ZIMMER BIOMET
Your progress. Our promise.®

Alliance™ Glenoid

Surgical Technique

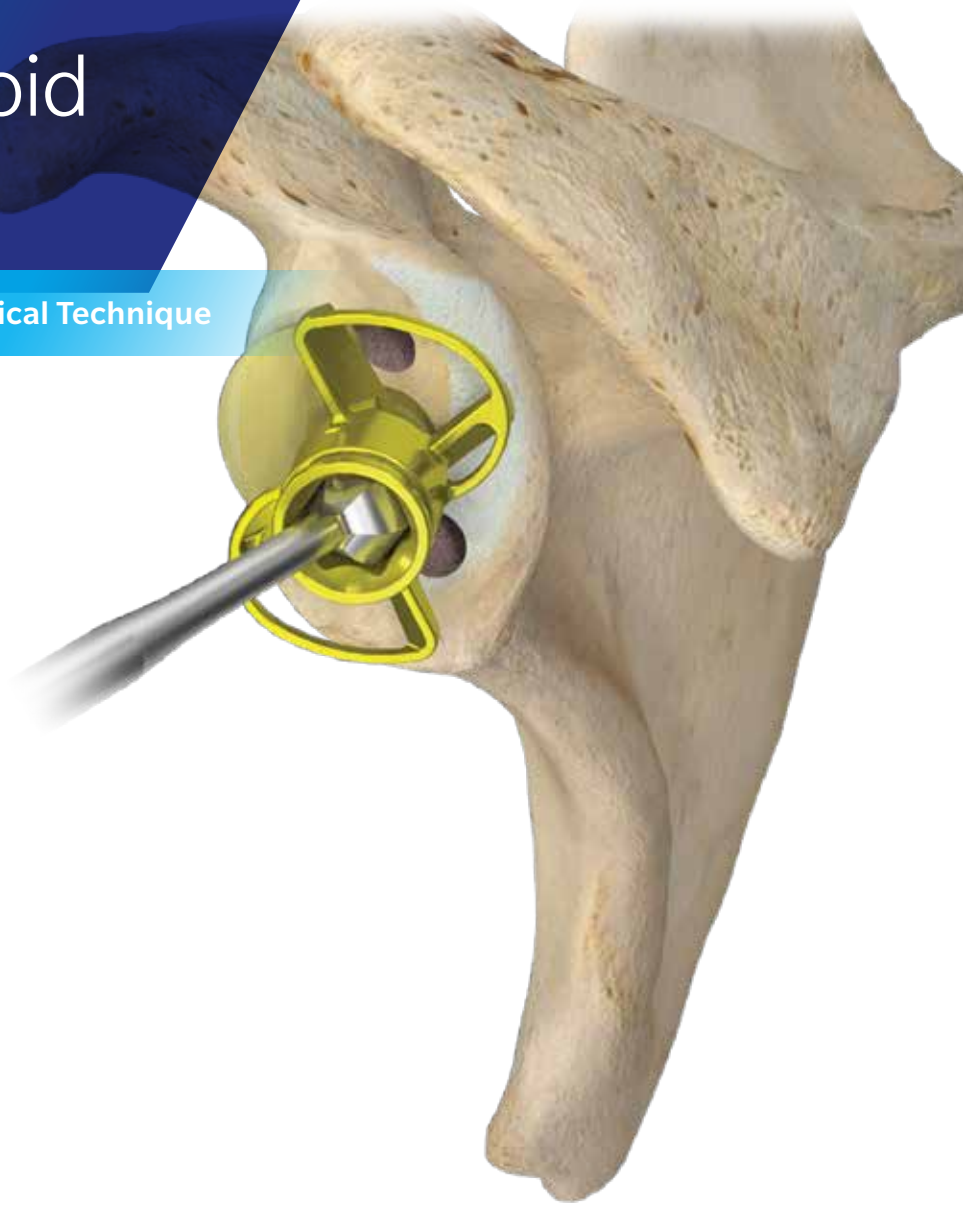


Table of Contents

Indications/Contraindications 2

Introduction 3

Compatibility with Other Zimmer Biomet Humeral Heads 3

Pre-Operative Planning 3

Technique Summary 4

4-Peg Modular Glenoid 9

4-Peg Modular Augmented Glenoid 13

3-Peg Modular Glenoid 20

3-Peg Monoblock Glenoid 24

2-Peg Monoblock Glenoid 28

Revision 32

The Alliance Glenoid has the following indications/intended uses:

