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EXCEED
Advanced Bearing Technologies

Exceed ABT™
Operative Technique

BIOMET®

The Exceed ABT™ acetabular system and subsequent operative technique was developed in conjunction with Mr E J Smith BSc MB BCh FRCS at the Avon Orthopaedic Centre, Bristol, UK.

Disclaimer

Biomet UK Ltd, as the manufacturer of this device, does not practice medicine and does not recommend any particular surgical technique for use on a specific patient. The surgeon who performs any implant procedure is responsible for determining and utilising the appropriate techniques for implanting the prosthesis in each particular patient. Biomet UK Ltd is not responsible for selection of the appropriate surgical technique to be utilised for an individual patient.

Exceed ABT™ Acetabular System

Exceed ABT™ Acetabular System

The Exceed ABT™ acetabular system comprises of fully instrumented acetabular components designed specifically for cementless application. Each acetabular component comprises of a titanium alloy shell and acetabular bearing. Bearings for the Exceed ABT™ acetabular system are available manufactured from highly cross-linked polyethylene (E-Poly), Biolox *delta*® ceramic (C^2a-Delta™) and CoCrMo (M^2a™) in articulation diameters of 22.22mm, 28mm, 32mm and 36mm. Fixation of the Exceed ABT™ shell into the acetabulum is achieved by using Biomet's patented Closed Pore Porous Plasma Spray Coating process. Hydroxyapatite combined with Closed Pore Porous Plasma Spray components is also available providing the additional benefit of accelerated and more even bone in-growth.

For details of the complete product range including instrumentation, please refer to pages 18-20 of this document.

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1. Pre-operative Planning

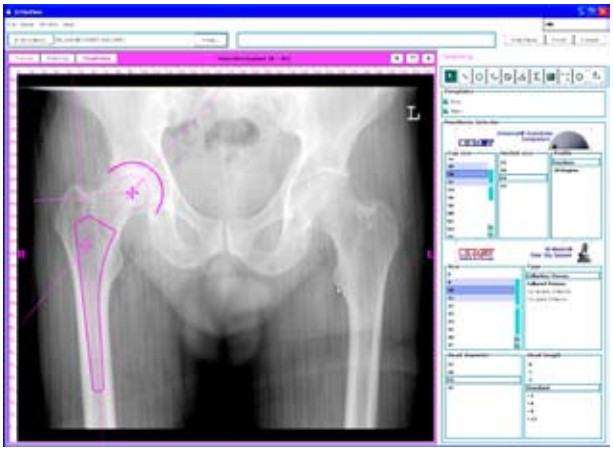
Selection of the correct acetabular component is attained through careful pre-operative planning. This can be achieved manually by means of x-ray templates, or digitally by means of a Picture Archiving and Communication System. (PACS)

1a. Manual Pre-operative Planning

The Exceed ABT™ acetabular system provides a comprehensive selection of acetabular x-ray templates in 100% and 115% magnification.

These templates are positioned over the AP x-rays to best decide the correct implant size, centre of rotation, and whether standard, high wall or angled shells or bearing are required to restore the patient's natural anatomy.

1b. Digital Pre-operative Planning

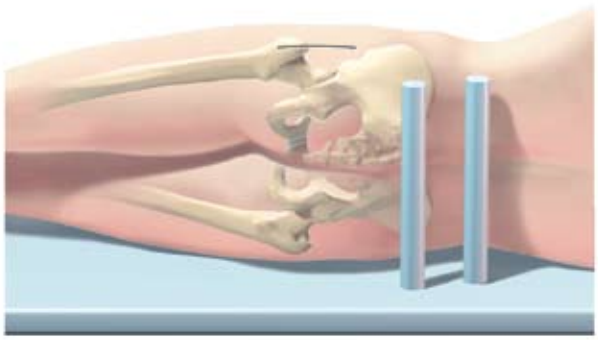


The Exceed ABT™ acetabular system digital templates are available through various digital template providers. When using digital templating for a primary THR, it is necessary to use a magnification marker with a known dimension. This is required in order for the system to calculate the correct magnification.

As soon as the correct magnification has been determined, the system can be used to best decide the correct implant size, centre or rotation and whether standard, high wall inserts or angled shells are required to restore the patient's natural anatomy.

2. Surgical Exposure

The Exceed ABT™ system can be implanted using any of the standard approaches for total hip replacement. The aim of the approach selected is to provide adequate visualization of both the acetabulum and proximal femur.



3. Preparation of the Acetabulum

It is important to remove all articular cartilage and any soft tissue protruding into the acetabulum. In order to seat the acetabular component, some loss of subcondral bone may be inevitable.

However, it is important to note, that subcondral bone, particularly peripheral bone, should be preserved.

