Surgical Technique

smith&nephew

REDAPT◇

Revision Acetabular System
Acetabular Augments

CONCELOC◇

Advanced Porous Titanium

Design surgeon list

Smith & Nephew thanks the following surgeons for their participation as part of the REDAPT® Revision Acetabular System design team:

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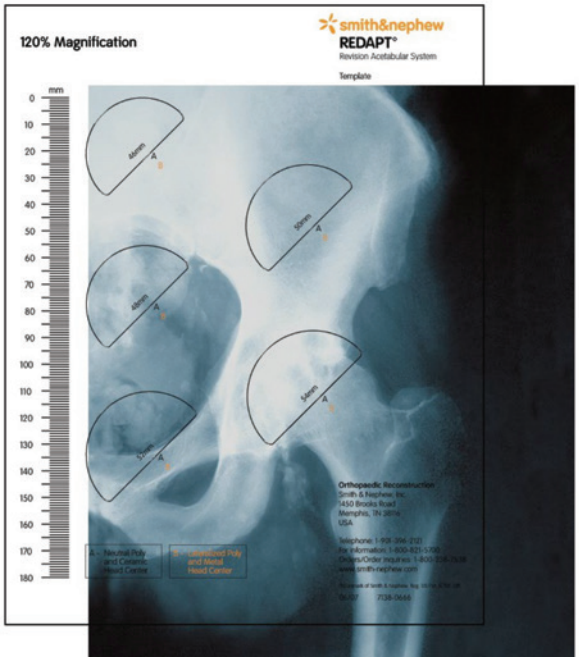
The following technique is for informational and educational purposes only. It is not intended to serve as medical advice. It is the responsibility of the treating physician to determine and utilize the appropriate products and techniques according to their own clinical judgment for each of their patients. For more information on any product referenced herein, including indications for use, contraindications, effects, precautions and warnings, please consult the product's Instructions for Use (IFU) prior to use.

Nota Bene: The technique description herein is made available to the healthcare professional to illustrate the authors' suggested treatment for the uncomplicated procedure. In the final analysis, the preferred treatment is that which addresses the needs of the patient.

Preoperative planning

The procedure should first begin with preoperative templating. Care should be taken to determine the degree of bone loss, any damaged/loose components and any difficult anatomical concerns. Factors such as leg length, and estimation of the hip center, etc. should be considered prior to surgery.



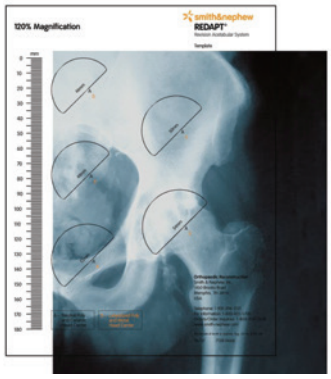
Acetabular exposure component removal

The surgeon should use the surgical approach with which he/she is comfortable.

Adequate exposure should be performed to accommodate the removal of existing components and insertion of the acetabular shell and REDAPT Acetabular Augments.

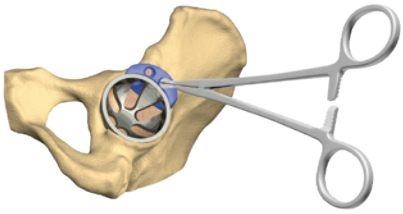
This surgical technique will focus on the acetabulum. Removing a well-fixed shell can be facilitated with the RENOVATION® Implant Removal System (71380701).

Short Surgical Technique

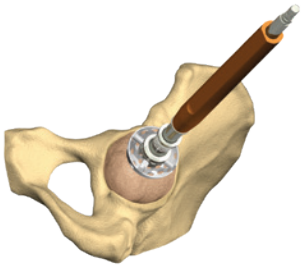


1. Preoperative planning

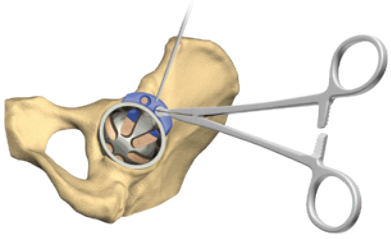
2. Remove existing components



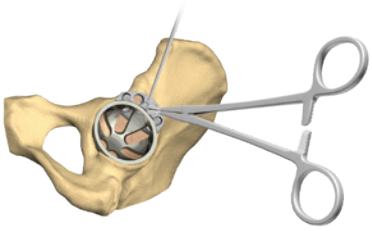
3. Initial acetabular trialing



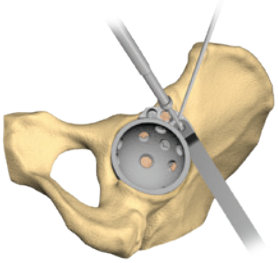
4. Ream defect



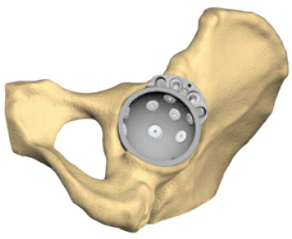
5. Acetabular trialing – insert Steinman Pin



