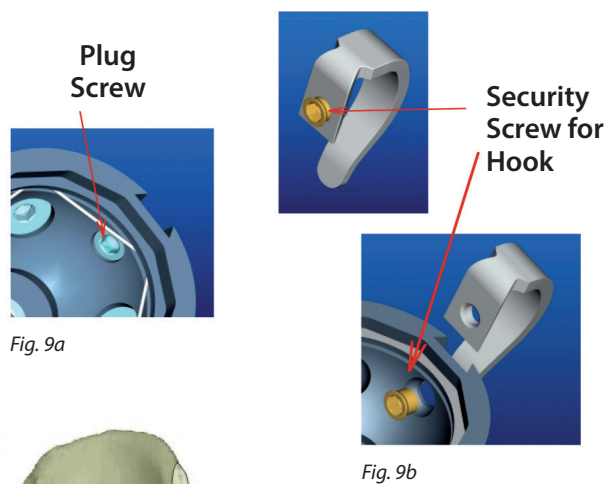
We prepare the assembly for introduction of the actual TC cup (Fig. 9a, b, c). The cup shell may be supplemented with a size S or L distal hook. If we so decide, we screw out the plug screw with an articulated screwdriver from the cup shell from the hook connection site, and a hook is introduced to the shell's exterior in the distal hook groove. The hook position is secured with a security screw using an articulated screwdriver. The security screw is supplied together with the hook.

To secure the hook, it is not possible to use a plug screw; it has a smaller thread.

The TC cup shell is introduced with an introducer **4**. The cup shell introducer may feature a horizontal **5** and vertical **6** positioning arm with a protractor.

Connection of the template shell with the introducer is enabled by placing the introducer stem's oval end to a corresponding depth at the bottom of the shell. A solid connection between template and introducer is achieved by screwing the introducer screwdriver into a threaded hole in the template shell. To tighten the connecting screw, the head of which has an internal hexagon and is located in the handle, a 5 mm hexagonal screwdriver is intended. The screwdriver is introduced through an opening on the handle's bumper in the direction of the arrow.

Before cup introduction, the operating table must be in a horizontal position. The cup axis on the transversal plane must be 45° from the sagittal plane. This axis is determined using a horizontal positioning arm, which must be parallel to the operating table and thereby also parallel with the patient axis. The second auxiliary arm is introduced vertically into the introducer. At its end is a simple protractor with a pendulum. This protractor shows the extent of the



cup's ante-version with respect to the sagittal plane. We recommend choosing a cup ante-version of 10 to 15°.

Before shell introduction, the bottom of the acetabulum is filled with bone grafts (the implant has a flat bottom).

The TC cup shell is introduced to the prepared acetabulum; we determine the required position using the arms, and the cup shell is anchored using hammer blows on the introducer's bumper. The shell must be held firmly during introduction in a particular position (Fig. 10).

Note:

Before cup shell introduction to the prepared acetabulum, the spaces between the shell's ribs may be filled with bone grafts (Fig. 11). It should be noted that with the aforementioned procedure of shell introduction, some grafts may jump away.