Acetabular preparation is undertaken using the grater reamers supplied. The axis of the grater reamer should be positioned at 40 to 45 degrees from the vertical axis, and in 10 to 15 degrees of anteversion. (Figure 1) Begin reaming with the smallest available grater reamer, increasing the diameter of each sequential grater reamer until the required diameter is achieved. As the shell is hemispherical, it is recommended to under ream the bone by 1 - 2mm depending on bone quality.

E.g. 54mm diameter Exceed ABT™ acetabular shell requires ream diameter of 52/53mm.

Note. If acetabular osteotomes are used, final shaping must still be achieved using the hemispherical grater reamer to ensure a congruent fit between the shell and the floor of the acetabulum.

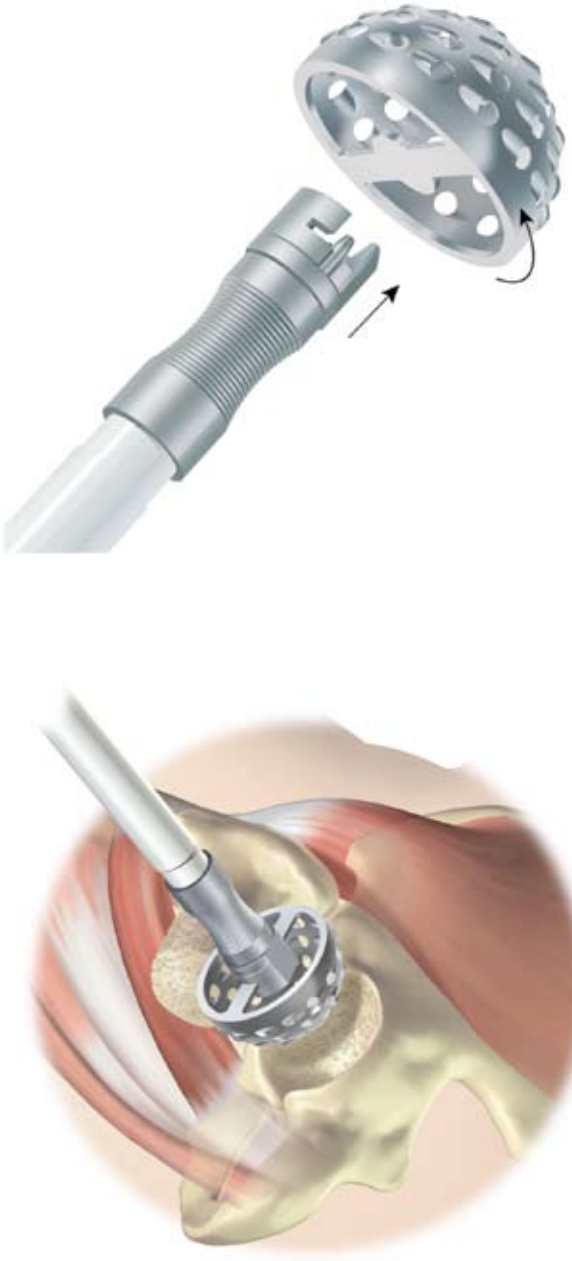


fig 1

4. Gauging the Acetabulum

Thoroughly clean and dry the acetabulum ensuring that any overhanging soft tissue has been excised. Insert the trial cup / gauge into the reamed acetabulum (Figure 2). The diameter should correspond to the diameter of the implant to be used. These trial cups / gauges are used to, a) check the stability of the final implant diameter prior to insertion, and b) to ensure the acetabulum is hemispherical. Should the trial shell / gauge be unstable, or if there are gaps between the trial cup / gauge and the acetabulum, it may be necessary to increase the diameter of the final grater reamer. However, in some instances it may not be possible to increase the reamed diameter. If this is indeed the case, then supplementary screw fixation will be necessary. Please refer to step 7 for method of supplementary screw fixation.

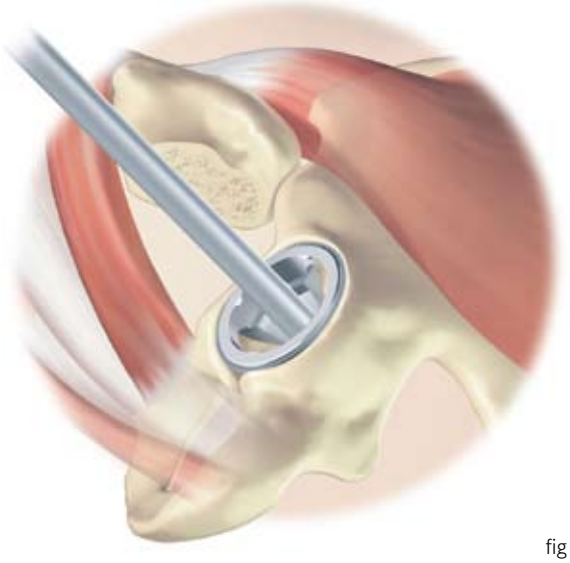


fig 2

5. Preliminary Trial Reduction (without implants)

The preliminary trial reduction of the hip joint can only be carried out once the acetabulum and femur have been fully prepared in accordance with relevant surgical technique. With the trial shell / gauge firmly located within the acetabulum, a preliminary trial reduction can be completed in order to assess the stability of the joint and to revalidate the component type and size selected at the pre-operative planning stage (Figures 3 & 4).