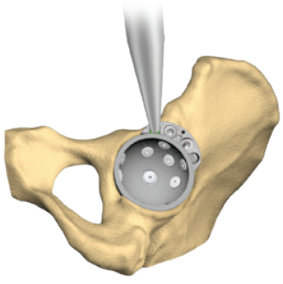
6. Augment insertion



7. Pre-drill for screws

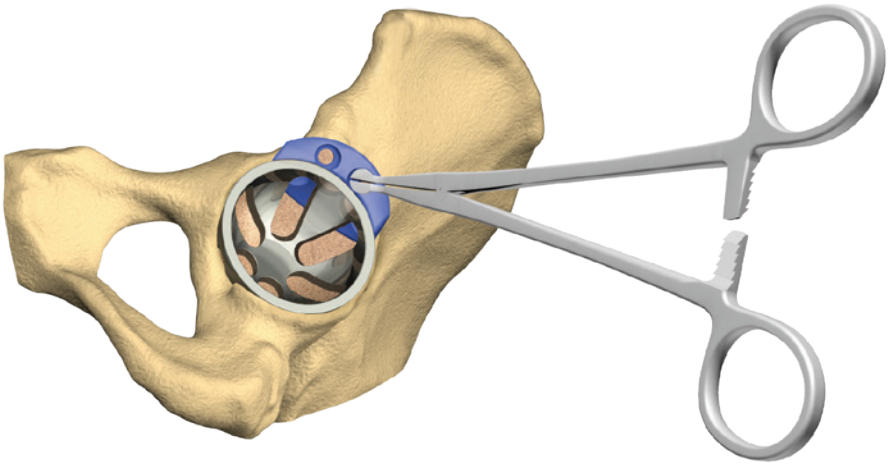


8. Screw insertion



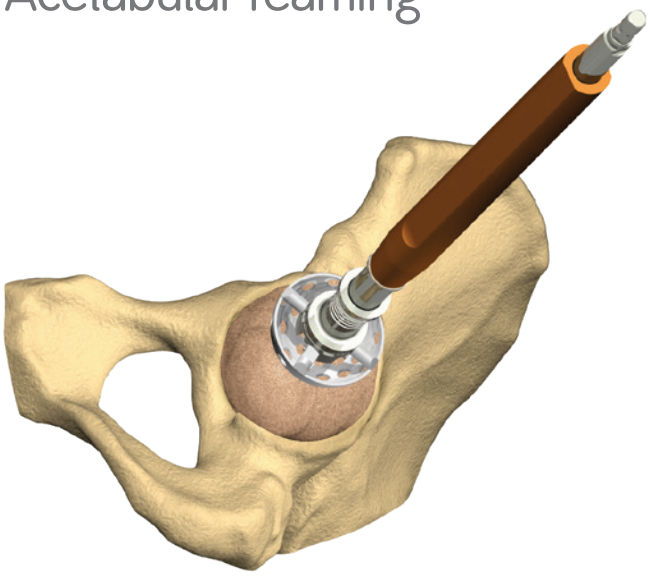
9. Cement augment to shell, “unitizing the construct”

Acetabular trialing



Prior to acetabular reaming, initial trialing should be performed to determine provisional shell and augment fit. The supplied trials can be inserted to verify size and position of the augment and shell. The surgeon should use the supplied augment holding forceps to hold the augment trial and assess appropriate orientation and size.

Acetabular reaming



If it is determined that the acetabular shell will need additional support, the acetabulum should be prepared to receive the REDAPT® Acetabular Augments. The provided reamers should be used to carefully prepare the acetabular defect. Care should be taken to remove as little host bone as possible.

Note: Reaming should begin with a reamer smaller than the diameter of the shell that was removed. Then the surgeon should sequentially move up in reamer size until the acetabulum is sufficiently prepared to receive the desired REDAPT Acetabular Augment. **The outer diameter of the REDAPT Acetabular Augments is 4mm less than the inner diameter.**

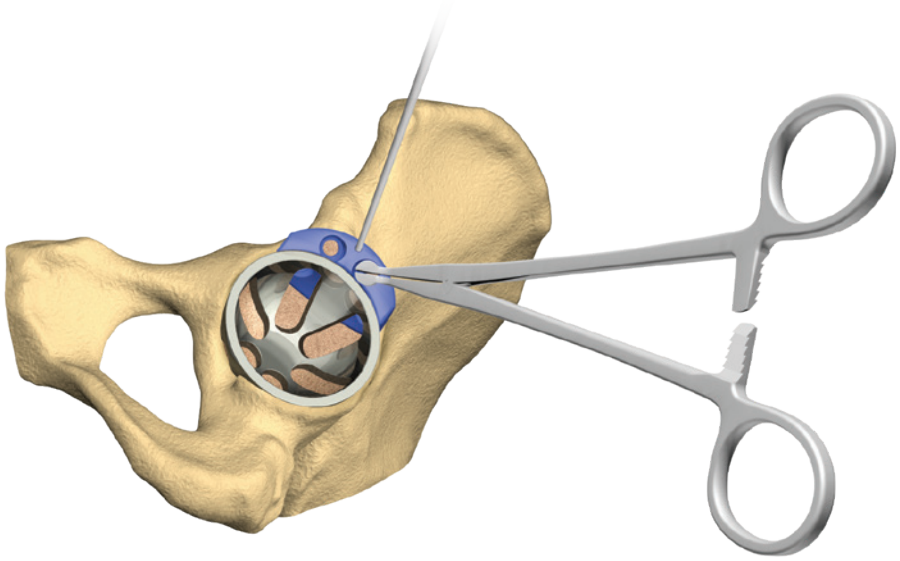
See chart below for reaming guidance.