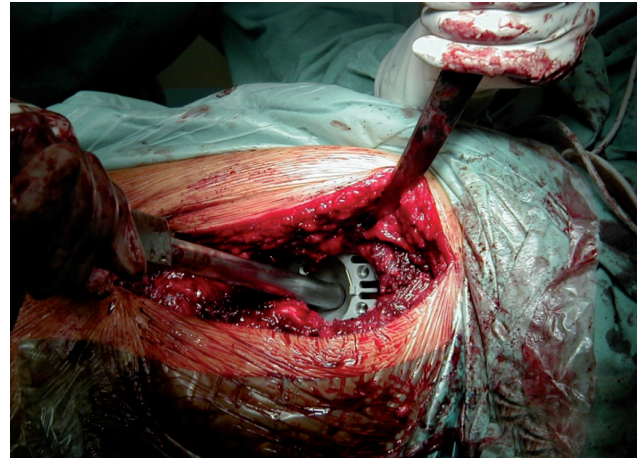


Fig. 10

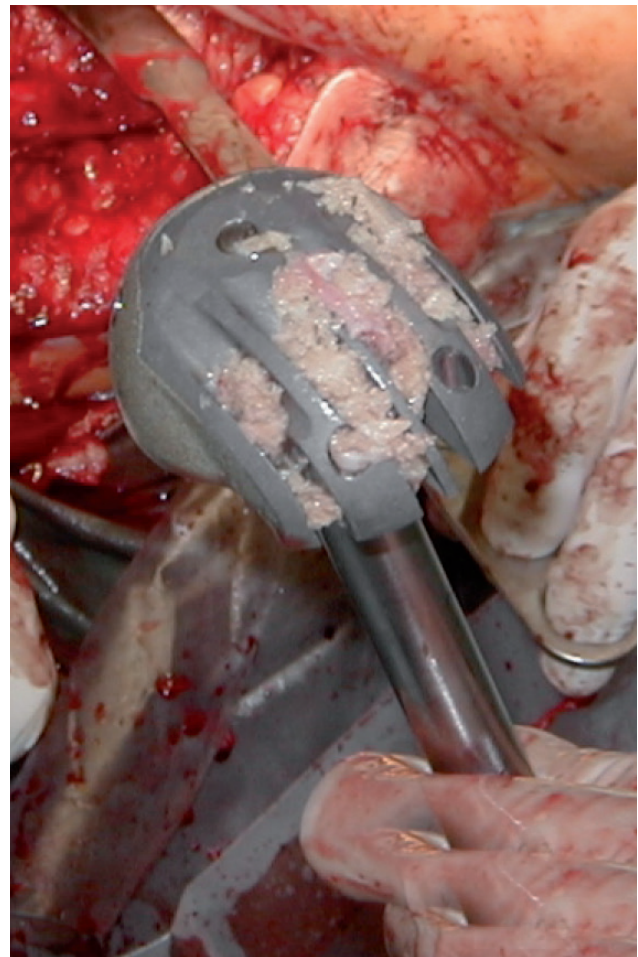
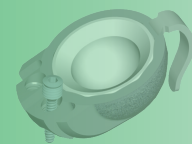


Fig. 11



4. Auxiliary Fixation Using Screws

The TC cup shell enables fixation of the implant using self-tapping, locking or cancellous titanium screws. Screws may be introduced to all three bones that comprise the acetabulum using openings in the ribs (cortical, locking and cancellous screws), and also using four openings inside the shell (cortical and cancellous screws). These four openings feature a plug, which may be released with an articulated **13** or straight **11** screwdriver.

For openings in the ribs, cortical and cancellous screws may be used in place of locking screws.

Holes for the screws are drilled using a drill with a diameter of 3.2 or 4 mm (according to bone tissue quality) with a flexible extension **9**. The depth of holes is measured with a depth gauge **11**. In this case, the drill must be protected with a drilling sleeve **10** (Fig. 12). Sometimes, it is also possible to use a direct drill.

For locking screws, we drill through a new drilling sleeve using a drill of 3.2 mm. The drilling sleeve **18** is screwed into a threaded opening in the ribs using a screwdriver. Fig. 13a.

In the first instance, it is suitable to fix the cup shell with locking screws, if so indicated (Fig. 13b).

When introducing cortical or cancellous screws, the screw is clamped to holding forceps **12** and is screwed in using an articulated screwdriver **13**. It is necessary to keep the fixation stable, and the TC cup must fit the bone and grafts exactly (Fig. 13c).