fig 3

fig 4

5a. Trial Reduction with Trial C²a™ or M²a™ Bearing

The Standard Exceed ABT™ acetabular shell should be used where adequate femoral head coverage and joint stability is achieved with the component at 40–45 degrees of inclination (Figure 5). The 15-degree Exceed ABT™ acetabular shell should be used to improve femoral head coverage and stability should the standard shell not suffice. Each 15-degree component is identified with the word 'cranial' located superiorly on the lip of the 15-degree feature and highlights the segment of the shell that should be positioned approximately 45 degrees superior/posterior within the acetabulum. It is also important to seat the inferior lip of the component within the rim of the acetabulum (Figure 6). Failure to follow these instructions may result in impingement between the neck of the femoral component and the 15-degree feature or the inferior rim of the component. With the trial shell / gauge in place, select the correct diameter trial acetabular insert (28, 32 or 36) to match the diameter of the shell. By selecting the appropriately sized trial bearing, the head diameter is automatically selected (See table 1 on page 10). This trial bearing is then placed into the trial shell by hand and then locked with a 3.5mm hex-driver. A trial reduction can then take place as long as the femur contains the relevant components and trial head.

NOTE: The taper fit trial liners should only be used in-conjunction with the shell gauges and not with the definitive shell.

fig 5

fig 6

5b. Trial Reduction with Trial E-Poly Bearing

Standard E-Poly bearings should be used where adequate femoral head coverage and joint stability is achieved. The Hi-wall components provide additional head coverage and security against dislocation and are positioned with the Hi-wall segment of the liner aligned approximately 45 degrees superior/posterior within the acetabulum. The 10-degree component is used to change the inclination or anteversion of the bearing surface. See table 1. (Figure 7)

Table 1. Exceed ABT ™ Acetabular Shell System.

Bearing Material	Shell Diameter (mm)															
	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70
C^2a^{TM} & M^2a^{TM}	–			28		32		36								
E-Poly	22.22															

A trial reduction utilising the trial E-Poly liners can only be performed with the definitive acetabular RingLoc-X component in-situ.

Should you wish to perform a trial reduction with the definitve acetabular shell, utilising the correct sized trial liner, care should be taken to correctly align the trial liner with the Acetabular cup. Mal-alignment of the trial liner can lead to 'jamming' of the trial liner within the acetabular shell resulting in the trial liner being difficult to extract.

fig 7

6. Insertion of Acetabular Shell

Upon correct sizing, attach the appropriate Exceed ABT™ shell directly to the inserter handle as shown. (Figure 8) For correct placement and orientation of the shell, the dome hole cluster should be positioned in the superior / posterior quadrant, with the cup impacted at 40 to 45 degrees of inclination from the horizontal axis of the pelvis and with 20 to 25 degrees anteversion. For a more accurate placement an angle guide device is available. (See figure 9 & 10)

IMPORTANT: The position of the shell is crucial in the use of the ceramic-on-ceramic and metal on metal articulation to reduce the risk of impingement.

Check via the apical hole to determine whether the shell is in full contact with the floor of the acetabulum. If not, the impactor handle must be re-attached to the shell and further impaction is required until the shell is fully seated. Failure to fully seat the shell into the acetabulum may compromise the quality of fixation.

When utilising the curved shell impaction handle, to facilitate tightening or loosening of the thumb wheel, it may be necessary to utilise the 3.5mm hexagon screwdriver contained within the Exceed ABT general instrument tray.

Once the Exceed ABT™ shell is fully seated, the apical hole is closed by means of the apical screw. The apical screw is secured into position by means of the 3.5mm hex-driver (Figure 11).

