

G7[®] Acetabular System

Surgical Technique

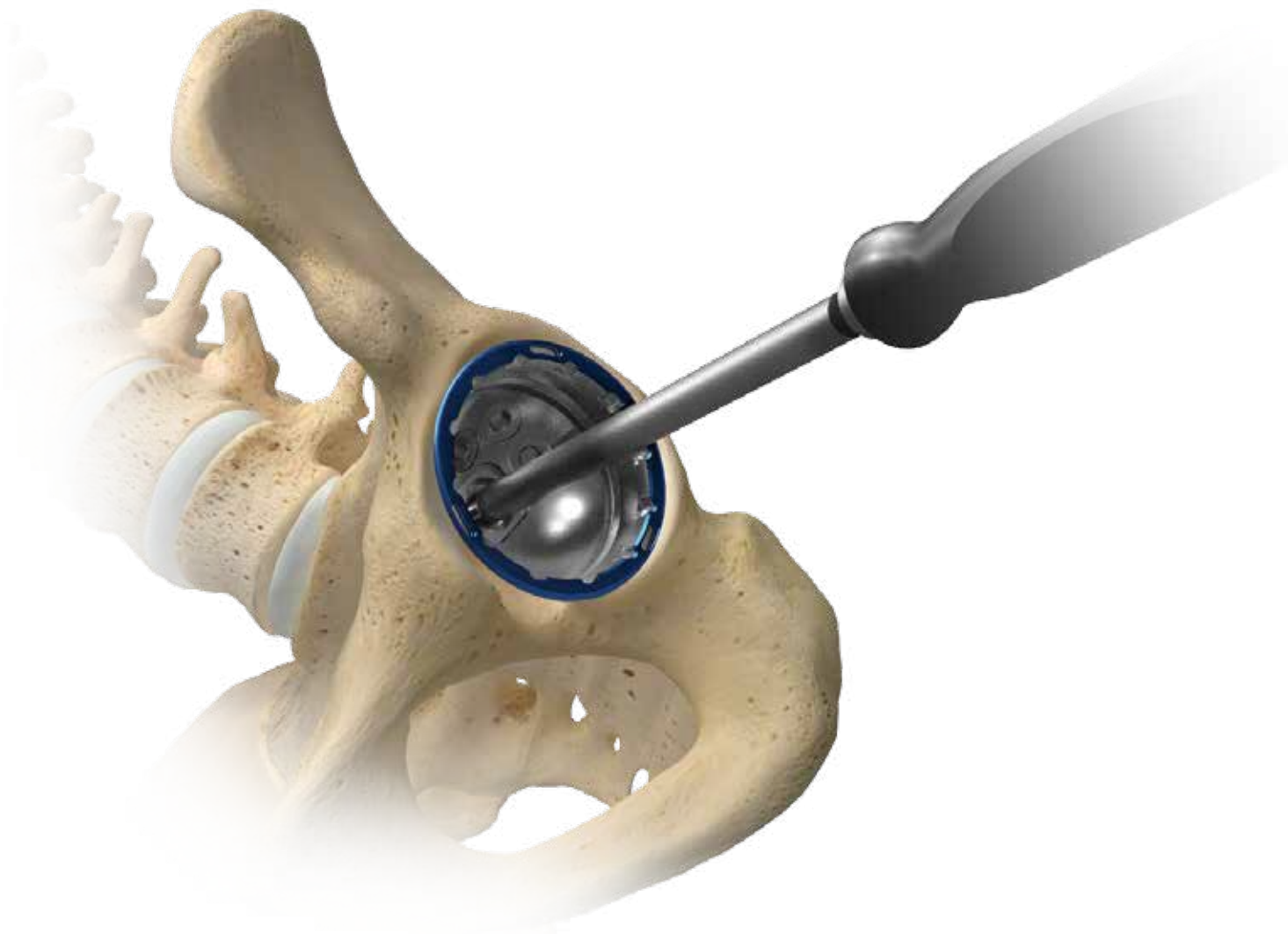


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Quick Reference Surgical Technique



Step 1:
Preoperative Planning
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Step 2:
Reaming



Step 3:
Instrument Selection



Step 4:
Shell Trialing (optional)



Step 5:
Shell Insertion



Step 6:
Supplemental Screw Insertion (optional)



Step 7:
Liner Trialing



Step 8:
Liner Insertion



Step 9:
Final Reduction

Note: There may be slight variations in colors between components.

G7 Family Tree

Acetabular Shells



PPS® and BoneMaster™™ Limited Hole



OsseoTi® Limited and Multi Hole



Finned PPS and BoneMaster™™ Limited Hole

Liners

Ceramic**



BIOLOX® delta

Dual Mobility*



Dual Mobility (CoCr only)



Dual Mobility Bearing (E1 & ArComXL)

E1® and ArComXL® Polyethylene



Neutral



+5 Neutral*



High Wall



10 Degree Face Changing

E1 Freedom® Constrained Polyethylene



Neutral



+5 Neutral*



10 Degree Face Changing*

Femoral Heads



BIOLOX® delta



BIOLOX® delta Option



CoCr Modular



Freedom CoCr

* Check for country product clearances and reference product specific instructions for use.
 ** Not for sale in the US.

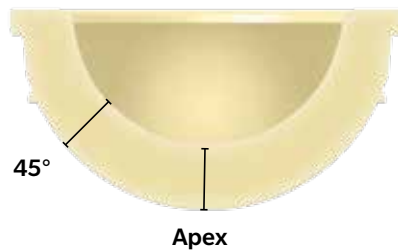
Quick Reference Polyethylene Guides

≈ Minimum Poly Liner Thickness at 45° (mm)

Shell Size	Head Size	Head Size				
		28	32	36	40	44
42 44	A	4.3				
46	B	6.3	4.3			
48	C	7.3	5.3			
50	D	8.3	6.3	4.3		
52	E	9.3	7.3	5.3		
54 56	F	10.3	8.3	6.3	4.3	
58 60	G	11.3	9.3	7.3	5.3	
62 64	H		11.3	9.3	7.3	5.3
66 68 70 72	I*			11.3	9.3	7.3
74 76 78 80	J*			14.3	12.3	10.3

≈ Minimum Poly Liner Thickness at Apex (mm)

Shell Size	Head Size	Head Size				
		28	32	36	40	44
42 44	A	4.7				
46	B	6.7	4.7			
48	C	7.7	5.7			
50	D	8.7	6.7	4.7		
52	E	9.7	7.7	5.7		
54 56	F	10.7	8.7	6.7	4.7	
58 60	G	11.7	9.7	7.7	5.7	
62 64	H		11.7	9.7	7.7	5.7
66 68 70 72	I*			11.7	9.7	7.7
74 76 78 80	J*			14.7	12.7	10.7



* Available in OsseoTi Multi hole configuration only

Quick Reference Polyethylene Guides

Polyethylene Articulation Sizing

Shell Size		Head Size				
		28	32	36	40	44
42 44	A	A - 28				
46	B	B - 28	B - 32			
48	C	C - 28	C - 32			
50	D	D - 28	D - 32	D - 36		
52	E	E - 28	E - 32	E - 36		
54 56	F	F - 28	F - 32	F - 36	F - 40	
58 60	G	G - 28	G - 32	G - 36	G - 40	
62 64	H		H - 32	H - 36	H - 40	H - 44
66 68 70 72	I*			I - 36	I - 40	I - 44
74 76 78 80	J*			J - 36	J - 40	J - 44

10 Degree Face Changing Leg Length Chart

Cup Size	Line Size	Offset (mm)	Leg Length (mm)	Lateralization (mm)
42 mm 44 mm	A	3.2	2.4	2.1
46 mm	B	3.6	2.7	2.3
48 mm	C	3.7	2.8	2.4
50 mm	D	3.9	3	2.6
52 mm	E	4.1	3.1	2.7
54 mm 56 mm	F	4.3	3.2	2.8
58 mm 60 mm	G	4.4	3.4	2.9
62 mm 64 mm	H	4.8	3.6	3.1
66 mm 68 mm 70 mm 72 mm	I	5.1	3.9	3.3
74 mm 76 mm 78 mm 80 mm	J*	5.7	4.3	3.7

*Available in OsseoTi Multi hole configuration only

Surgical Technique



Figure 1

G7 Acetabular System Color & Letter Coding Key

Color and Liner Size	Shell Size(s)
A	42,44 mm
B	46 mm
C	48 mm
D	50 mm
E	52 mm
F	54,56 mm
G	58,60 mm
H	62,64 mm
I	66, 68, 70*, 72* mm
J*	74, 76, 78, 80 mm

*Available in OsseoTi Multi hole configuration only

Figure 2

Device Description

The hemispherical design of the G7 acetabular shell provides fixation and stability with proven¹⁻⁷ PPS Porous Plasma Spray Coating or OsseoTi Porous Structure. Multiple bearing options are also available, including E1 Antioxidant Infused Technology, ArComXL Polyethylene and BIOLOX® *delta* ceramic liners.