The screws are fully tightened only after all fixation screws are introduced. It is necessary to tighten these screws well, because protruding heads of loose screws would prevent correct fitting of the

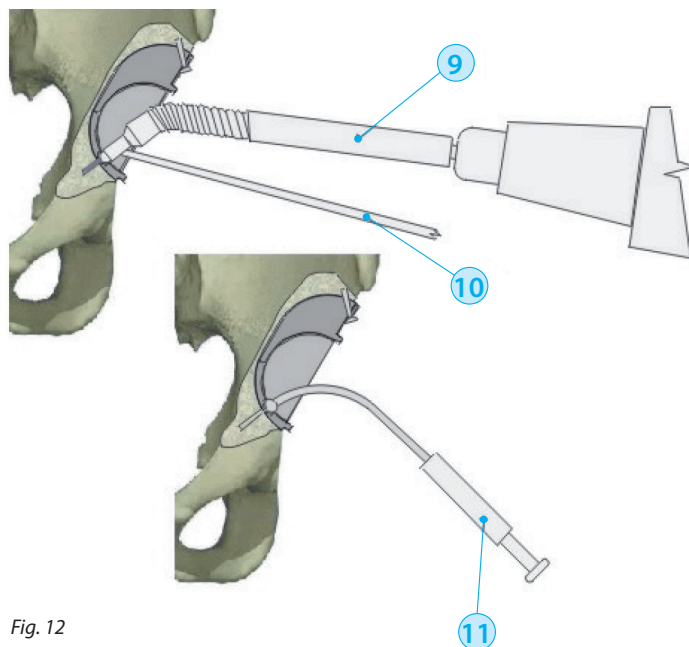


Fig. 12

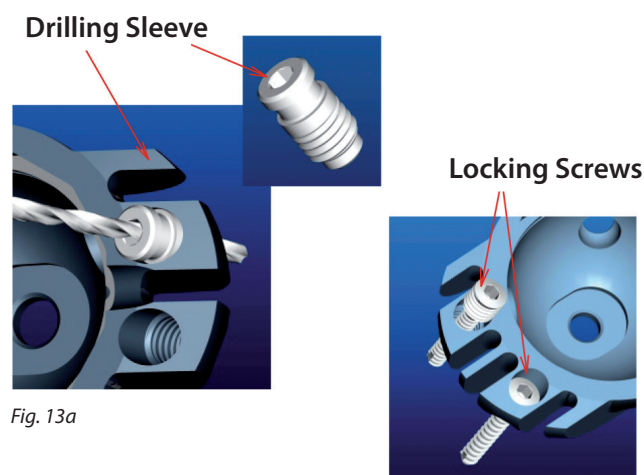


Fig. 13a

Fig. 13b

articulation insert from being achieved, and the wire security spring from being secured.

We always recommend using screws for additional fixation.

Check correct shell positioning and close the shell's introducer opening with the prepared metal plug. Make sure that the plug does not protrude into the shell's interior. If this requirement is not fulfilled, it is not possible to introduce the articulation insert (Fig. 14).

5. Use of Bone Plasty

Using a graft pusher **18**, it is possible to push cancellous bone grafts between the ribs. Finally, we check correct cup positioning.

Note:

Filling the space between the ribs may only be performed after insertion of the articulation insert.