The Exceed acetabular shell is supplied as a solid shell with the option of removing titanium-blanking plugs intra-operatively should supplementary screw fixation be necessary.

fig 8

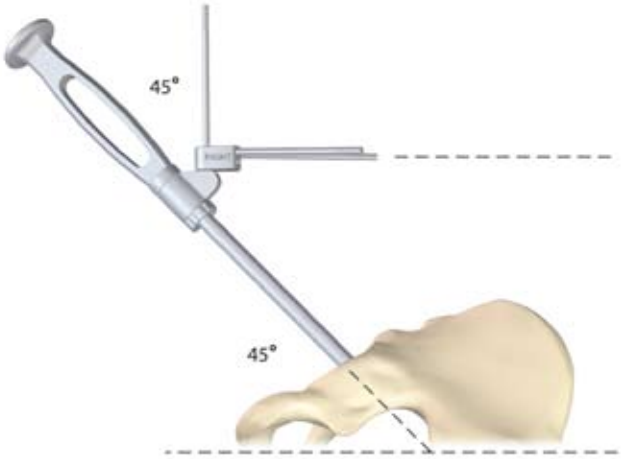


fig 9

fig 10

fig 11

7. Supplementary Screw Fixation

For primary cases where good bone stock is present and the shell is firmly seated within the acetabulum, the use of fixation screws is generally unnecessary. However, in cases where motion can be detected between the shell and the acetabulum, or whether the bone quality is not optimal, supplementary screw fixation is advised. When dome screws are utilized they should be placed posterosuperiorly into the thick part of the ilium (Figure 12). Screw placement must be chosen carefully to avoid injury to neurovascular structures. Care should also be exercised when supplementary screw fixation is required to avoid damaging or scratching the internal surfaces of the Exceed ABT acetabular components. Should screw fixation be necessary, the blanking screws are removed by means of a 3.5mm hex-driver. (Figure 13)

NOTE: Screws should never be placed in the anteromedial area of the acetabulum.

fig 12

fig13

7a. Exceed ABT Multi-hole / Revison shell

In cases where extreme motion can be detected between the shell and the acetabulum, where the bone quality is not optimal or a revision shell is required multi screw fixation is advised. Screw placement must be chosen carefully to avoid injury to neurovascular structures. Care should also be exercised when supplementary screw fixation is required to avoid damaging or scratching the internal surfaces of the Exceed ABT acetabular components.

NOTE: Blanking plugs screws are not provided as standard in the Exceed ABT multi-hole shell but all holes should be filled before inserting the bearing liner.

7c. Screw hole preperation

Prepare the screw holes utilizing the quick connect drill bits, the drill guide and the flexible drill bit shaft. (Figure 14) When drilling into the posterior/superior quadrant, place a finger posteriorly into the sciatic notch to ensure the screw cannot penetrate too deeply. Measure the length of the drill holes with the flexible depth gauge. (Figure 15) Insert the low profile dome screws using the forceps and universal joint screwdriver (Figure 16).

NOTE: To avoid impingement of the acetabular insert, check that all screw heads are seated below the inner surface of the shell. Only use Biomet 6.5mm low profile dome screws.

fig 14

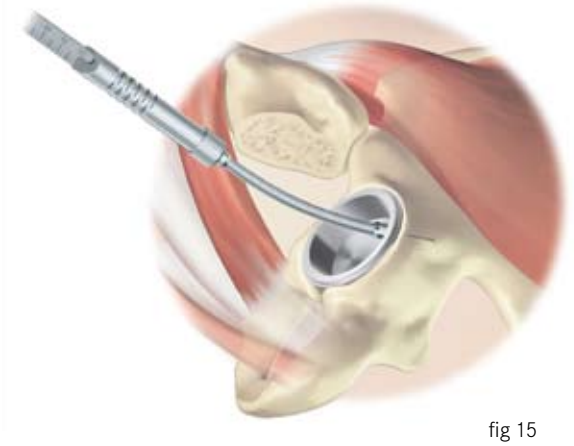


fig 15

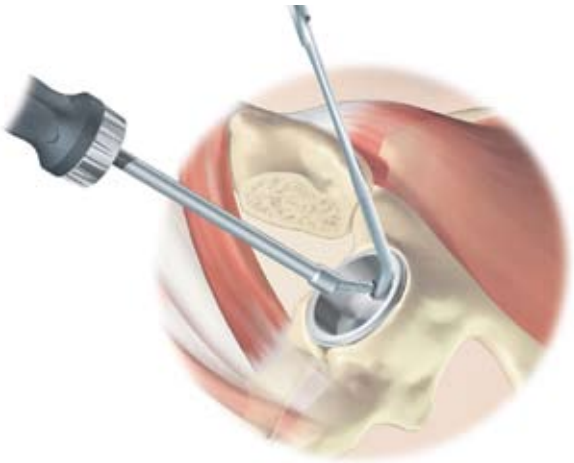


fig 16

8. Trial Reduction with Trial E-Poly Bearing

Following the insertion and fixation of the acetabular shell, select the correct diameter trial acetabular bearing (22.22, 28, 32 or 36mm) that matches the diameter of the shell. By selecting the appropriately sized trial bearing, the head diameter is automatically selected. (See table 1 on page 11). This trial insert is then placed into the acetabular component by hand. A trial reduction can then take place (Figure 17).

fig 17

9. Insertion of Acetabular Bearing

The definitive acetabular bearing should only be inserted into the acetabular shell once the shell is deemed to be stable and placed in the correct inclination and orientation. Failure to follow this instruction may cause premature implant failure.