The G7 Acetabular System utilizes a unique color coding system designed to offer an efficient operating experience. The provisional shells, provisional liners, labels and face plate impactors match the color anodized on the rim and letter designation of the acetabular shell implant (Figure 1).

The G7 Acetabular System color and letter coding key is listed in Figure 2.

Note: Implant identification should be made using letter and size information. Color coding should be used only as a secondary reference. There may be slight variations in colors between components.



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Preoperative Templating

Accurate preoperative planning and acetabular templating help determine the size, desired location and position of the acetabular shell and are an essential part of the surgical process. Templating is best performed with an A/P pelvis radiograph with the limb internally rotated approximately 15 degrees. This allows more accurate determination of femoral offset, radiographic leg length inequality, and referencing of contralateral hip, if required.

When examining the A/P radiograph, the shell should be positioned against, but not medial to, the radiographic teardrop at 40 degrees of inclination. Acetabular shell size is best determined on a cross-table lateral radiograph. If the patient's anatomy is obscured, it may be helpful to check the acetabular component size on the contralateral hip radiograph, as well.

Make note of the shell size that fills the acetabular space appropriately and fits the anterior to posterior diameter of the native acetabulum, keeping in mind that final decision on shell size should be made during surgery when adequate visualization of the acetabulum is achieved.

Note: Use of an X-ray magnification marker is needed to template with OrthoSize® Digital Templating Software. The magnification marker can be located against the joint (ball/coin) or on the table (coin/ruler), but must be visible within the X-ray.

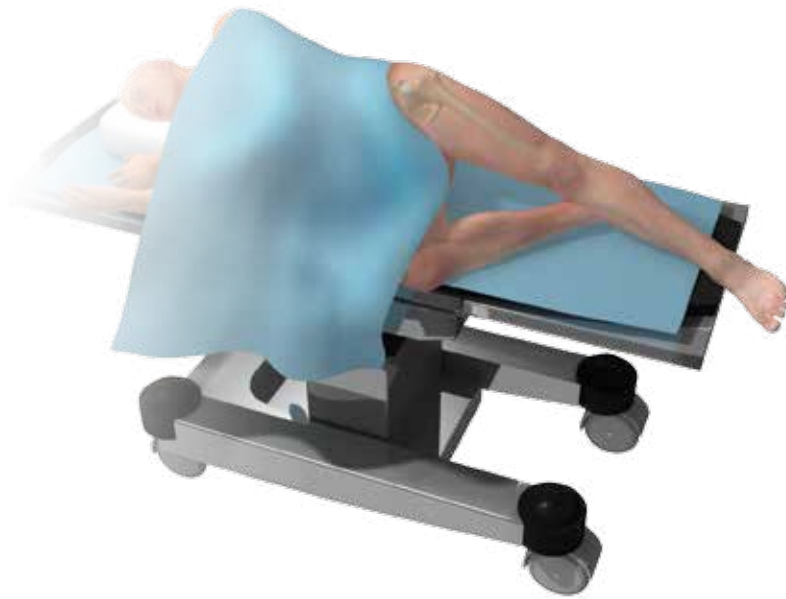


Figure 3

Patient Positioning

The G7 Acetabular System is designed to be used with all surgical approaches (Figure 3).

Acetabular Exposure

Prior to reaming, acetabular exposure should be adequate and the anterior, posterior and superior walls should be directly visible. The medial acetabular wall, which dictates the depth of the reaming, should be uncovered of floor osteophytes or pulvinar pad. Specialized acetabular retractors are available to help facilitate exposure for whichever approach is chosen.



Figure 4

Acetabular Reaming

Determine a starting reamer size from the preoperative template and from the measured diameter of the resected femoral head. This is typically 6–8 mm smaller than the femoral head diameter. Reamer handles are provided as straight or curved (offset). Use is dictated by surgeon preference, surgical exposure, and patient body composition. During the reaming process, frequently determine the amount of anterior and posterior acetabular bone remaining to avoid reaming away the wall and compromising fixation.

Beginning with a small reamer, apply constant pressure first toward the medial wall, appropriately medializing the acetabulum for optimal hip biomechanics and the normal center of hip rotation. Gradually progress to larger reamers, while maintaining concentricity within the acetabular cavity until bleeding subchondral bone is exposed (Figure 4).

The preferred acetabular orientation is 40 degrees inclination and 20 degrees of anteversion, but final acetabular position depends on patient anatomy and may vary slightly with approach. Final orientation of the acetabular implant is also dictated by the amount of version of the femoral implant (i.e., greater anteversion of the acetabular component may be required in the case of a retroverted stem). Under-reaming of the acetabulum is dependent on bone quality and should be determined by the surgeon intraoperatively as soft bone will more readily accommodate a larger press-fit than harder, sclerotic bone. The following reaming recommendation may be used as an initial guideline:

Acetabular Shell	Recommended Under Ream*
G7 PPS and OsseoTi Hemispherical Shell	1 mm under final implant size
G7 Finned** Hemispherical Shell	Line to line

* This is a general recommendation only, appropriate reaming is dependent on bone quality and should be determined by the surgeon intraoperatively.

** Check for country product clearances and reference product specific instructions for use.

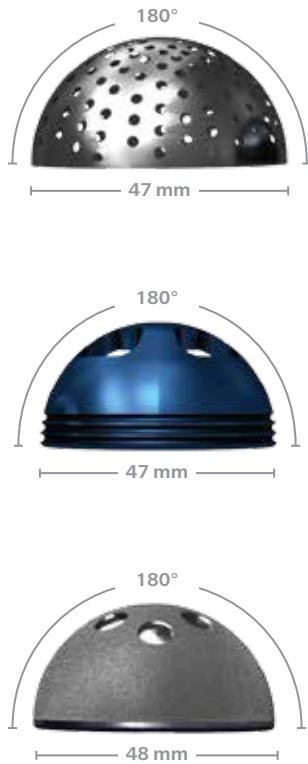


Figure 5

Acetabular Reaming (cont.)

Once reaming is complete, use the provisional shells to confirm the position and accuracy of the reaming. Final shaping must be achieved using the hemispherical grater reamer to ensure a congruent fit between the shell and the acetabulum.

Note: All G7 acetabular shells are measured over porous coating or structure. All acetabular shells, provisional shells and acetabular reamers are marked true to size. All components are a full hemisphere and measure 180 degrees (Figure 5).



Figure 6

Optional Shell Trialing and Alignment

Once the desired ream has been achieved, select a provisional shell that is 1 mm smaller than the final implant. The provisional shell is marked with its true size and indicates the corresponding liner size both alphabetically and by color (Figure 6).

The shell gauge handle may be threaded to the acetabular shell provisional and used to gauge the size of the reamed acetabulum (Figure 6).

Note: Do not impact on the shell gauge handle.

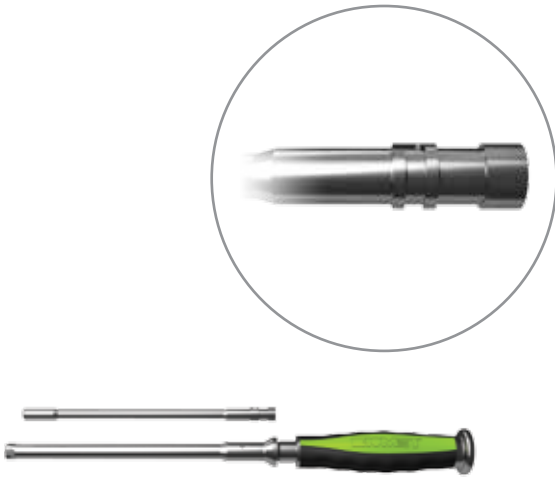


Figure 7



Figure 8



Figure 9

Optional Shell Trialing and Alignment (cont.)

Alternatively, utilize either the straight monoblock, curved or straight modular inserter handle. Place the provisional shell into the acetabulum at approximately 40 degrees of inclination and 20 degrees of anteversion.

When using the curved or straight modular handle, place the appropriate threaded shaft into the handle through the hole in the strike plate of the straight modular handle (Figures 7 and 8), or the hole at the distal tip of the curved inserter handle (Figure 9).

If using the G7 Straight Monoblock Inserter Handle, assemble to the mating component by rotating clockwise and disassemble by rotating counterclockwise. Ensure the G7 Monoblock Inserter Handle is fully threaded to the mating component prior to impaction.

Note: Levering on the inserter handle or impacting the handle on a location other than the strike plate to reposition the shell may damage the threads.



Figure 10



Figure 11

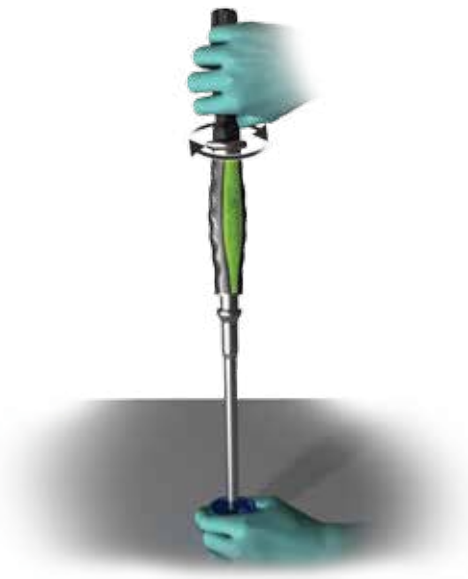


Figure 12

Optional Shell Trialing and Alignment (cont.)