INDICATIONS

- Non-inflammatory degenerative joint disease including osteoarthritis and avascular necrosis.
- Rheumatoid arthritis.
- Correction of functional deformity.
- Fractures of the proximal humerus, where other methods of treatment are deemed inadequate.
- Difficult clinical management problems, where other methods of treatment may not be suitable or may be inadequate.

Optional use in revision: in some medical conditions (e.g. revision when healthy and good bone stock exists), the surgeon my opt to use a primary implant in a revision procedure.

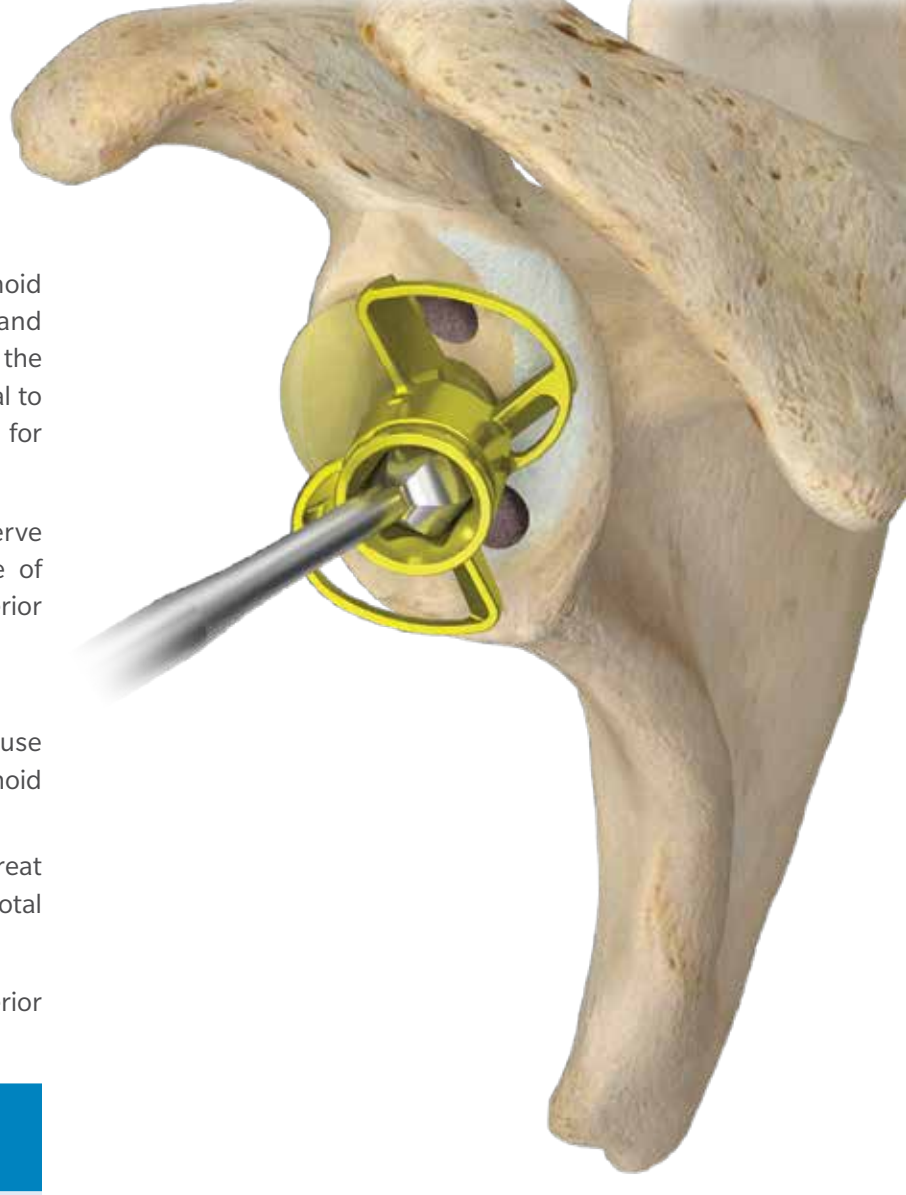
The all-poly monoblock components are indicated for cemented application only. The modular glenoid components are intended to be implanted with bone cement in the peripheral peg holes. The Trabecular Metal™ and Porous Plasma Spray posts should be inserted without bone cement.