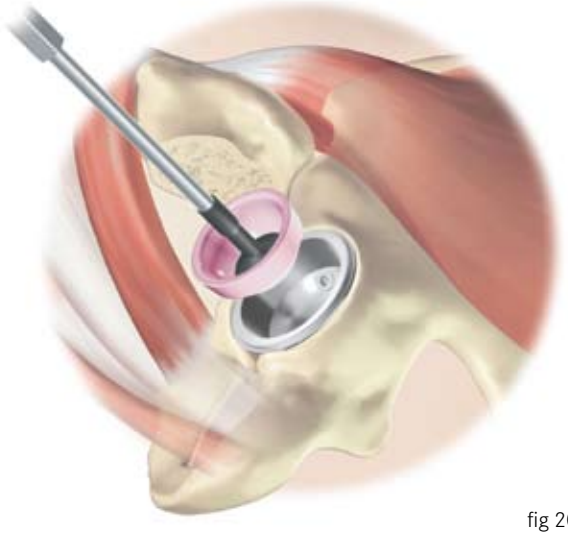


fig 20

9a. Insertion of C²a™ or M²a™ Bearing

The definitive ceramic or metal bearing may now be positioned with the aid of the insertion device and handle, being careful not to misalign the insert (Figure 20). The surgeon should place their fingers around the face of the shell to ensure that the bearing is properly aligned. The edge of the bearing must be flush with the edge of the acetabular shell prior to applying any impaction force to the bearing (Figure 21). Several moderate impactions of the bearing are necessary utilizing the appropriately sized plastic ball impactor to ensure stable seating of the bearing (Figure 22). This is especially important when inserting ceramic bearings. Failure to follow these instruments may result in damaged ceramic bearings.

Important: When inserting the trial or definitive bearing, the interior of the acetabular shell should be carefully cleaned and dried. The taper region of the acetabular insert should also be dry before insertion into the acetabular shell. Care should be taken not to scratch the taper surface of the ceramic or metal bearing or the inner taper

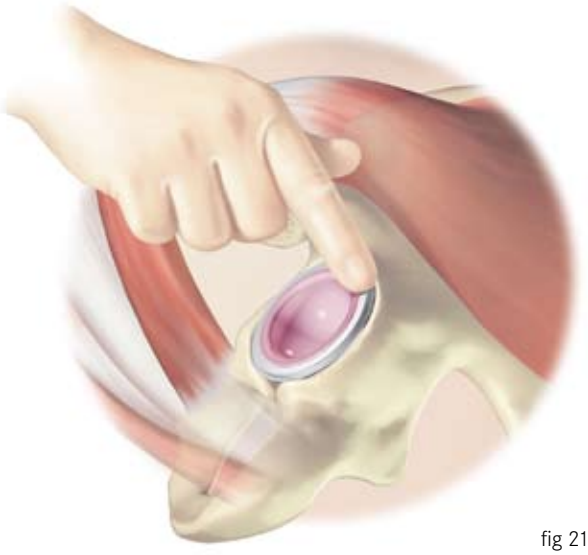


fig 21

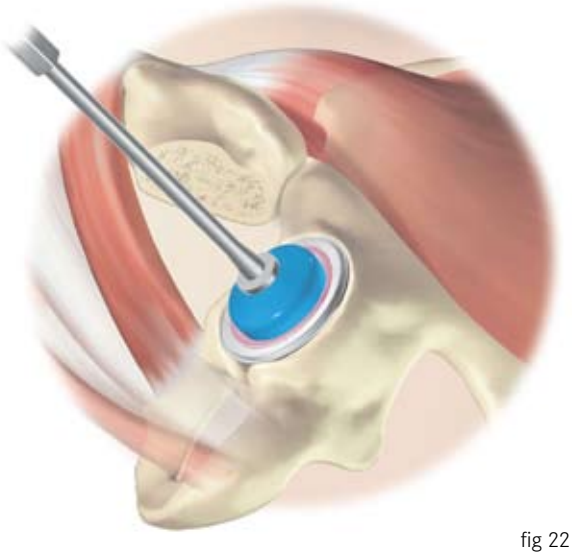


fig 22

9b. Insertion of E-Poly Bearing

The definitive E-Poly bearing may now be introduced. The bearing should be positioned initially by hand into the shell ensuring that it is correctly aligned both radially and longitudinally. The bearing is then finally impacted in position using the appropriately sized ball impactor and impactor handle. A visual indicator window is located within the shell that highlights whether or not the bearing is successfully restrained within the shell. (Figure 23)