Insert the ball hex driver into the hole in the strike plate of the straight handle or the hole at the distal tip of the curved handle and turn to advance the threaded shaft until the threads are exposed (Figures 10 and 11).

Line up the square tip of the insertion handle with the square at the apex of the shell trial. Turn the ball hex driver in a clockwise direction to advance the thread into the shell (Figures 10–12). Remove the ball hex driver from the handle. Ensure that the shell is securely fastened to the handle by lightly pulling on the provisional shell.

Approximate version can be obtained by using the transverse acetabular ligament or by referencing the opening of the acetabular component 90 degrees off of the sciatic notch. Alternatively, a positioning guide may be used.

If using the G7 Straight Monoblock Inserter Handle, assemble to the mating component by rotating clockwise and disassemble by rotating counterclockwise. Ensure the G7 Monoblock Inserter Handle is fully threaded to the mating component prior to impaction.

Note: Levering on the inserter handle or impacting the handle on a location other than the strike plate to reposition the shell may damage the threads.

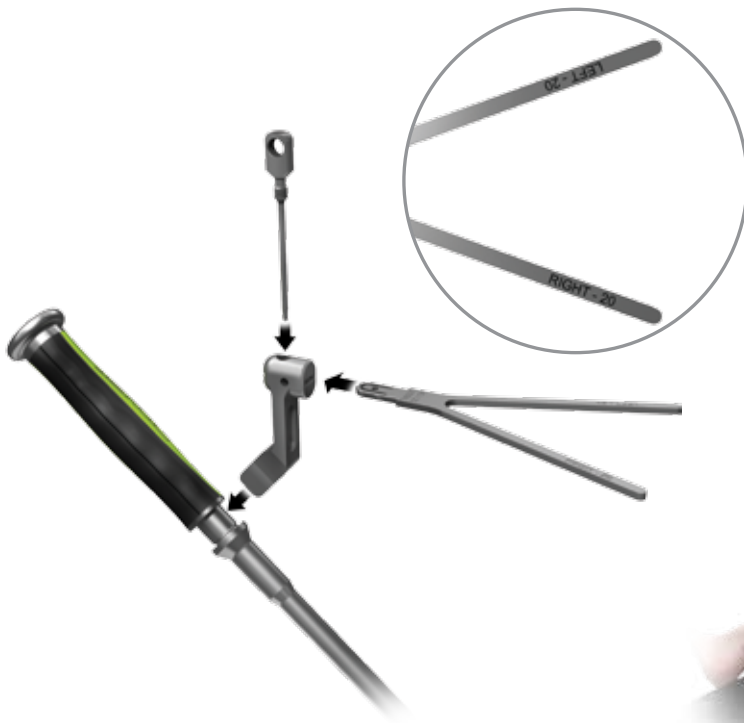


Figure 13

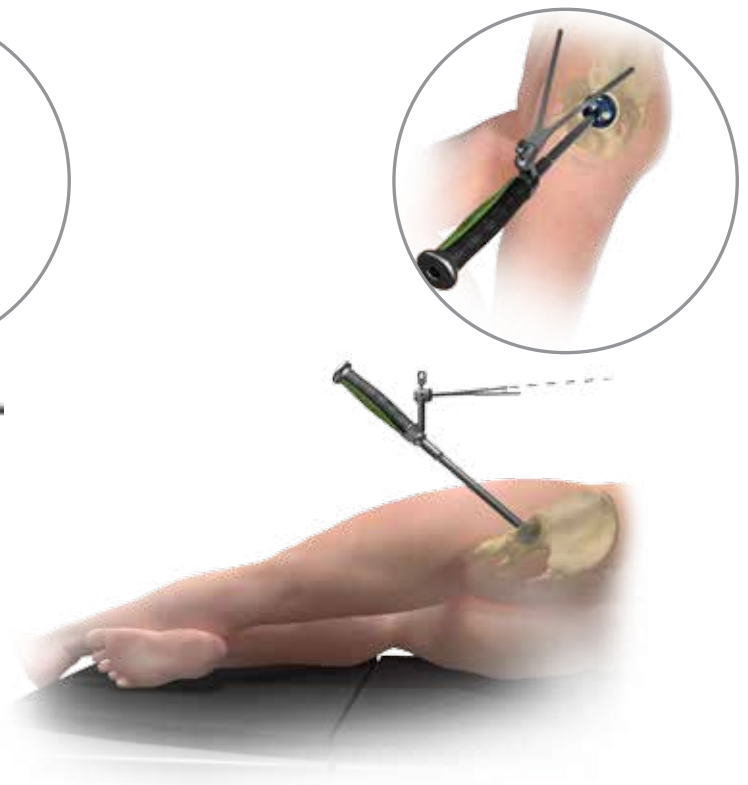


Figure 14

Optional Shell Trialing and Alignment (cont.)

Positioning Guides

The Lateral and Anterior Supine G7 positioning guides are designed to aid in proper insertion of the acetabular component.

Assemble the positioning guide on the back table before securing to the insertion handle. Connect the body of the positioning guide to the insertion handle by sliding the guide into the opening between the handle grip and shaft on the inserter handle. Slide the positioning guide into the flat opening on the guide body. When the guide is in place, tighten the positioning guide rod to secure the guide to the handle (Figure 13).

Lateral Guide

When positioning the acetabular shell, the **lateral** guide arms should be parallel to the table, aimed toward the patient's ipsilateral shoulder (Figure 14).

For the **right hip**, use the reference arm of the "V" shaped guide labeled "**RIGHT**." For the **left hip**, use the reference arm of the "V" shaped guide labeled "**LEFT**" (Figure 13).

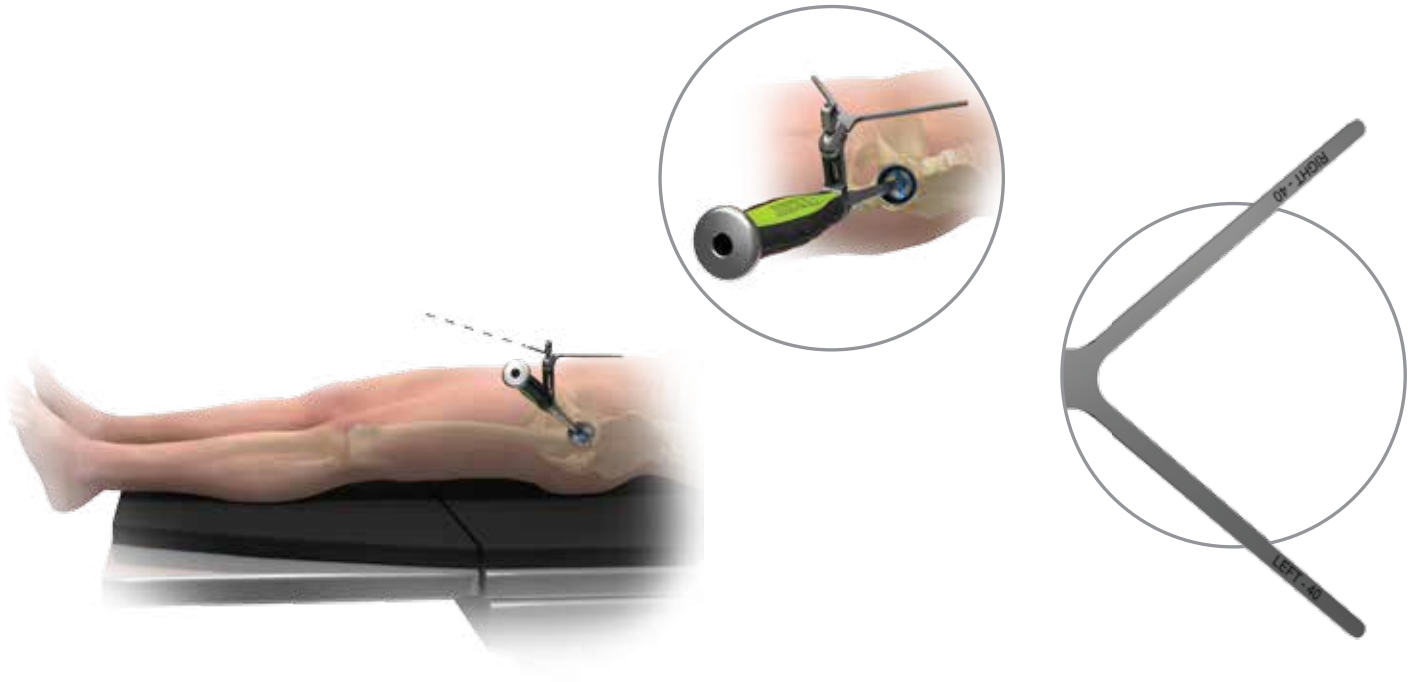


Figure 15

Optional Shell Trialing and Alignment (cont.)