Augment	Reamer
50	46
56	52
62	58
68	64
74	70

Surgical tips:

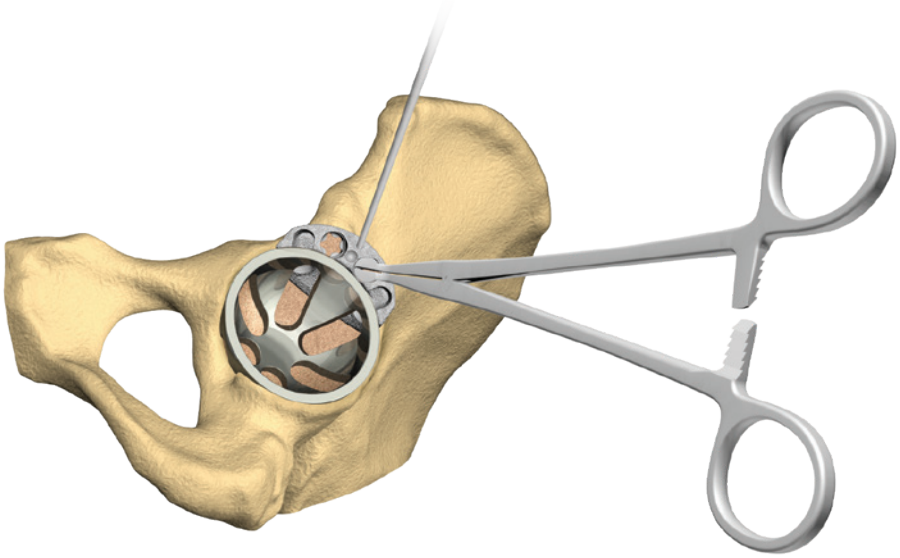
- Anticipate minimal reaming for revision procedures.
- Adhere to the preoperative plan and take care not to chase defects or ream beyond the width of the anterior or posterior columns.
- If fixation of the augment to the bone will require utilization of the internal holes on the REDAPT Augments (Slice Augment only), the "Augment First" technique should be used to ensure the internal holes are not blocked by the shell

Secondary trialing

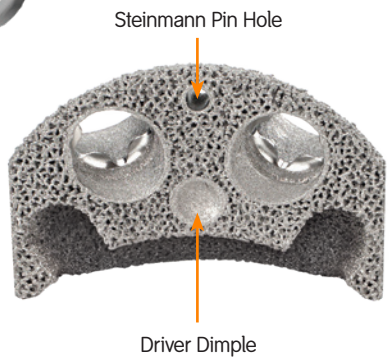


Assess the prepared defect with trial shells and trial augments. Once the desired shell and augment orientation and sizing is achieved, a Steinmann pin (up to 2mm) can be inserted into the small hole on the superior face of the augment trial. The trial can be slid over the Steinmann Pin leaving the Steinmann Pin in place to mark the desired position and orientation.

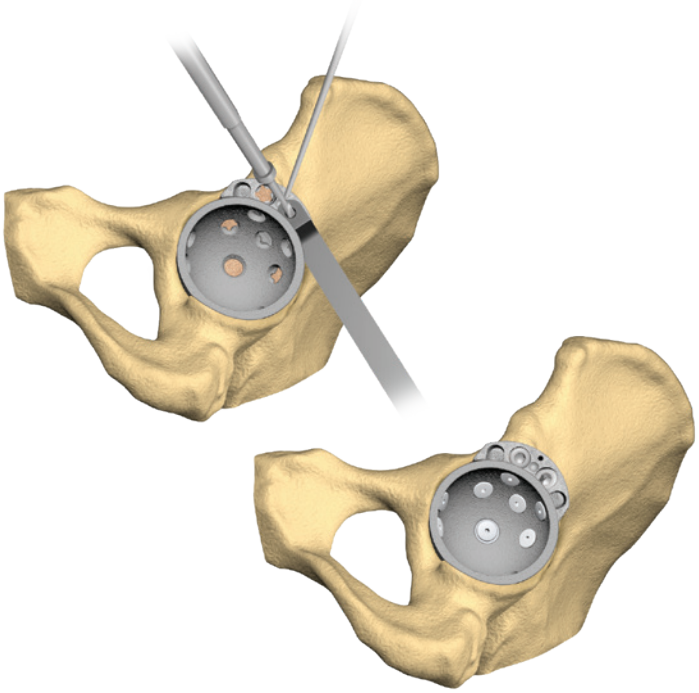
Acetabular augment insertion



After acetabular component trialing is complete, select the corresponding size augment and affix to the augment holding forceps (71355366). Once the desired positioning of the augment is achieved, the augment can be further seated by using the R3 Hole Cover Impactor (73-2117) and a mallet to lightly impact the augment at the dimple (see image) just below the Steinman Pin hole. Note: 8mm thick augments may not have a driver dimple feature.