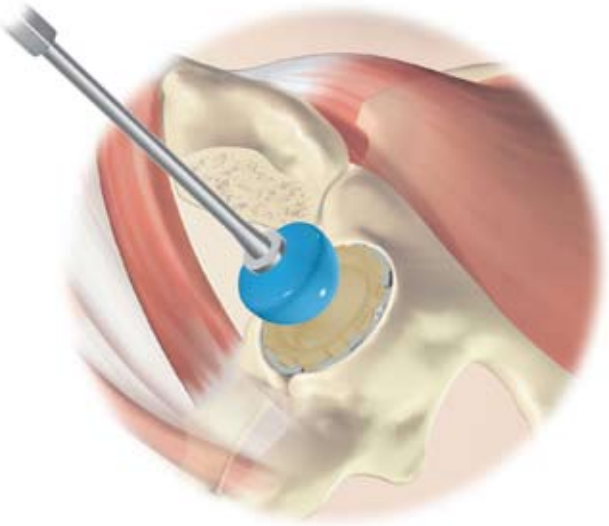


fig 23

10. Modular Head Selection & Impaction

With the definitive acetabular bearing in place, and upon completion of femoral reconstruction and trial reduction, the corresponding modular head can now be selected. Impact the selected modular head onto the stem with several moderate mallet strikes using a plastic head impactor only (Figure 24).

Important: Ensure all taper surfaces are clean and dry before seating the modular head on the stem taper. It is important that the stem and cup tapers be new, as a used taper can reduce the fatigue strength of the ceramic components.

fig 24

Once the correct modular femoral head has been attached to the femoral component, the hip joint can be reduced (Figure 25).

fig 25

11. Removal of Acetabular Bearing & Shell

Should it be necessary to remove a bearing from an Exceed ABT™ shell, you must first endeavour to identify the type of acetabular component inserted as the two shells have differing methods of bearing extraction.

11a. Removal of C²a™ & M²a™ Bearing

Should it be necessary to remove a ceramic or metal bearing, the insert remover can be used in conjunction with the insertion device. First attach the insertion device to the articulation surface of the bearing, and impact the rim of the shell with the insert remover, being careful not to impact the bearing itself. The vibration created from the impact will loosen the bearing from the shell and allow it to be removed (Figure 26).

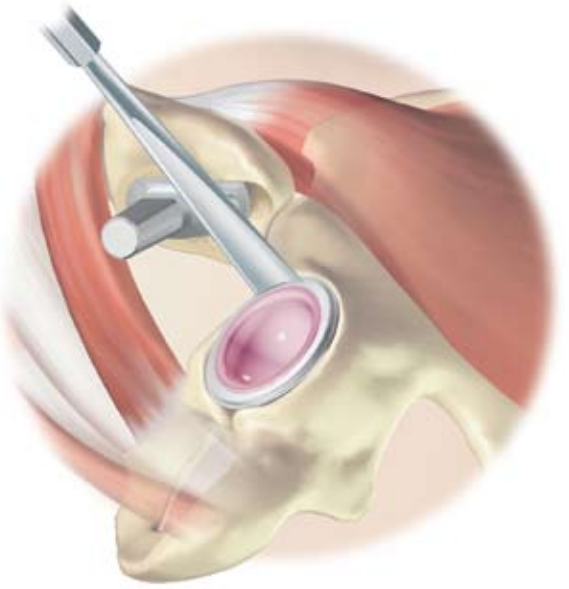


fig 26

11b. Removal of E-Poly Bearing

Should it be necessary to remove an E-Poly bearing from an Exceed ABT™ shell, it will be necessary to locate the open end of the retaining ring located within the shell. This open end of the retaining ring is located inside the window situated on the mouth of the acetabular shell. To open the ring, utilize the circlip pliers to widen the opening and with the liner extraction tool, remove the liner from the shell (Figure 27).