Supine Guide

When positioning the acetabular shell, the **anterior supine** positioning guide arms should be parallel to the table, aligned with the patient's spinal column (Figure 15).

For the **right hip**, use the reference arm of the "V" shaped guide labeled "**RIGHT**." For the **left hip**, use the reference arm of the "V" shaped guide labeled "**LEFT**" (Figure 15).

ⓘ **Note:** The primary reference for acetabular shell position should be based on the patient's anatomy. These instruments rely significantly on patient position and are designed to be used only as a secondary verification. If at any time there is concern about acetabular position, the orientation may be verified with intraoperative fluoroscopy or with intraoperative radiographs. A true A/P pelvis without rotation is best indicated when the tip of the coccyx lines up with the pubic symphysis and is within 1–2 cm of the symphysis.



Figure 16



Figure 17

Optional Shell Trialing and Alignment (cont.)

Optional Shell Trialing

Lightly impact the provisional shell and confirm complete seating through the cutouts on the provisional shell (Figure 16). Remove any soft tissue or osteophytes from the acetabular rim that overhang the edge of the provisional component to obtain proper seating. If the provisional shell is unstable, or if there are gaps between the provisional shell and the acetabulum, it may be necessary to increase the diameter of the final reamer. However, in some instances it may not be possible to increase the reamed diameter. If this is the case, then supplementary screw fixation may be necessary. Disconnect the inserter handle from the provisional shell.

Liner Trialing with Provisional Shell

Following seating of the provisional shell, select the appropriate provisional liner size, as indicated alphabetically and by color, in the desired liner configuration.

Insert the provisional liner into the shell by hand. Utilize a 3.5 mm hex screwdriver to tighten the screw in the dome of the provisional liner into the apical hole of the provisional shell (Figure 17).

Note: Do not overtighten the provisional liner.



Figure 18



Figure 19

Trial Reduction and Range of Motion

Select the appropriate provisional head, head diameter and neck length to create equal leg length and needed lateralization as determined by the surgeon. These determinations can be made during preoperative templating, but final adjustments are made intraoperatively. Insert the provisional head onto the implanted stem or broach and reduce the hip (Figures 18 and 19).

Ensure the provisional head is seated fully on the trunnion. If using the G7 self retaining provisional head in combination with a Type 1 reduced taper, a click is felt and/or heard when the provisional head is fully seated. Check for joint stability and range of motion, making any necessary adjustments to restore joint mechanics. Make certain that prominent impinging bone and/or osteophytes are removed from the periphery of the acetabulum to maximize range of motion and stability. Make note of all provisional components used and then remove all provisionals.

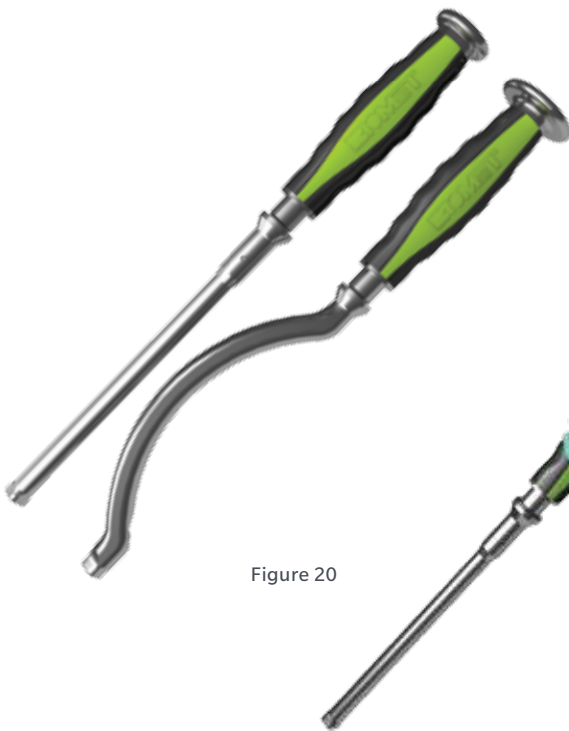


Figure 20

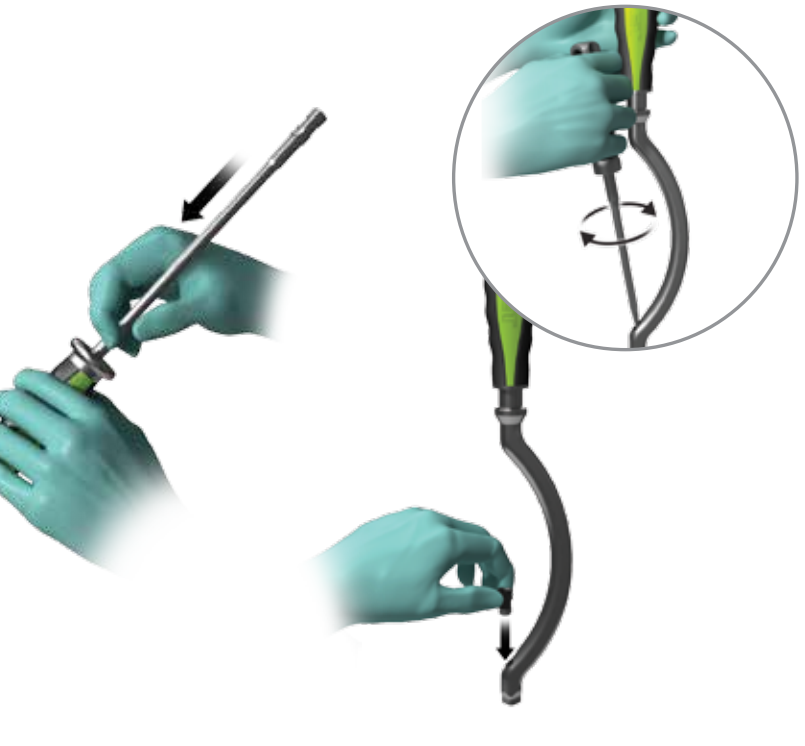


Figure 21

Figure 22

Acetabular Shell Insertion

Similar to provisional shell insertion, the same curved or straight handle may be used for the final implant shell insertion (Figure 20).

Note: Limited hole shells are packaged with the screw holes pre-plugged. Should screw fixation be necessary, the screw hole covers should be removed using a 3.5 mm hex driver prior to shell insertion.

When using the curved or straight handle, place the appropriate threaded shaft (Figures 21 and 22) into the handle through the hole in the strike plate of the straight handle, or the hole at the distal tip of the curved handle inserter. For the curved handle, turn clockwise to advance the threads of the internal shaft through the tip of the impactor handle.

If using the G7 Straight Monoblock Inserter Handle, assemble to the mating component by rotating clockwise and disassemble by rotating counter-clockwise. Ensure the G7 Monoblock Inserter Handle is fully threaded to the mating component prior to impaction.



Figure 23

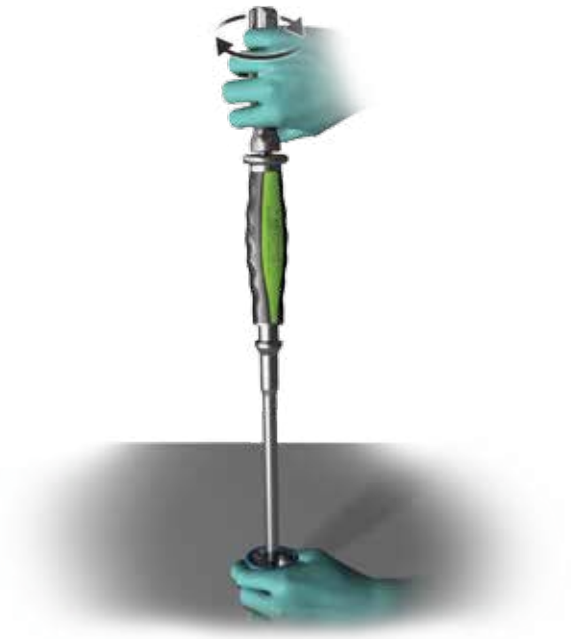


Figure 24

Acetabular Shell Insertion (cont.)

Insert the ball hex driver into the hole in the strike plate of the straight handle or the hole at the distal tip of the curved handle and turn to advance the threaded shaft until the threads are exposed. Line up the square tip of the insertion handle with the square indentation on the inside of the G7 shell (Figure 23). Turn the ball hex driver in a clockwise direction to advance the thread into the shell (Figure 24).

ⓘ **Note:** If the threads begin to loosen when impacting the modular inserter handle, utilize the ball hex driver to retighten and continue impaction.

Remove the ball hex driver from the handle.

ⓘ **Note:** When the curved handle is used, **the curve of the insertion handle should line up with the screw holes on the shell.** Ensure the shell is securely fastened to the handle by lightly pulling on the shell.