CONTRAINDICATIONS

Absolute contraindications include infection, sepsis, and osteomyelitis.

Relative contraindications include:

- Uncooperative patient or patient with neurologic disorders who is incapable or unwilling to follow directions.
- Osteoporosis.
- Metabolic disorders which may impair bone formation.
- Osteomalacia.
- Distant foci of infections which may spread to the implant site.
- Rapid joint destruction, marked bone loss or bone resorption apparent on roentgenogram.
- Deficient rotator cuff.



Introduction

The Alliance Glenoid is the first anatomic glenoid replacement system to include standard and augmented devices in the same system. 75% of the steps to prepare for a 4-peg augment are identical to the 4-peg modular glenoid, providing familiarity for the surgeon and operating room staff.

The augment is a half-wedge design to preserve subchondral bone when used in the presence of posterior glenoid ersoion.[1] A single 19 degree posterior build-up angle was chosen for three reasons:

- To limit intraoperative decisions
- To acknowledge that surgeons often use preferential reaming to correct less severe glenoid erosion.[2-4]
- To recognize that surgeons commonly treat more severe posterior erosion with reverse total shoulder arthroplasty[5]

With a constant 19 degree augment angle, the posterior thickness will increase as implant size increases:

Size	Incremental Posterior Thickness	Total Posterior Thickness
2	3.5 mm	7.7 mm
3	3.9 mm	8.3 mm
4	4.3 mm	8.9 mm
5	4.7 mm	9.6 mm

Compatibility

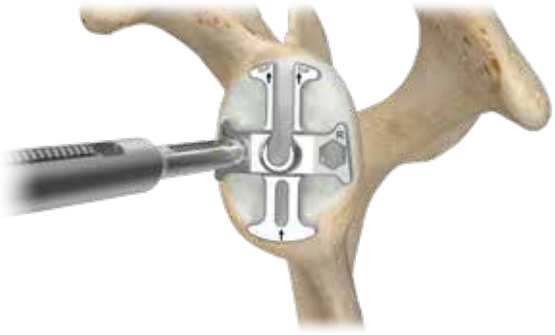
See ZimmerBiomet.com for compatibility matrix

Pre-Operative Planning

Prior to surgery, secure A/P and axial radiographs or an axial CT scan to fully assess the glenoid bone. Pay particular attention to any bony erosion. Determine the glenoid version and asses the vault depth and orientation.

Surgical Technique Summary

4-Peg Modular



Size

Ream Fossa

Ream Vault

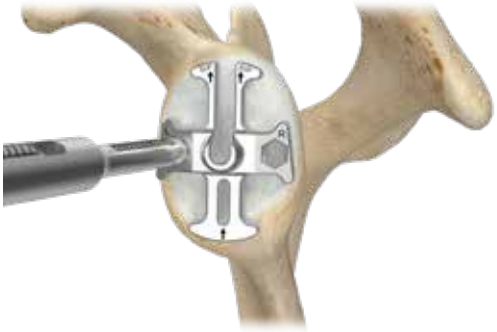
Drill Peg Holes

Trial

Assemble

Implant

4-Peg Modular Augment



Size

Ream Fossa

Check Reaming

Ream Vault

Drill Peg Holes

Insert Guide

Posterior Ream

Trial

Assemble

Implant

Surgical Technique Summary (cont.)