Acetabular screw insertion



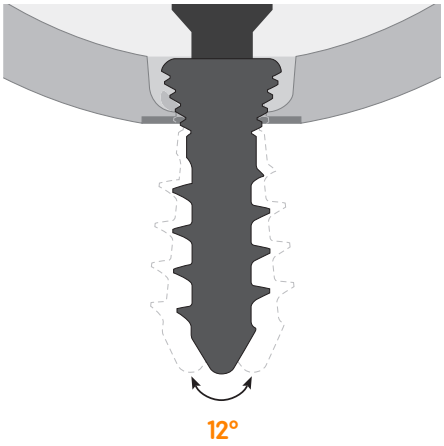
Screws should be used to secure the augment. For screw fixation, each screw hole must be pre-drilled. **When drilling to prepare for screw holes, the REDAPT° Drill Guide (71355121) must be used.** If the tip is not fully seated, damage to the locking tabs may occur, the limits of angulation may be exceeded and the locking strength of the screws may be affected. After drilling the hole, use the depth gauge to verify appropriate screw length(s). The REDAPT Acetabular Augments provide multiple opportunities for screw fixation to host bone. Care should be taken to orient the augment so that the hole pattern aligns with desired points of fixation. Each hole can accept either a spherical head screw or a variable angle locking screw. **Drilling through the porous structure to create additional fixation points or altering the shape of REDAPT Acetabular Augments should not be attempted as implant integrity may be compromised. Altering the shape of the implants should not be attempted.**

Spherical head screws

Spherical head screws can be used with REDAPT Revision Acetabular Systems. Use the screw forceps to hold the screw. Attach the ball-joint or flexible screwdriver shaft to the end of the screw. Then introduce the screw into the hole and screw it into place using the ratcheting screwdriver handle. Make sure the screw is fully seated within the screw hole so that it will not impinge on the Revision Acetabular components.

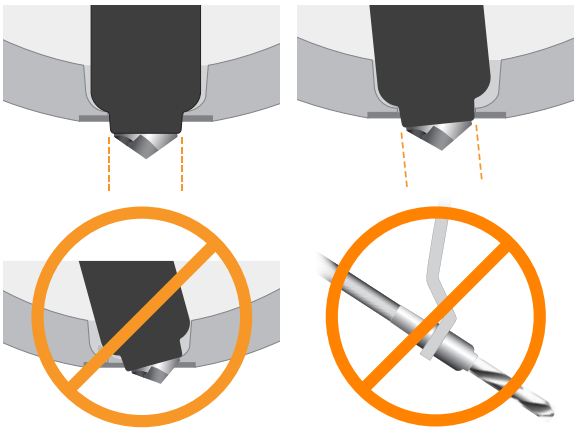
Surgical tips:

- The REDAPT Drill Guide has two different tip angles. When using this guide, use whichever end of the drill guide provides optimal access to ensure it is fully seated in the selected screw hole.
- Many surgeons choose to place a non-locking screw first, then proceed to locking screws. At least one non-locking screw should be placed prior to placing locking screws.
- It is important to avoid neurovascular complications by proper screw placement, avoiding the anterior/superior or anterior/inferior quadrants.
- Inspect each screw to ensure that screw heads are flush or below the inner diameter of the acetabular shell.
- The use of radiographic imaging may facilitate precise screw placement.
- Provisional but not final tightening of augment screws may be preferred in augments to ease the insertion of the acetabular shell. Final tightening of the screws should be performed prior to unitizing the construct.



Instrument tips:

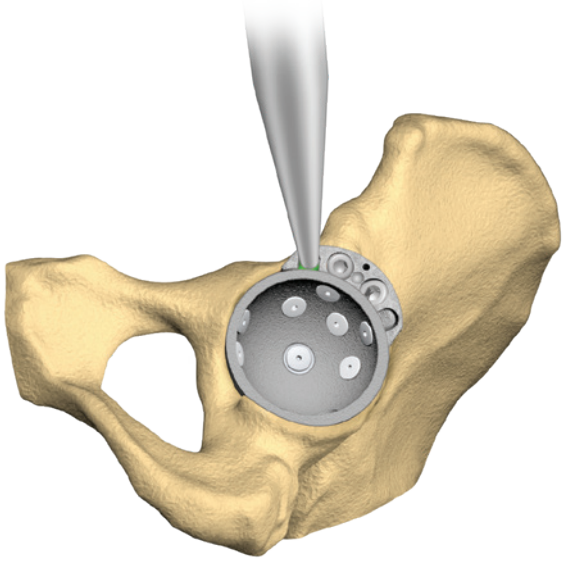
- The tip of the REDAPT drill guide must be fully seated in the screw hole.



Acetabular screw insertion *continued*

Locking screws
The Torque Limiting Driver (71354299) should always be used to ensure a secure fit and prevent over-tightening. Over-tightening may result in damage to the locking screw tabs on the shell or augment.