Figure 25



Figure 26

Acetabular Shell Insertion (cont.)

Alternatively, each inserter handle may also be utilized to insert the shell with a face plate impactor. Select the appropriately sized impactor plate that matches alphabetically and by color to the implant. Thread the impactor plate onto the insertion handle with the word “insert” facing the user (Figure 25).

The face plate impactor will align with any of the anti-rotation tabs on the face of the shell for impaction. These plates may be used with or without the optional quick connect bolt, which threads onto the face plate impactor (Figure 26). This bolt then snaps into the apical hole of the implant to retain the shell on the face impactor. Once inserted, the face plate is disengaged from the shell by lightly pulling backwards.



Figure 27

Acetabular Shell Insertion (cont.)

Optional use of Positioning Guide

The Lateral and Anterior Supine G7 positioning guides are designed to aid in proper insertion of the acetabular component. Utilizing the positioning guide as a reference, determine the correct position and alignment of the acetabular shell. See positioning guide section (Pages 13 and 14). In addition, approximate version can be obtained by using the transverse ligament or by referencing the opening of the acetabular component 90 degrees off of the sciatic notch. Position of the acetabular shell is crucial for optimizing wear, reducing impingement, reducing dislocation and reducing potential adverse outcomes.

Use a mallet to impact the handle on the strike plate, driving the shell into the acetabulum. While impacting, note the position of the screw holes to obtain the optimal position for screw placement, typically in the posterior/superior quadrant of the acetabulum (Figure 27). There are 2 indents on the shell rim, to provide a secondary reference in identifying screw hole locations after the implant is inserted.

Gently toggle the insertion handle to make certain the shell is stable. Once the implant is fully seated, reinsert the ball hex driver and turn in a counter-clockwise direction to release the threads from the shell. If using an impactor plate, pull back gently from the shell to disengage the plate.

Check through the apical hole to determine whether the shell is in full contact with the floor of the acetabulum. If not, the impactor handle may be re-attached to the shell for further impaction, until the shell is fully seated. Failure to fully seat the shell into the acetabulum may compromise the quality of fixation. The force required to fully seat the implant depends on multiple factors including quality of bone, diameter of acetabulum and amount of underream.

Ensure the G7 Straight Monoblock Inserter Handle is fully threaded to the mating component prior to impaction.

Note: Levering on the inserter handle or impacting the handle on a location other than the strike plate to reposition the shell may damage the threads.

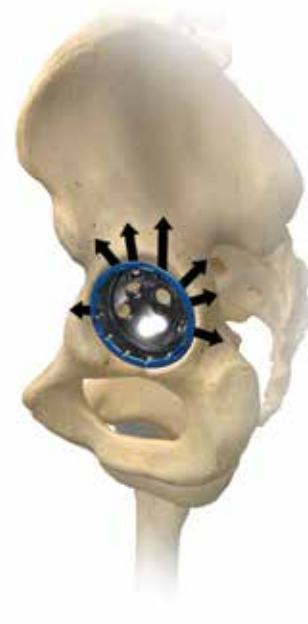


Figure 28



Limited hole configuration

Figure 29



Multi hole configuration

Figure 30

Acetabular Shell Insertion (cont.)

- ⊖ **Note:** Consideration should be given to the location of screw holes prior to impaction if screws will be used.
- ⊖ **Note:** In the unlikely event that the inserter handle threads may fracture during impaction and be left in the apical hole of the acetabular shell, utilize the Thread Extractor instrument for removal. The tapered tip of the Thread Extractor may be engaged in the small through hole of the fractured threads, allowing the fractured threads to be removed from the apical hole of the acetabular shell (Figure 28).

Supplemental 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 press-fit stability is in question, or where the bone quality is not optimal, supplementary screw fixation is advised.

Screw placement must be chosen carefully to avoid injury to neurovascular structures. Optimal position for screw placement is typically in the posterior/superior quadrant of the acetabulum (Figure 29 and 30). Care should also be exercised when supplementary screw fixation is required to avoid damaging or scratching the internal surfaces of the acetabular components. Use of the gold drill guide is required for accurate screw placement. Consideration should be given to placement of a screw near the dome of the implant first to prevent possible shifting of the implant caused when placing peripheral screws.

- ⊖ **Note:** Placement of screws outside of the “safe zone” may inadvertently injure neurovascular structures and should be utilized at the discretion of the operating surgeon. When using G7 Limited Hole shells, screws should never be placed in the anterior/medial area of the acetabulum. When using the G7 OsseoTi Multi Hole shell, extreme caution should be used if screw placement is required in the anterior/medial area of the acetabulum.

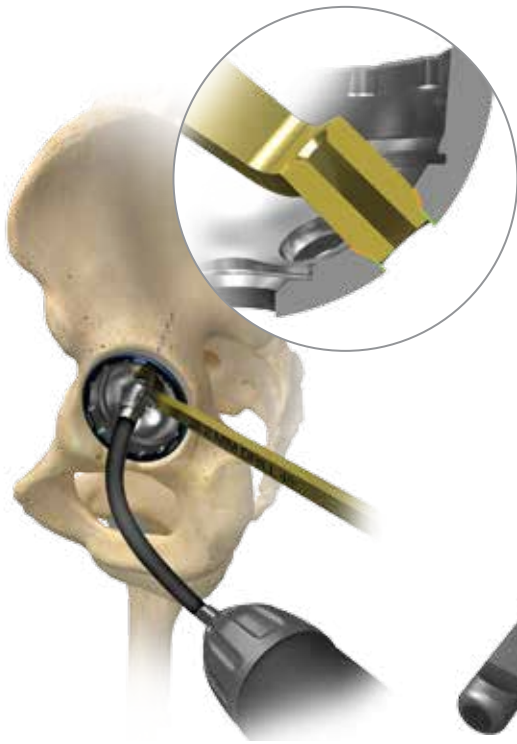


Figure 31

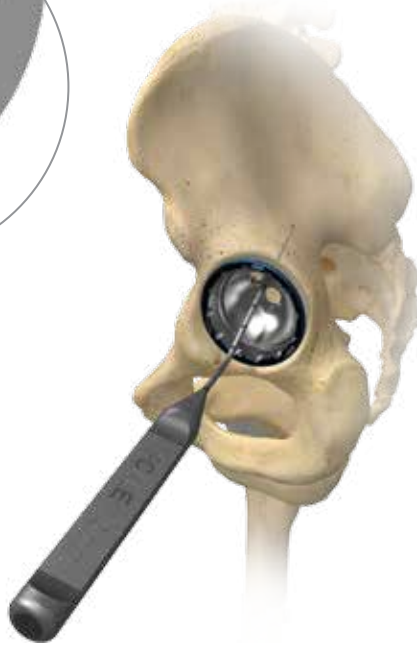


Figure 32



Figure 33

Supplemental Screw Fixation (cont.)

Use the gold drill guide to drill a pilot hole in the desired screw hole. Make certain the drill guide is fully seated and locked into position within the screw hole BEFORE the drill bit begins to engage bone (Figure 31). This will ensure the appropriate screw direction can be achieved. The G7 screw holes allow approximately 15 degrees of variability. Screws oriented outside this range may result in incomplete seating of the screws and prominent screw heads within the shell, which could impede insertion of the liner. When drilling into the posterior/superior quadrant, place a finger posteriorly into the sciatic notch to ensure the screw cannot penetrate too deeply.

- ⓘ **Note:** Levering on the drill bit during drilling may cause damage to the drill bit.
- ⓘ **Note:** Use only the G7 gold colored screws and the gold colored drill guide with G7 implants.
- ⓘ **Note:** Check that all screw heads are seated below the inner surface of the shell to ensure proper liner seating.

The drill bits are available in variable lengths. However, 30 or 40 mm drill bits are most commonly utilized. The drill bit chosen should be dictated by surgeon choice and the projected length of the screws. To ensure proper seating of the G7 acetabular screw after drilling pilot holes, it is important to remove all bone debris from the screw hole prior to placing the screw. After measuring the depth of the hole with the depth gauge (Figure 32), select the 6.5 mm gold colored screw with the corresponding length and insert it into the hole with the 3.5 mm hex screwdriver and screw forceps (Figure 33). Place additional screws as needed. Screws should not be placed in the apical hole of the shell.



Figure 34



Figure 35

Optional Liner Trialing with Final Implant

Clean and dry the shell and clear all soft tissue from around its perimeter. If another trial reduction is desired, utilize the provisional liner colored to match the rim of the shell and previously selected during the earlier trial reduction with the matching letter designation. Insert the provisional liner into the shell by hand, utilizing a 3.5 mm hex screwdriver, tighten the screw in the dome of the provisional liner into the apical hole of the final implant (Figure 34).

- ⓘ **Note:** Do not overtighten the provisional liner.
- ⓘ **Note:** For ease of insertion, ensure the screw in the dome of the liner provisional is aligned with the apical hole of the final implant.

Insert a provisional head onto the femoral stem and perform the trial reduction (Figure 35). When selection of the appropriate liner is complete, remove all provisional components.