3-Peg Modular

Size

Ream Fossa

Ream Vault

Drill Peg Holes

Trial

Assemble

Implant

3-Peg Monoblock

Size

Ream Fossa

Ream Vault

Drill Peg Holes

Trial

Implant

Surgical Technique Summary (cont.)

2-Peg Monoblock

Size

Ream Fossa

Drill Peg Holes

Trial

Implant

Figure 1

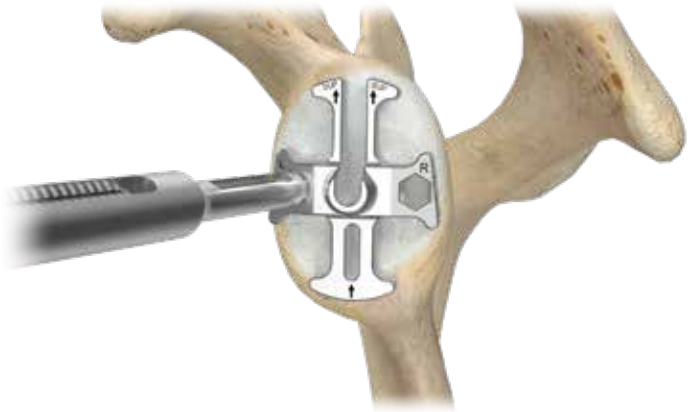


Figure 2

4-Peg Modular Glenoid

Glenoid Surface Preparation

Using the Glenoid Scraper, remove all cartilage from the glenoid fossa (Figure 1).

Mark superior/inferior and anterior/posterior lines that intersect to identify center of the glenoid fossa. To determine glenoid implant size, attach the Glenoid Sizer Handle to the anterior hole of a cruciate-shaped Glenoid Sizer. The Sizers range from size 2–5. By thumb, depress the plunger on the Sizer Handle to enable connection to the Sizer. The Sizer is pear-shaped to mimic the glenoid anatomy and implant shape. Ensure the arrows point in the superior direction. The superior arm of the Sizer is an open channel to aid in Sizer removal after pin insertion. Ensure this open channel is aligned superiorly. Place the Glenoid Sizer against bone in the desired version and inclination based on pre-operative imaging. The Sizer should be centered both superiorly/inferiorly and anteriorly/posteriorly (Figure 2). The anterior and posterior edges of the Sizer should slightly under hang the glenoid bone. If the Sizer overhangs bone, use a smaller Sizer. If between sizes, choose the smaller of the two sizes.

Insert a 3.2 mm threaded Steinmann Pin through the Glenoid Sizer central hole and into bone until medial cortical engagement. If the Pin fails to make medial cortical contact, it may disengage from bone during center post drilling.

Remove the Glenoid Sizer from the Steinmann Pin.

Figure 3

4-Peg Modular Glenoid (cont.)

Alternative Pin Placement

Optional: If an anterior medial reference point for pin placement is desired, the Glenoid Vault Guide can be attached to the Sizer Handle. Tighten the thumb screw so that the pin-hole arm is locked in place. Position the Vault Guide along the anterior medial side of the glenoid with the pin-holes aligned to the center of the fossa. Insert the Steinmann Pin through the pin-hole that best aligns to the center of the fossa. Insert the pin until medial cortical engagement. To disengage the Vault Guide from the Steinmann Pin, loosen the thumb screw with the 3.5 mm ball hex end of the Modular Center Post Driver. Remove the Vault Guide from the Steinmann Pin.

Slide a plastic Reamer Driver Sleeve over the Reamer Driver shaft, then thread the size-specific Glenoid Reamer onto the Reamer Driver until fully seated. The Glenoid Reamer size must match the Glenoid Sizer used previously.

Glenoid reaming can be performed using power or by hand. If hand reaming, connect the reamer assembly to a ratchet T-Handle. Slide the reamer assembly over the Steinmann Pin. Prior to contacting bone, begin rotating the reamer (Figure 3). Carefully ream the glenoid, ensuring sufficient bone removal for complete contact between implant underside and glenoid bone.

Note: Avoid excess bone removal as this may decrease glenoid surface area and vault depth.

Remove the reamer assembly from the Steinmann Pin, leaving the Pin in bone.