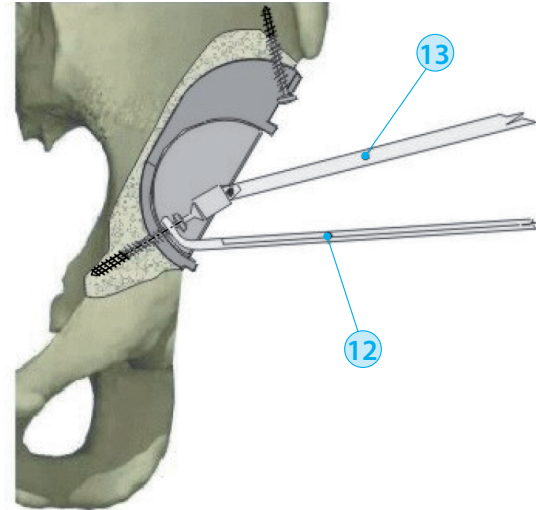


Fig. 13c

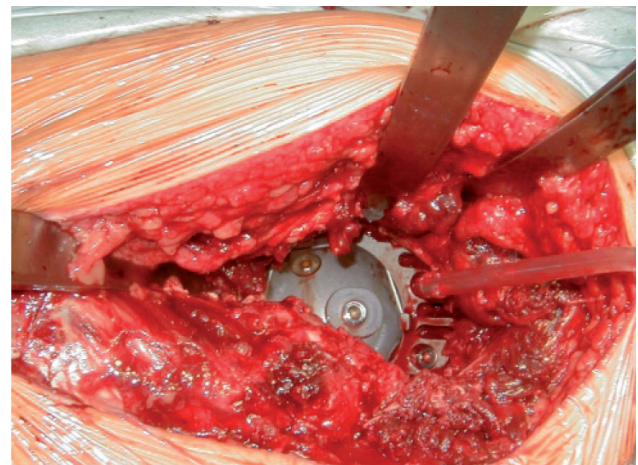


Fig. 14

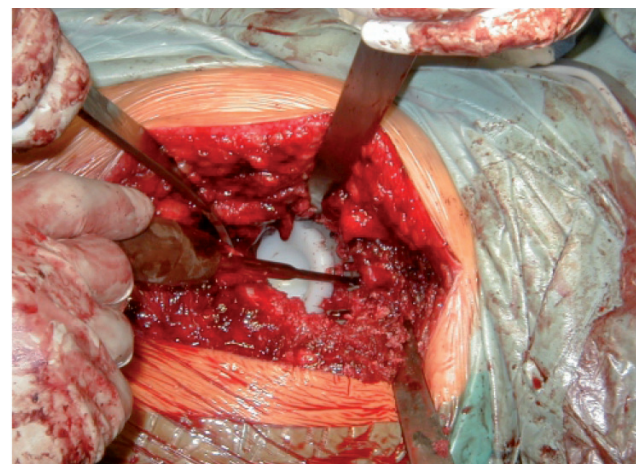
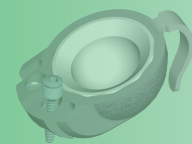


Fig. 15



6. Trial Articulation

A trial insert ⑭ intended for trial articulation is inserted into the shell. The insert need not be secured in the shell, as it holds by means of the elasticity of the spring in the TC cup shell (Figure 16).

7. Insertion of Articulation Insert

Before final insertion of the articulation insert, the cleanness of the shell's internal surface is checked to ensure proper fitting of the insert, and thereby also correct functioning of the wire security spring.

The correct placement of the spring into the articulation insert's groove is accompanied by a „click“.

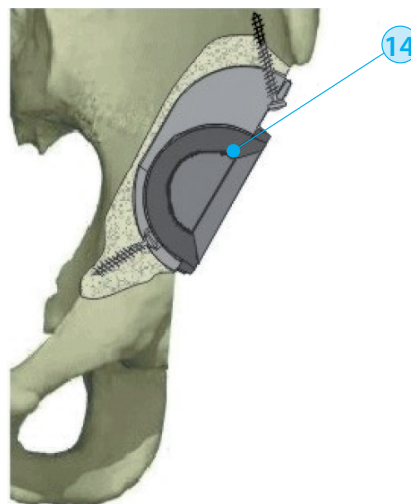
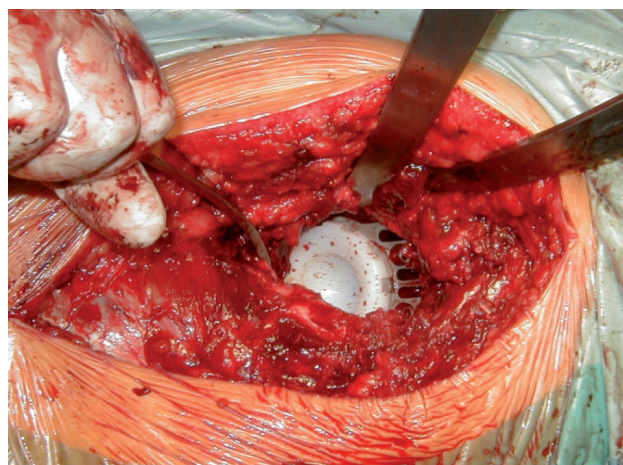


Fig. 16






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