- ⓘ **Note:** G7 provisional heads are designed with a retaining feature. A click is felt and/or heard when the provisional head is fully seated.

When using a High Wall or 10 Degree Face Changing liner, note the position of the liner to maintain orientation during final seating or adjust rotation as necessary in order to minimize impingement and optimize stability.

Freedom Constrained Liner Trialing

Determine the desired neck length and head size and select the appropriate provisional head. Insert the provisional head onto the implanted stem or broach. Ensure the provisional head is seated fully on the trunnion and reduce the hip. Check for joint stability and range of motion, making any necessary adjustments to restore joint mechanics. Make certain that prominent impinging bone and/or osteophytes are removed from the periphery of the acetabulum to maximize range of motion and stability. Make note of all provisional components used and then remove all provisionals.

- ⓘ **Note:** Only Freedom provisional heads are compatible for trialing with Freedom implant liners.



Figure 36



Figure 37

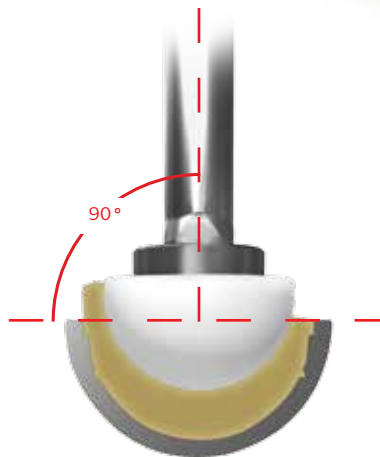


Figure 38

Optional Apical Plug

If desired, the apical hole in the acetabular shell can be covered with the plug packaged with the implant. Place the apical hole plug on the 3.5 mm hex screwdriver. Align the plug with the apical hole and twist the screwdriver clockwise to tighten the plug (Figure 36). Placing a drop of blood on the end of the screwdriver prior to attaching it to the apical hole plug may aid in retention of the plug on the screwdriver tip.

- ⓘ **Note:** Only G7 Limited Hole Shells are packaged with an apical plug.
- ⓘ **Note:** The apical plug cannot be used when using the ceramic liner.

Polyethylene Liner Insertion

The definitive polyethylene liner may now be introduced. The color on the liner label should match the color anodized on the rim of the acetabular shell. Ensure the interior of the shell is dry and free of debris and overhanging soft tissue is removed. Manually place the liner into the shell, ensuring the scallops are correctly aligned with the recessed areas on the shell. Apply manual pressure to the dome region to provisionally secure the liner in place by lightly engaging the scallops. Utilizing the appropriately sized G7 ball impactor, place the tip of the impactor on the dome of the liner with the handle perpendicular to the **face of the shell** (Figure 37).

- ⓘ **Note:** When inserting a 10 degree liner, the higher side of the liner should be placed superiorly and the insertion handle must be perpendicular with the face of the shell (Figure 38). Do not angle the handle to match the angled face of the liner.

Strike the impactor with the mallet to begin impaction. Continue to impact with the handle perpendicular to the face of the shell until the liner is fully seated.

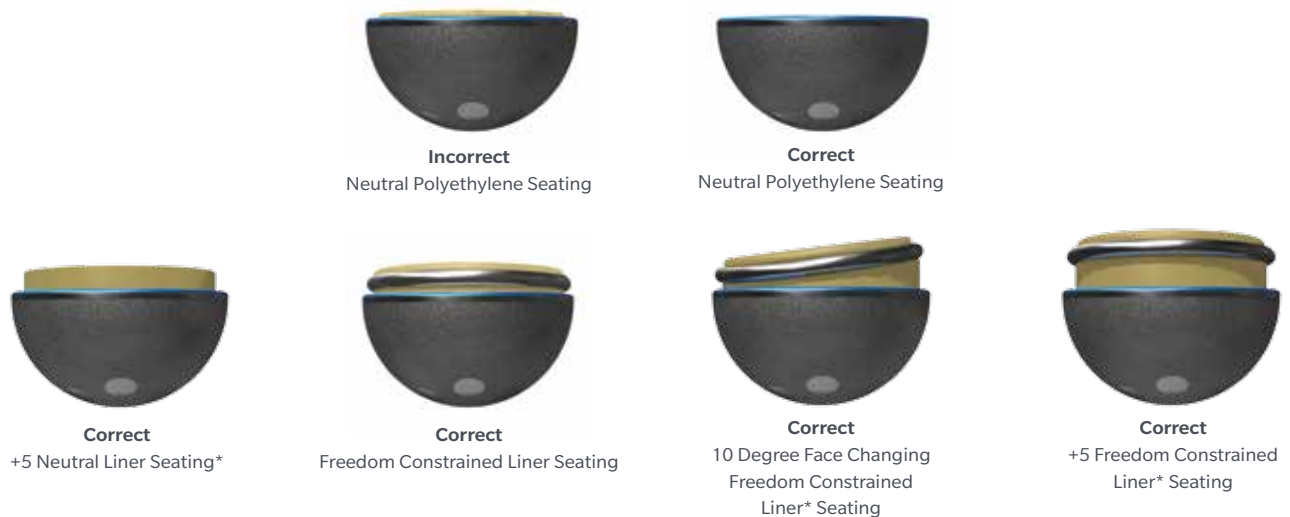
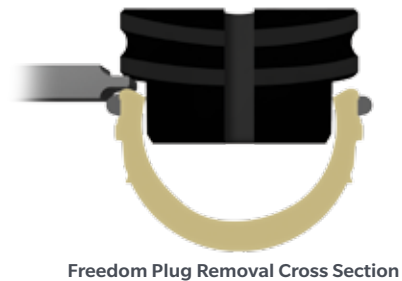


Figure 39



Freedom Plug Removal Cross Section

Figure 40

Polyethylene Liner Insertion (cont.)

Note: If the liner becomes tilted during initial impaction, it is recommended that you do not impact the sides of the liner and instead manually remove and reseat the liner prior to additional impaction. Once in place, begin impaction again by delivering several firm mallet strikes with the tip of the impactor in the dome of the liner.

Note: The impaction force needed to fully seat the liner into the acetabular shell may be dependent on liner size, liner style and polyethylene thickness. To ensure complete seating of the liner, it may be necessary to utilize an impaction force similar to that which is needed to insert the acetabular shell.

Check to ensure the liner is fully seated by running your finger around the face of the shell. When properly seated, the polyethylene scallops will sit flush with, or slightly below, the face of the shell (Figure 39).

Note: The ball impactor is slightly undersized to prevent excessive forces at the rim that may cause polyethylene deformation and prevent full seating.

Freedom Constrained Liner Insertion

Remove the black plug covering the mouth of the liner with the Freedom plug removal tool (Figure 40); discard this plug. Place the liner into the acetabular shell. When satisfied with placement, using the appropriately sized G7 Freedom ball impactor, place the tip of the impactor on the dome of the liner and strike the impactor with the mallet to ensure proper seating of the liner. When properly seated there will be a slight gap between the constraining ring and the face of the shell. Pull on the liner by hand after insertion to ensure proper seating has been achieved.

Note: The diameter of the G7 36 mm size D Freedom liner ring is slightly larger than the G7 50 mm D shell. Care should be taken when using this construct.

*Check for country product clearances and reference product specific instructions for use.

G7 Ceramic Articulation

Shell Size		Head Size			
		28	32	36	40
46	B	B 28			
48	C		C 32		
50	D		D 32		
52	E		E 32	E 36	
54	F		F 32	F 36	
56					
58	G		G 32	G 36	G 40
60					
62	H		H 32	H 36	H 40
64					
66	I		I 32	I 36	I 40
68					
*70					
*72					

*Available in OsseoTi Multi hole configuration only

Figure 41

Ceramic Liner Insertion

The definitive ceramic liner may now be introduced (Figure 41). Ensure the apical plug is not present at the dome of the shell and that the interior of the shell and all tapers are dry and free of debris.

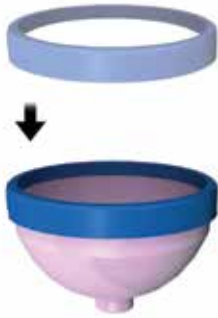


Figure 42

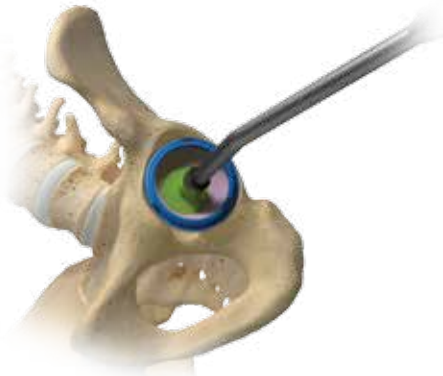


Figure 43a



Figure 43b



Figure 43c



Correct Ceramic Liner Seating

Figure 43d

Ceramic Liner Insertion (cont.)