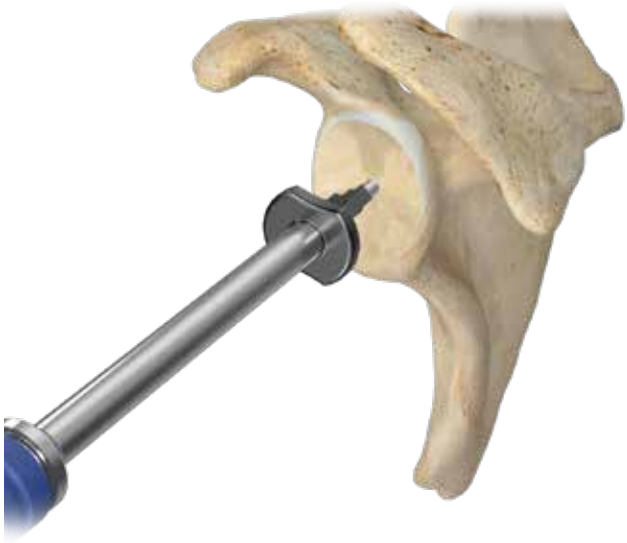


Figure 4

Figure 5

4-Peg Modular Glenoid (cont.)

Glenoid Vault Prep

Using the second Reamer Driver with Driver Sleeve attached, thread the black Modular Center Post Reamer onto the Reamer Driver until fully seated. Slide the reamer assembly down the Steinmann Pin (Figure 4). Prior to establishing contact with bone, begin rotating the reamer. Ream until the Center Peg Reamer bottoms out on the glenoid surface. Failure to fully seat the Center Peg Reamer on bone may lead to the final implant sitting proud.

Technique Tip: To unthread both the Glenoid Reamer and Modular Center Post Reamer from the Reamer Driver, place the reamer into the Disassembly Puck so that it seats flush. The Disassembly Puck has two sides which are size-specific to the Glenoid Reamer – one side accommodates sizes 1–2, the other sizes 3–5. Rotate the reamer assembly counter-clockwise to disengage.

To prepare the peripheral holes, place the tip of the Glenoid Sizer Handle into the anterior hole (L or R based on operative side) of the black 4-Peg Modular Drill Guide.

Slide the assembly down the Steinmann Pin until fully seated in the vault and against the glenoid surface. Prior to drilling, ensure complete seating of the guide against bone.

The Modular Drill Guide should be oriented with the superior hole aligned to the superior/inferior axis of the glenoid. When drilling each peripheral peg, it is important to maintain axial alignment between the Steinmann Pin and the Drill Driver. Insert a quick-release Drill Bit into the magnetic Drill Driver. Drill the anterior/inferior hole until the Drill Bit bottoms out on the Drill Guide (Figure 5). When the Drill Bit is static, bone will provide slight resistance, allowing the Drill Bit to disengage from the driver and remain in place for anti-rotation. Repeat the drilling process until all peg holes have been prepared.

Using forceps or a kocher, remove all Drills from the Drill Guide. Slide the Drill Guide out over the Pin. Remove the Steinmann Pin.

Figure 6

Figure 7a

Figure 7b

4-Peg Modular Glenoid (cont.)

Glenoid Vault Prep (cont.)

Using the Glenoid Inserter, place the appropriate size Glenoid Trial into bone ensuring it does not overhang the glenoid (Figure 6). The trial is translucent to allow visual confirmation of uniform and complete seating against the prepared bone. If desired, perform a trial range of motion.

Glenoid Implantation

Remove the Glenoid Trial from bone. Select a final glenoid implant based on the size-specific instruments used previously. Thread a Trabecular Metal or Porous Plasma Spray modular post into the backside boss of the glenoid implant using the Modular Center Post Driver. Care should be taken to fully seat the center post without excessive force.

Lavage the prepared glenoid and dry the peripheral peg holes with a thrombin-soaked sponge. Using a syringe, inject cement only into the peripheral holes and digitally pressurize. Cement should not be placed into the central hole.