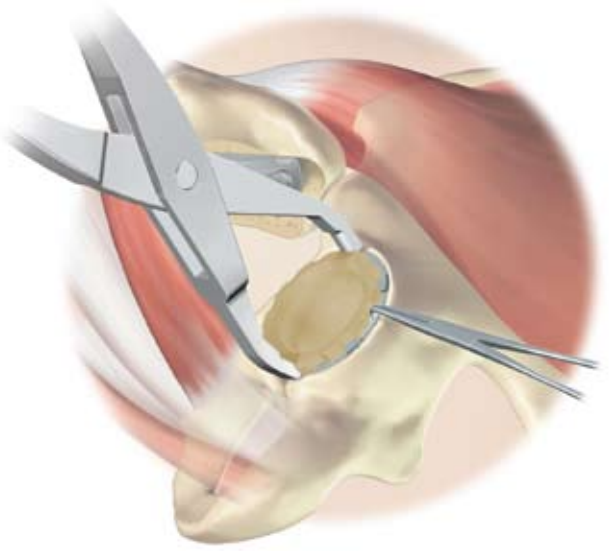


fig 27

11c. Removal of Exceed ABT™ Acetabular Shell

Before attaching the slide hammer mechanism to the Exceed ABT™ acetabular shell, one must first remove the bearing as described on previous page. Once the bearing has been removed, unscrew the apical hole blanking screw with 3.5mm hex-driver. It is then necessary to remove any supplementary screw fixation and ensure any bone / implant fixation has been severed (Figure 28). The low-profile screws are removed with a 3.5mm hex-driver, whilst the bone / implant interface is severed with curved osteotomes. However, it is important to employ extreme care when extracting the shell as too much force may damage the acetabular floor, peripheral rim and anterior and posterior columns of the acetabulum (Figure 29).

fig 28

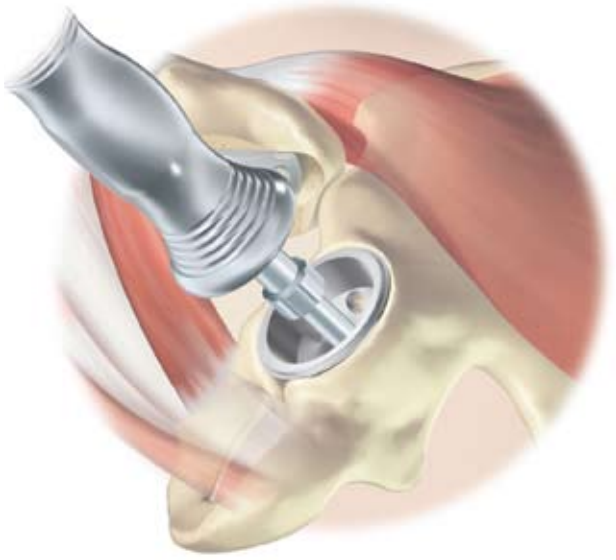


fig 29

Exceed ABT™ Acetabular Components with C²a™ and M²a™ Bearings

Size (mm)	Standard Shells			15° Shells			Bearings		
	PC	HA/PC	HA/BM	PC	HA/PC	HA/BM	Articulation	C²a-Delta™	M²a™ Series
Ø46	123746	123746HA	123746BM	233746	233746HA	233746BM	Ø28mm	650-0790	650-0895
Ø48	123748	123748HA	123748BM	233748	233748HA	233748BM			
Ø50	123950	123950HA	123950BM	233950	233950HA	233950BM	Ø32mm	650-0791	650-0896
Ø52	123952	123952HA	123952BM	233952	233952HA	233952BM			
Ø54	124454	124454HA	124454BM	234454	234454HA	234454BM	Ø36mm	650-0795	650-0897
Ø56	124456	124456HA	124456BM	234456	234456HA	234456BM			
Ø58	124858	124858HA	124858BM	234858	234858HA	234858BM,	Ø36mm	650-0796	650-0898
Ø60	124860	124860HA	124860BM	234860	234860HA	234860BM			
Ø62	125262	125262HA	125262BM	235262	235262HA	235262BM	Ø36mm	650-0797	650-0899
Ø64	125264	125264HA	125264BM	235264	235264HA	235264BM			
Ø66	125266	125266HA	125266BM	235266	235266HA	235266BM			
Ø68	125268	125268HA	125268BM	235268	235268HA	235268BM			
Ø70	125270	125270HA	125270BM	235270	235270HA	235270BM			

Exceed ABT™ Acetabular Components with E-Poly Bearings

Size (mm)	3- Hole Shells			Multi-Hole Shells			E-Poly Bearings				Equivalent RingLoc™ Size
	PC	HA/PC	HA/BM	PC	HA/PC	HA/BM	Articulation	Standard	Hi-Wall	10°	
Ø40	131340	131340HA	131340BM	-	-		Ø22.22mm	EP-042240	EP-052240	EP-062240	20
Ø42	131342	131342HA	131342BM	-	-			EP-042242	EP-052242	EP-062242	-
Ø44	131344	131344HA	131344BM	-	-			EP-042244	EP-052244	EP-062244	21
Ø46	131346	131346HA	131346BM	-	-		Ø28mm	EP-042846	EP-052846	EP-062846	22
Ø48	131348	131348HA	131348BM	-	-			EP-042848	EP-052848	EP-062848	-
Ø50	131350	131350HA	131350BM	130450	130450HA	130450BM	Ø32mm	EP-043250	EP-053250	EP-063250	23
Ø52	131352	131352HA	131352BM	130452	130452HA	130452BM		EP-043252	EP-053252	EP-063252	-
Ø54	131354	131354HA	131354BM	130454	130454HA	130454BM	Ø36mm	EP-043654	EP-053654	EP-063654	24
Ø56	131356	131356HA	131356BM	130456	130456HA	130456BM		EP-043656	EP-053656	EP-063656	-
Ø58	131358	131358HA	131358BM	130458	130458HA	130458BM		EP-043658	EP-053658	EP-063658	25
Ø60	131360	131360HA	131360BM	130460	130460HA	130460BM		EP-043660	EP-053660	EP-063660	26
Ø62	131362	131362HA	131362BM	130462	130462HA	130462BM		EP-043662	EP-053662	EP-063662	-
Ø64	131364	131364HA	131364BM	130464	130464HA	130464BM		EP-043664	EP-053664	EP-063664	27
Ø66	131366	131366HA	131366BM	130466	130466HA	130466BM		EP-043666	EP-053666	EP-063666	-
Ø68	131368	131368HA	131368BM	130468	130468HA	130468BM		EP-043668	EP-053668	EP-063668	28
Ø70	131370	131370HA	131370BM	130470	130470HA	130470BM					