Option 1: Hard Bearing Inserter Ring

Select the appropriate hard bearing inserter ring, as indicated alphabetically and by color. The inserter ring is designed to properly align the taper interface for accurate seating of the ceramic liner. Its color will match the rim of the acetabular shell. Press the hard bearing inserter ring onto the face of the definitive liner implant (Figure 42). Visually verify the ring is fully seated against the face of the liner.

Utilizing the straight insertion handle with a suction cup attached or the bent suction cup handle, gently seat the liner into the taper (Figure 43a). Ensure the hard bearing inserter ring evenly contacts the face of the shell, prior to impaction (Figure 43b).

Utilizing the appropriately sized liner impactor, impact the definitive liner with several moderate mallet strikes. During impaction, the hard bearing inserter ring will disengage from the definitive liner and should be removed (Figure 43c). When properly seated, the liner will sit flush with, or slightly above the face of the shell (Figure 43d).

ⓘ **Note:** The definitive liner must be seated with impaction force. Pushing the liner into the shell by hand may result in malalignment. Failure to follow these instructions may result in damaged liners.

ⓘ **Note:** The purpose of the hard bearing inserter ring is for alignment only and is not an indicator that the liner is engaged or fully seated. The liner may need to be impacted several times to ensure the taper is fully seated.

Important: Care should be taken not to scratch the taper surface of either the bearing or the shell. If the liner must be removed for any reason, a new shell must be inserted before inserting another ceramic liner.

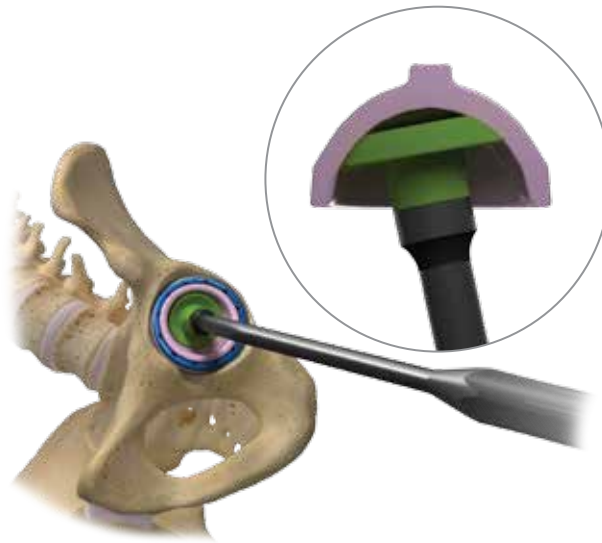


Figure 44

Ceramic Liner Insertion

Option 2: Suction Cup Handle Only

Utilizing the straight insertion handle with a suction cup attached, first position the suction cup on the liner at the 11 o'clock position (Figure 44). This angular placement helps to ensure straight seating of the liner.

Once attached to the suction cup, align the ceramic liner with the most anterior point of the acetabular shell, leading with the attachment point of the suction cup (Figure 44). Gently seat the liner into the taper. The button on the back of the liner will help aid alignment. Once inserted, push on the liner to seat fully. Rotate the suction cup clockwise to disengage from the liner. Prior to impaction, ensure the edge of the liner is properly aligned in relation to the face of the rim.



Figure 45

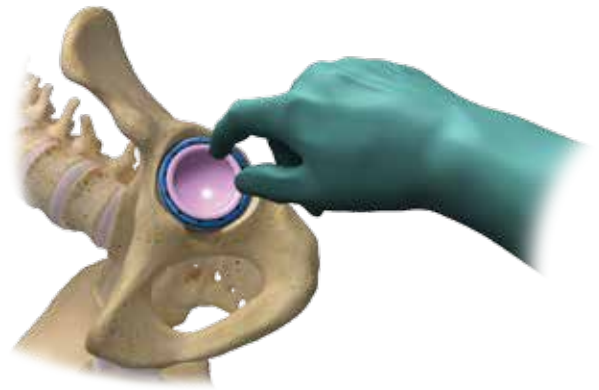


Figure 46



Correct Ceramic Liner Seating

Figure 47

Ceramic Liner Insertion (cont.)

Utilizing the appropriately sized liner impactor, place the tip of the impactor on the dome of the liner and strike the impactor with the mallet to ensure proper seating of the liner (Figure 45). Check to ensure the liner is fully seated by running your finger around the face of the shell (Figure 46). When properly seated, the liner will sit flush with, or slightly above, the face of the shell (Figure 47).

IMPORTANT: Care should be taken not to scratch the taper surface of either the bearing or the shell. If the liner must be removed for any reason, a new shell must be inserted before inserting another ceramic liner.

ⓘ **Note:** To release a ceramic liner which is malpositioned, the G7 Tamp instrument is available. Line the tab up to one of the three recessed areas on the face of the shell. Hit the impactor area with the mallet several times to cause vibration and loosen the liner. Use the suction cup to grasp the liner and remove from the shell.



Figure 48



Figure 49

Modular Head Selection and Impaction

With the definitive acetabular bearing in place, and upon completion of femoral implantation and trial reduction, the corresponding modular head can now be selected. After fully seating the femoral component, position the modular head onto a dry and clean trunnion. Fully seat the modular head by means of firm axial impaction utilizing the femoral head pusher and mallet.

- ⓘ **Note:** If using a modular ceramic head with a taper sleeve insert, it is important that the taper sleeve is new as a used taper can reduce fatigue strength of ceramic components.
- ⓘ **Note:** When utilizing the Freedom Constrained liner, position the Freedom head on the stem so that the marking on the head is located in the most superior position prior to impaction.

Final Reduction

Once all final implants have been placed, perform the final reduction of the hip. Check for joint stability and range of motion, making any necessary adjustments to restore joint mechanics (Figure 48).

- ⓘ **Note:** When reducing the hip using the Freedom Constrained liner and head, ensure that the marking on the head is still in the superior position on the stem (Figure 49). Reduce the joint by aligning the flat aspect of the head with the liner's mouth. Full reduction may produce an audible "snap." Place the joint through a full range of motion to ensure stability, checking that there is no early impingement.

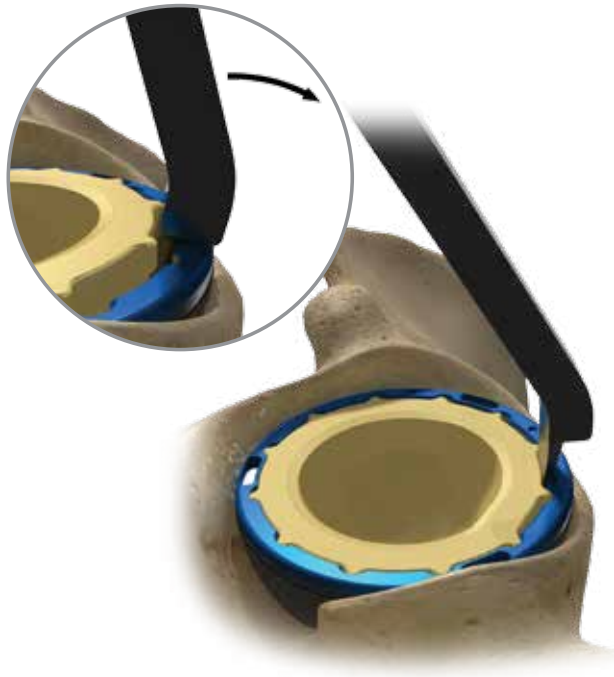


Figure 50

Polyethylene Liner Removal

Should it be necessary to remove the liner from the shell, the polyethylene liner removal tool can be used to disassociate the liner. To remove the liner, insert the pointed tip of the liner removal tool between the liner and the shell with the tip positioned between the liner scallops. Start insertion with the grip angled toward the inner diameter of the shell. As the wedge is driven between the shell and the liner, gradually rotate the grip until vertical. Impact the polyethylene liner removal tool until the shoulder fully rests on the face of the shell (Figure 50).

Apply a lever force to the liner by pressing against the shaft of the liner removal tool.

It may be necessary to do this in several locations around the face of the shell to disengage the locking mechanism. The polyethylene liner will lever out of the shell once the locking mechanism has been disrupted.

- ⊖ **Note:** Avoid driving the metal tip along the tapered region of the shell to prevent damage to the taper during liner extraction.
- ⊖ **Note:** The polyethylene liner removal tool should only be used on a well fixed shell or a shell with acetabular screws.



Figure 51



Figure 52

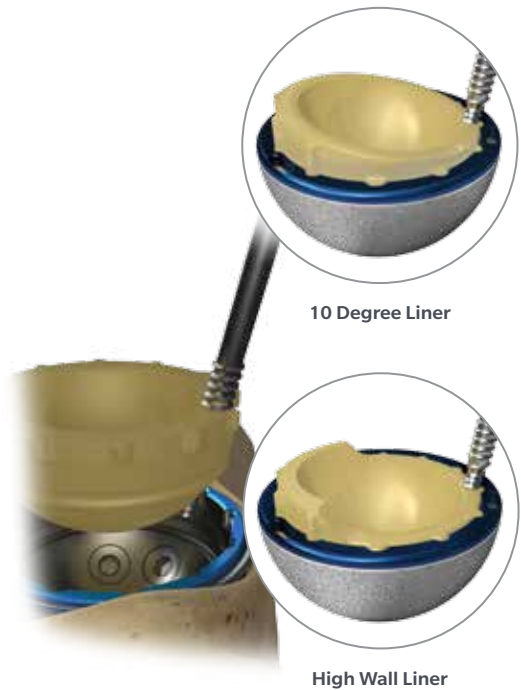


Figure 53

Figure 53a

Polyethylene Liner Removal (cont.)