Acetabular shell insertion



When satisfactory placement of the augment is achieved, the surgeon should begin preparation to implant the acetabular shell component. Care should be taken to ensure intimate contact between the augment and shell components. Implant the shell using the surgical technique described for the chosen acetabular shell component. REDAPT Acetabular Augments can be used with: REDAPT Fully Porous Shell, REDAPT Modular Revision Shell, or R3 Acetabular Shells.

Note: If augment screws were provisionally tightened, final tightening of the augment screws will be required after the acetabular shell is fully seated.

Acetabular component assembly

The augment and shell must be fixed together using bone cement.

Mix bone cement according to suggested manufacturer's instructions allowing appropriate cure time.

The Tapered Cement Nozzle (71270081) supplied with Smith & Nephew RALLY° cement kit features a nozzle that easily interfaces with the cement ports on the face of the REDAPT Acetabular Augments to help with filling the interface between the shell and augment. A Toomey syringe can be filled with uncured cement and inserted into the cement ports. It is important to alternate between the cement ports to ensure an adequate fill of the cement channels. Inject cement slowly but steadily. Ensure the nozzle remains fully seated within the cement port in the REDAPT Acetabular Augment. Remove any excess uncured cement. Augment/shell interface must be cemented prior to liner cementing to ensure proper cement flow through the tapered nozzle.

Alternate technique

The REDAPT◊ Augments can also be placed after the acetabular shell is implanted. For this approach, follow the surgical technique for the type of shell being implanted. Once the shell is implanted, trial assessments of the defect can be performed to determine the size and orientation of REDAPT Augment that will be implanted.

Note: This technique will not permit the utilization of the internal screw holes on the REDAPT Slice Augment. The REDAPT Staple Augment may be a preferred option for this technique.

After acetabular component trialing is complete, select the corresponding size augment and affix to the augment holding forceps (71355366). Once the desired positioning of the augment is achieved, the augment can be further seated by using the R3◊ Hole Cover Impactor (73-2117) and a mallet to lightly impact the augment at the dimple just below the Steinmann Pin hole.

Note: Smaller size augments may not have a driver dimple feature.

Acetabular component assembly

The augment and shell must be fixed together using bone cement.

Mix bone cement according to suggested manufacturer's instructions allowing appropriate cure time.

The nozzle supplied with Smith & Nephew RALLY◊ cement kit features a nozzle that easily interfaces with the cement ports on the face of the REDAPT Acetabular Augments to help with filling the interface between the shell and augment. A Toomey syringe can be filled with uncured cement and inserted into the cement ports. It is important to alternate between the cement ports to ensure an adequate fill of the cement channels. Inject cement slowly but steadily.Ensure the nozzle remains fully seated within the cement port in the REDAPT Acetabular Augment. Remove any excess uncured cement.

REDAPT◇ Blade Augment

Special thanks to the following surgeons for their assistance in describing the surgical technique for the REDAPT Blade Augment:

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Marcus C. Ford, MD
Campbell Clinic Orthopedics
Memphis, TN

Thomas W. Huff, MD
University of Oregon Health Sciences
Portland, OR

For instances where defects are not contained or where there is degradation of the anterior or posterior acetabular columns, a “buttress”, “columnar”, or “7-graft style” augment may be preferred. The REDAPT Blade Augment is designed to assist in the reconstruction of these defects. The REDAPT Blade Augment is a two piece augment consisting of: a Base to re-establish an acetabular rim and Wing to affix the ilium.

Pre-operative planning and defect identification/classification will facilitate a more efficient experience. For the use of the REDAPT Blade Augment, an extensile exposure should be favored. Caution should be exercised to avoid nerve structures. Sub periosteal exposure is optimal for placement of the Wing component. Visualization of the inferior ischium and posterior ilium is key.

Acetabular Preparation

The acetabulum should be prepared to restore the anatomic hip center. In most instances, the acetabular shell should be placed prior to placing the REDAPT Blade Augment. A series of trials for both shells and augments can be used to identify the anatomic hip center.

After the anatomic hip center is defined, the definitive implants should be implanted to replicate the trials. At this point, it will need to be determined if in situ provisional assembly of the buttress and Wing components is feasible or if they will need to be assembled ex vivo.