Modular Heads for E-Poly, C²a-Delta™ and M²a™ Articulation - Biomet Type 1 Taper

Head Offset	CoCrMo Modular Heads				C²a-Delta™ Ceramic Modular Heads		
	Ø22.22mm	Ø28mm	Ø32mm	Ø36mm	Ø28mm	Ø32mm	Ø36mm
-6mm	-	650-0863	650-0870	650-0839	-	-	-
-5mm	164441	-	-	-	-	-	-
-3mm	163653	650-0864	650-0871	650-0840	164135	164185	650-0660
0mm	164440	650-0865	650-0872	650-0841	164136	164186	650-0661
+3mm	-	650-0866	650-0873	650-0842	164137	164187	650-0662
+5mm	-	-	-	-	164138	-	-
+6mm	-	650-0867	650-0874	650-0843	-	12-115117	650-0663

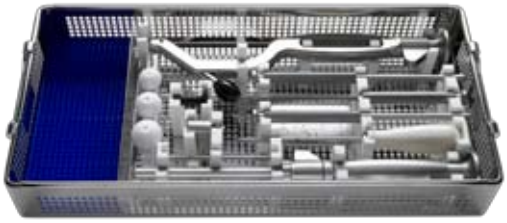
Modular Heads for E-Poly, C²a-Delta™ & M²a™ Articulation - Biomet 12/14 Taper

Head Offset	CoCrMo Modular Heads				C²a-Delta™ Ceramic Modular Heads		
	Ø22.22mm	Ø28mm	Ø32mm	Ø36mm	Ø28mm	Ø32mm	Ø36mm
-4mm	-	-	650-0882	650-0887	-	650-0833	650-0836
-3.5mm	-	650-0877	-	-	650-0830	-	-
-2mm	164131	-	-	-	-	-	-
0mm	164132	650-0878	650-0883	650-0888	650-0831	650-0834	650-0837
+2mm	164133	-	-	-	-	-	-
+3.5mm	-	650-0879	-	-	650-0832	-	-
+4mm	-	-	650-0884	650-0889	-	650-0835	650-0838
+8mm	-	-	-	650-0890	-	-	650-0667

Exceed ABT RingLoc Trial Liner Tray Assembly

Exceed ABT Trial 15° Shell and Liner Tray Assembly

Exceed ABT Trial Standard Shell and Liner Tray Assembly



Exceed ABT General Instrument Tray Assembly

Exceed ABT Supplementary Screw Fixation Tray Assembly

Exceed ABT Trial Modular Head Tray Assembly

Grater Reamer Tray Assembly (1 mm Increments)

Exceed ABT™ Acetabular System Instrumentation

Cat No.	Description
31-601120	Exceed ABT General Instrument Tray Assembly
31-601122	Exceed ABT Supplementary Screw Fixation Tray Assembly
31-601124	Exceed ABT Trial Standard Shell and Liner Tray Assembly
31-601126	Exceed ABT Trial 15° Shell and Liner Tray Assembly
31-601132	Exceed ABT RingLoc Trial Liner Tray Assembly
31-601035	Exceed ABT X-ray Template Set
31-600055	Grater Reamer Tray Assembly (1 mm Increments)
31-601112	Stainless Steel Twist Drill Ø3.2mm x 40mm
31-100592	Stainless Steel Twist Drill Ø3.2mm x 50mm
31-601114	Stainless Steel Twist Drill Ø3.2mm x 60mm
31-100593	Stainless Steel Twist Drill Ø3.2mm x 70mm
31-601128	Exceed ABT Trial Modular Head Tray Assembly (T1)
31-601130	Exceed ABT Trial Modular Head Tray Assembly (12/14 Taper)