Neutral Liner Removal Using Drill Instruments

If using the Poly Liner Removal Drill Bit and Screw, first select the face plate corresponding to the letter and color of the shell size implanted. Turn the face plate upside down so that the word “extract” is facing you and attach it to an insertion handle. Align the tabs of the face plate to the recessed areas on the face of the shell.

Insert the G7 Poly Liner Removal Drill Bit into either drill hole of the face plate (Figure 51). Drill a pilot hole for the poly removal screw and advance until the shoulder of the drill bit touches the face plate.

Remove the face plate and handle. Using the ratcheting screwdriver handle, insert the Poly Liner Removal Screw into the pilot hole, advancing it all the way to the shell dome to remove the liner (Figures 52 and 53).

ⓘ **Note:** The Poly Liner Removal Drill Bit and Poly Liner Removal Screw are delivered sterile for single use.

ⓘ **Note:** If the screw enters one of the shell screw holes, remove the screw and repeat in an alternate location with a new drill bit and screw.

10 Degree Face Changing and High Wall Liner Removal with Drill Instruments

Position the G7 Poly Liner Removal Drill Bit at the face of the polyethylene liner. Angle the drill bit at approximately 15 degrees from the axis of the shell and drill a pilot hole for the poly removal screw (Figure 53a).

Should the drill cut through into the inner diameter of the polyethylene, drill a new hole in an alternate location around the rim, slightly decreasing the entrance angle relative to the axis of the shell.

Drill the pilot hole until the shoulder of the drill bit touches the face of the liner or the drill tip touches the dome of the shell. Using the ratcheting screwdriver handle, insert the Poly Liner Removal Screw into the polyethylene and advance it all the way to the shell dome to remove the liner.

ⓘ **Note:** The Poly Liner Removal Drill Bit and Poly Liner Removal Screw are delivered sterile for single use.

ⓘ **Note:** If the screw enters one of the shell screw holes, remove the screw and repeat in an alternate location with a new drill bit and screw.

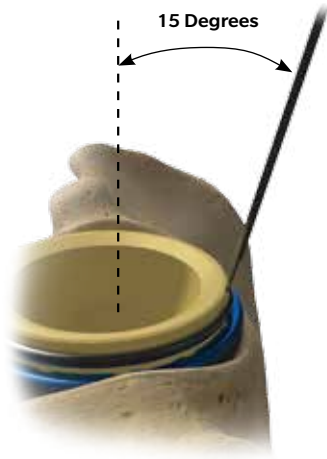


Figure 54



Figure 55



Figure 56

Polyethylene Liner Removal (cont.)

Freedom Constrained Liner Removal

Place the Poly Liner Removal Drill Bit at the interface of the liner and the constraining ring. Angle the drill bit at approximately 15° from the axis of the shell and drill a pilot hole for the poly removal screw (Figure 54).

The drill should only enter the polyethylene, but remain close to the constraining ring.

Should the drill cut through into the inner diameter of the polyethylene, drill a new hole in an alternate location around the rim, slightly decreasing the entrance angle relative to the axis of the shell.

Drill the pilot hole until the shoulder of the drill bit touches the face of the liner. Insert the Poly Liner Removal Screw into the poly and advance it all the way to the shell dome to remove the liner (Figure 55 and 56).

ⓘ **Note:** For sizes I & J, the poly removal drill bit may be inserted through the exposed polyethylene scallops or the polyethylene liner removal tool may be used in the same manner as with non-constraining liners.

ⓘ **Note:** When removing a Freedom 10 Degree Face Changing liner*, align the drill bit with the black line located on the raised portion of the liner and ensure the angle of the removal screw is nearly perpendicular to the face of the shell before drilling the pilot hole.

*Check for country product clearances and reference product specific instructions for use.



Figure 57

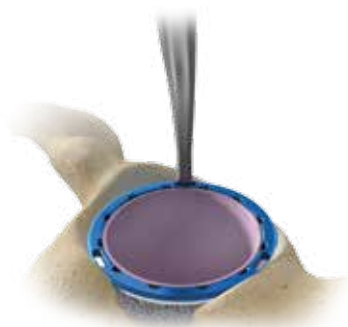


Figure 59



Figure 58



Figure 60

Ceramic Liner Removal

Should it be necessary to remove the ceramic liner, the insertion/extractor plates can be used. Select the appropriate face plate that matches the letter and color of the implant. Turn the insertion plate upside down so that the word “extract” is facing you and attach it to the straight impactor handle. Align the tabs of the face plate with the three recessed areas on the face of the shell (Figure 57). Hit the impactor handle with the mallet several times to cause vibration and loosen the liner. Use the suction cup to grasp the liner and remove from the shell (Figure 58).

ⓘ **Note:** To release a ceramic liner which is malpositioned, the G7 Tamp instrument is available. Align the tamp with one of the three recessed areas on the face of the shell (Figure 59). Hit the impactor area with the mallet several times to cause vibration and loosen the liner. Use the suction cup to grasp the liner and remove from the shell.

ⓘ **Note:** The G7 Tamp should only be used on a well fixed shell or a shell with acetabular screws.

Shell Removal

To remove the acetabular shell ensure all bone screws have been removed. Thread the extractor tool to a standard slap hammer and thread into the apical hole of the shell. Utilize the slap hammer to pull the shell directly out of the acetabulum, conserving as much bone as possible (Figure 60). Once the component is removed, careful evaluation of the acetabulum is suggested, with close attention to the integrity of the anterior/posterior columns and the medial wall. Any osteolytic cysts should be curetted and irrigated.

Inserter Handle Disassembly

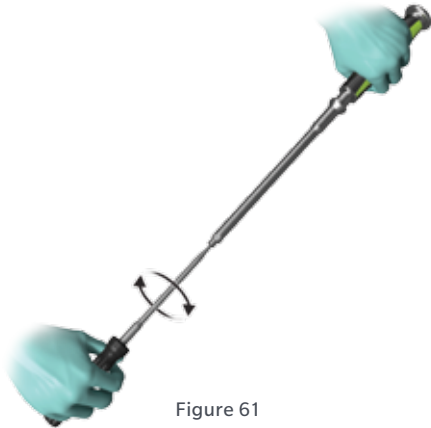


Figure 61



Figure 62

Straight Inserter Handle Disassembly

To disassemble for cleaning, place a 3.5 mm hex screwdriver in the tip of the threaded shaft. Turn the screwdriver clockwise while pushing lightly to disengage the threaded shaft from the handle (Figure 61).

Curved Inserter Handle Disassembly

To disassemble for cleaning, place a 3.5 mm hex screwdriver in the tip of the threaded insert. Turn the screwdriver clockwise while pushing lightly to disengage the insert (Figure 62).

Indications

1. Noninflammatory degenerative joint disease including osteoarthritis and avascular necrosis.
2. Rheumatoid arthritis.
3. Correction of functional deformity
4. Treatment of non-union, femoral neck fracture, and trochanteric fractures of the proximal femur with head involvement, unmanageable by other techniques.
5. Revision procedures where other treatment or devices have failed.

Porous acetabular shells and femoral stems are indicated for uncemented biological fixation. Non-coated or polyethylene components may be used with mating components that are indicated for either cemented or uncemented use.

Indications for Biomet G7 Freedom Constrained Liners:

The Biomet G7 Freedom Constrained Liner is indicated for use as a component of a total hip prosthesis in primary and revision patients at high risk of dislocation due to a history of prior dislocation, bone loss, joint or soft tissue laxity, neuromuscular disease, or intraoperative instability, and for whom all other options to constrained Acetabular components have been considered.

Contraindications

Absolute contraindications include: infection, sepsis, and osteomyelitis.

Relative contraindications include: 1) uncooperative patient or patient with neurologic disorders who are incapable of following directions, 2) osteoporosis, 3) metabolic disorders which may impair bone formation, 4) osteomalacia, 5) distant foci of infections which may spread to the implant site, 6) rapid joint destruction, marked bone loss or bone resorption apparent on roentgenogram, and 7) vascular insufficiency, muscular atrophy, or neuromuscular disease.

Contraindications when shell is used with Biomet G7 Freedom Constrained Liner:

Bone or musculature compromised by disease, infection, or prior implantation that cannot provide adequate support or fixation for the prosthesis.

For full prescribing information, including Indications for Use, Contraindications, Warnings, Precautions and Possible Adverse Effects, see the package insert and “Patient Risk Information” tab on zimmerbiomet.com.

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