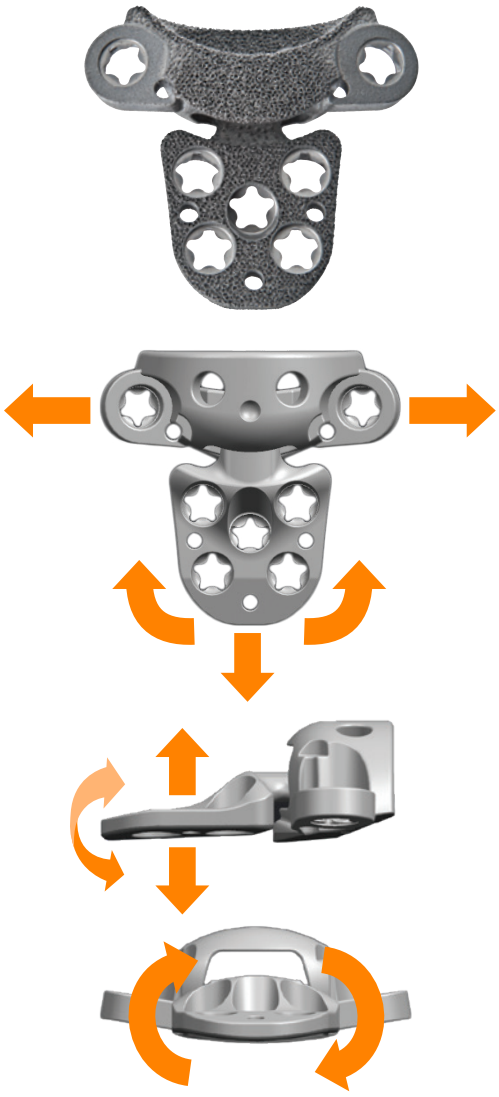
This technique will describe the in situ placement:

1. The REDAPT Blade Augment Base trial component should be used to determine the appropriate size to reestablish an acetabular rim while maintaining maximum contact with the acetabular shell. Minor bone resection may be required to optimize coverage.

2. Provisionally fix the Base in place with Steinmann Pins (up to 2mm).

3. REDAPT Augment Holding Forceps can be used with the Blade Augment trials and implants. The two screw holes of the Base and three screw holes near the beam of the Wing are compatible with the forceps. Otherwise, hand placement of components can also suffice.

4. Use the REDAPT Blade Augment Wing trial should be interlocked with the Base and adjusted to ensure adequate iliac fixation. Steinmann Pins can be used with the Wing trial, but they may be better utilized for ex vivo assembly of the Blade components.



5. The final position of the REDAPT® Blade Augment Wing trial should be noted or marked to assist with placement of the definitive REDAPT Blade Augment Wing implant.

6. The definitive implants should replace the position of each of the trial components final position.

7. The REDAPT Blade Augment Base implant should be fixed with screws. It may be preferred to use locking screws to minimize and cantilevering or "lift off" effect when tightening the initial screw.

8. The REDAPT Blade Augment Base should be secured with screws to provide a stable position before assembling the Wing component.

9. The R3 Hole Cover Impactor [73-2117] may be used to stabilize the Base component at the dimple during pre-drilling and screw insertion. Avoid interference of screws used in the shell and augment. It is recommended that two screws be used to attach the base component.

10. The REDAPT Blade Augment Wing implant should be assembled by rotating the Wing for a diagonal insertion and then rotating into a final position.

11. Recreate the trial condition of the implants before securing the REDAPT Blade Augment Wing implant into place.

12. The Wing component should be fixed to the ilium. It may be desired to use a Spherical Head Screw central hole in the hole cluster of the Wing for initial screw placement. It is recommended that three screws be used to fasten the wing component: one screw into the center hole and two additional screws on either side.

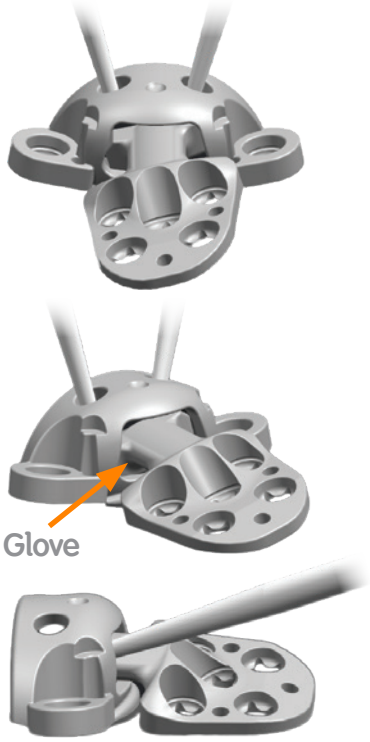
13. Maximum utilization of screw fixation is desirable into the ilium. Care should be taken not to alter the position of the Wing implant when drilling for screw holes.

Unitizing the construct

It is important that the Blade Wing and Base be unitized by filling the cement pocket thoroughly with cement.

To ensure that cement is retained in the cement pockets, hole covers should be utilized to block cement from ingress through screw holes in the acetabular shell. It is recommended that the Smith & Nephew tapered nozzle (CI 71270081) in conjunction with the Smith & Nephew MIXOR® Vacuum Mixing System (CI 71270020) and VORTEX Cement Gun (CI 71272001) be used to inject cement. If a Smith & Nephew tapered nozzle is not available, a Toomey syringe can be used as an alternate.

Start by injecting cement into the ports on the face of the Base. Alternate between each port to ensure a thorough fill. It is advisable to attempt to pressurize the cement by blocking any visible overflow of the cement using a gloved finger. Once thoroughly filled through the cement ports, additional cement should be applied to the aperture where the Base and Wing are assembled. Maximum cement coverage is critical to the integrity of the construct. It may be advisable to inject cement through any unused screw holes in the shell within close proximity of the Base component to assure no voids are present.



Augment Sizes

	Staple			Slice			Blade	
	8mm	12mm	18mm	12mm	18mm	24mm	Base	Wing
50mm								
56mm								
62mm								
68mm								
74mm								

Augment Shell Compatibility

REDAPT Augments
Staple

REDAPT Shells	R3 Shells
REDAPT Porous Acetabular Shells	R3 No Hole Acetabular Shells
REDAPT Modular Acetabular Shells	R3 No Hole HA Acetabular Shells
	R3 Three Hole Acetabular Shells
	R3 Three Hole HA Acetabular Shells
	R3 Multi Hole Acetabular Shells
	R3 Multi Hole Acetabular Shells

REDAPT Augments
Slice

REDAPT Shells	R3 Shells
REDAPT Porous Acetabular Shells	R3 No Hole Acetabular Shells
REDAPT Modular Acetabular Shells	R3 No Hole HA Acetabular Shells
	R3 Three Hole Acetabular Shells
	R3 Three Hole HA Acetabular Shells
	R3 Multi Hole Acetabular Shells
	R3 Multi Hole Acetabular Shells

REDAPT Augments
Blade

REDAPT Shells	R3 Shells
REDAPT Porous Acetabular Shells	R3 No Hole Acetabular Shells
REDAPT Modular Acetabular Shells	R3 No Hole HA Acetabular Shells
	R3 Three Hole Acetabular Shells
	R3 Three Hole HA Acetabular Shells
	R3 Multi Hole Acetabular Shells
	R3 Multi Hole Acetabular Shells

The REDAPT® Augments can be used with the REDAPT Porous Shells, REDAPT Modular Shells, and all variant types of R3® shells.

Augment Shell Compatibility *continued*

The size compatibility of the REDAPT® augments with the acetabular shells is shown below:

Color Key	
	REDAPT
	R3®

Augment Type	Compatible Acetabular Shell Size	Augment Size
Staple Augment	48mm, 50mm, 52mm	50x8mm, 50x12mm, 50x18mm
	54mm, 56mm, 58mm	56x8mm, 56x12mm, 56x18mm
	60mm, 62mm, 64mm	62x8mm, 62x12mm, 62x18mm
	66mm, 68mm, 70mm	68x8mm, 68x12mm, 68x18mm
	72mm, 74mm, 76mm, 78mm, 80mm	74x12mm, 74x18mm
	48mm, 50mm, 52mm	50x8mm, 50x12mm, 50x18mm
	54mm, 56mm, 58mm	56x8mm, 56x12mm, 56x18mm
	60mm, 62mm, 64mm	62x8mm, 62x12mm, 62x18mm
	66mm, 68mm, 70mm	68x8mm, 68x12mm, 68x18mm
	72mm, 74mm, 76mm, 78mm, 80mm	74x12mm, 74x18mm
Slice Augment	50x12mm, 50x18mm, 50x24mm	48mm, 50mm, 52mm
	56x12mm, 56x18mm, 56x24mm	54mm, 56mm, 58mm
	62x12mm, 62x18mm, 62x24mm	60mm, 62mm, 64mm
	68x12mm, 68x18mm, 68x24mm	66mm, 68mm, 70mm
	74x12mm, 74x18mm, 74x24mm	72mm, 74mm, 76mm, 78mm, 80mm
	50x12mm, 50x18mm, 50x24mm	48mm, 50mm, 52mm
	56x12mm, 56x18mm, 56x24mm	54mm, 56mm, 58mm
	62x12mm, 62x18mm, 62x24mm	60mm, 62mm, 64mm
	68x12mm, 68x18mm, 68x24mm	66mm, 68mm, 70mm
	74x12mm, 74x18mm, 74x24mm	72mm, 74mm, 76mm, 78mm, 80mm

The size compatibility of the REDAPT® augments with the acetabular shells is shown below:

Color Key	
	REDAPT
	R3®

Augment Type	Compatible Acetabular Shell Size	Augment Size
Blade Augment Base	48mm, 50mm, 52mm	50mm
	54mm, 56mm, 58mm	56mm
	60mm, 62mm, 64mm	62mm
	66mm, 68mm, 70mm, 72mm, 74mm, 76mm, 78mm, 80mm	68mm
	48mm, 50mm, 52mm	50mm
	54mm, 56mm, 58mm	56mm
	60mm, 62mm, 64mm	62mm
	66mm, 68mm, 70mm, 72mm, 74mm, 76mm, 78mm, 80mm	68mm
Blade Augment Wings	All sizes	Standard Size
	All sizes	Standard Size

Catalog

Spherical Head Screws	
Cat. no.	**Length (mm)**
71332515	15
71332520	20
71332525	25
71332530	30
71332535	35
71332540	40
71332545	45
71332550	50

REDAPT® Variable Angle Locking Screws	
Cat. no.	**Length (mm)**
71354502	15
71354503	20
71354504	25
71354505	30
71354506	35
71354507	40
71354508	45
71354509	50

REDAPT® Augments	
Item	**Description**
71354641	REDAPT® Slice Augment Trial 50 x 12mm
71354642	REDAPT Slice Augment Trial 56 x 12mm
71354643	REDAPT Slice Augment Trial 62 x 12mm
71354644	REDAPT Slice Augment Trial 68 x 12mm
71354645	REDAPT Slice Augment Trial 74 x 12mm
71354646	REDAPT Slice Augment Trial 50 x 18mm
71354647	REDAPT Slice Augment Trial 56 x 18mm
71354648	REDAPT Slice Augment Trial 62 x 18mm
71354649	REDAPT Slice Augment Trial 68 x 18mm
71354651	REDAPT Slice Augment Trial 74 x 18mm
71354652	REDAPT Slice Augment Trial 50 x 24mm
71354653	REDAPT Slice Augment Trial 56 x 24mm
71354654	REDAPT Slice Augment Trial 62 x 24mm
71354655	REDAPT Slice Augment Trial 68 x 24mm
71354656	REDAPT Slice Augment Trial 74 x 24mm

Continued on next page

REDAPT® Augments *continued*	
Item	**Description**
71354657	REDAPT Staple Augment Trial 50 x 8mm
71354658	REDAPT Staple Augment Trial 56 x 8mm
71354659	REDAPT Staple Augment Trial 62 x 8mm
71354661	REDAPT Staple Augment Trial 68 x 8mm
71354663	REDAPT Staple Augment Trial 50 x 12mm
71354664	REDAPT Staple Augment Trial 56 x 12mm
71354665	REDAPT Staple Augment Trial 62 x 12mm
71354666	REDAPT Staple Augment Trial 68 x 12mm
71354667	REDAPT Staple Augment Trial 74 x 12mm
71354668	REDAPT Staple Augment Trial 50 x 18mm
71354669	REDAPT Staple Augment Trial 56 x 18mm
71354671	REDAPT Staple Augment Trial 62 x 18mm
71354672	REDAPT Staple Augment Trial 68 x 18mm
71354673	REDAPT Staple Augment Trial 74 x 18mm
71355366	REDAPT Augment Holding Forceps
71355368	REDAPT Straight Shaft Drill 15mm
71355369	REDAPT Straight Shaft Drill 25mm
71355371	REDAPT Straight Shaft Drill 35mm
71355372	REDAPT Straight Shaft Drill 50mm
71355374	REDAPT Revision Acetabular Slice Augment Trials Tray
71355375	REDAPT Revision Acetabular Staple Augments Trials Tray
71355115	REDAPT Revision Acetabular Gen Instrument Tray
71362915	REFLECTION Flexible Drill 15mm
71362925	REFLECTION Flexible Drill 25mm
71362935	REFLECTION Flexible Drill 35mm
71362950	REFLECTION Flexible Drill 50mm
71354299	REDAPT Torque Limiter
71355121	REDAPT Drill Guide
71355119	REDAPT Revision Acetabular Tray Lid
71362293	Straight Shaft Screwdriver

REDAPT® Blade Augments	
Item	**Description**
71354679	REDAPT Blade Augment Base Trial 50mm
71354681	REDAPT Blade Augment Base Trial 56mm
71354682	REDAPT Blade Augment Base Trial 62mm
71354683	REDAPT Blade Augment Base Trial 68mm
71354685	REDAPT Blade Augment Wing Trial

Catalog *continued*

R3° Straight Shell Impactor/Positioner **Cat. no.** 71364450	
R3 Impactor Replacement Tip **Cat. no.** 71368570	
R3 Depth Gauge **Cat. no.** 71364451	
X-Bar **Cat. no.** MT-2201	
Screw Forceps **Cat. no.** 71362298	
Ball Joint Screwdriver **Cat. no.** 71362295	
REDAPT° Drill Guide **Cat. no.** 71355121	
Reamer Handle **Cat. no.** 71362279	
Flexible Screw Drills **Cat. no.** **Length (mm)** 71362915 15 71362925 25 71362935 35 71362950 50	
Captured Flexible Screwdriver Shaft **Cat. no.** 71362291	
Captured U-Joint Screwdriver Shaft **Cat. no.** 71362292	
Torque Limiter **Cat. no.** 71354299	
Trial Shell Handle **Cat. no.** 71362297	
Flexible Screwdriver **Cat. no.** 71362290	

Ratchet Handle **Cat. no.** 71362294	
Small Slap Hammer **Cat. no.** 71367541	
Straight Shaft Screwdriver **Cat. no.** 71362293	
Power Adaptors (not shown) **Cat. no.** 71362781 71362782 71362783	
Tapered Cement Nozzle **Cat. no.** 71270081	
RALLY® Medium Viscosity Bone Cement **Cat. no.** 71271580	
R3® Primary Reamer Set **Cat. no.** 71360673	
R3 Large Reamer Set **Cat. no.** 71362230	
R3 Jumbo Reamer Set **Cat. no.** 71362160	
R3 Primary Trial Shell Set **Cat. no.** 71360674	
R3 Jumbo Trial Shell Set **Cat. no.** 71362170	
R3 Acet Dome Screw Set **Cat. no.** 71334100	

Notes

Notes

Products may not be available in all markets because product availability is subject to the regulatory and/or medical practices in individual markets. Please contact your Smith & Nephew representative or distributor if you have questions about the availability of Smith & Nephew products in your area.

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