Grasp the final glenoid implant using the Glenoid Inserter (Figure 7b). Insert the glenoid into bone. Ensure the center post is aligned and that the peripheral pegs are aligned to their respective holes prior to implant impaction. Using the Glenoid Impactor and a mallet, impact the glenoid until fully and uniformly seated. Remove all excess cement and assess circumferential seating. If a gap exists, re-impact the glenoid to close the gap.

Figure 8

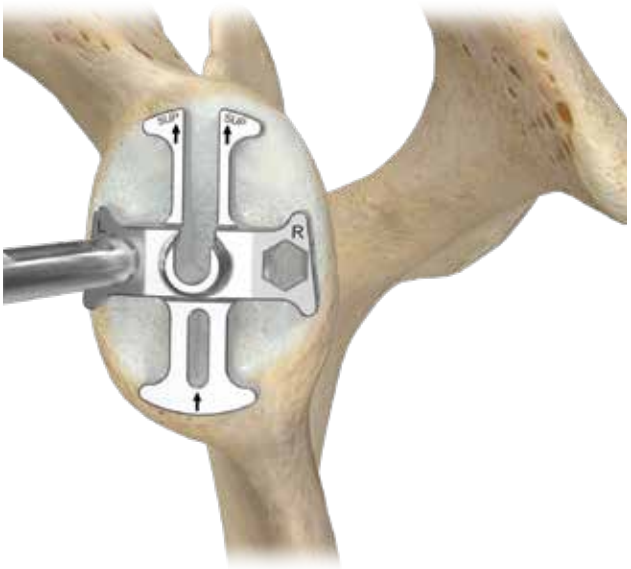


Figure 9

4-Peg Modular Augmented Glenoid

Glenoid Surface Preparation

Using the Glenoid Scraper, remove all cartilage from the glenoid fossa (Figure 8).

Mark superior/inferior and anterior/posterior lines that intersect to identify center of the glenoid fossa. To determine glenoid implant size, attach the Glenoid Sizer Handle to the anterior hole of a cruciate-shaped Glenoid Sizer. The Sizers range from size 2–5. By thumb, depress the plunger on the Sizer Handle to enable connection to the Sizer. The Sizer is pear-shaped to mimic the glenoid anatomy and implant shape. Ensure the arrows point in the superior direction. The superior arm of the Sizer is an open channel to aid in Sizer removal after pin insertion. Place the Glenoid Sizer against bone in the desired version based on pre-operative imaging. The Sizer should be centered both superiorly/inferiorly and anteriorly/posteriorly (Figure 9). The anterior and posterior edges of the Sizer should slightly underhang the glenoid bone. If the Sizer overhangs bone, use a smaller Sizer. If in between sizes, choose the smaller of the two sizes.

Insert a 3.2 mm threaded Steinmann Pin through the Glenoid Sizer central hole and into bone until medial cortical engagement. If the pin fails to make medial cortical contact, the Posterior Ream Guide will not fully seat.

Remove the Glenoid Sizer from the Steinmann Pin.

Figure 10

4-Peg Modular Augmented Glenoid (cont.)

Alternative Pin Placement

Optional: If an anterior medial reference point for pin placement is desired, the Glenoid Vault Guide can be attached to the Sizer Handle. Tighten the thumb screw so that the pin-hole arm is locked in place. Position the Vault Guide along the anterior medial side of the glenoid with the pin-holes aligned to the center of the fossa. Insert the Steinmann Pin through the pin-hole that best aligns to the center of the fossa. Insert the pin until medial cortical engagement. To disengage the Vault Guide from the Steinmann Pin, loosen the thumb screw with the 3.5 mm ball hex end of the Modular Center Post Driver. Remove the Vault Guide from the Steinmann Pin.

Slide a plastic Reamer Driver Sleeve over the Reamer Driver shaft, then thread the size-specific Glenoid Reamer onto the Reamer Driver until fully seated. The Glenoid Reamer size must match the Glenoid Sizer used previously.

Glenoid reaming can be performed using power or by hand. If hand reaming, connect the reamer assembly to a ratchet T-Handle. Slide the reamer assembly over the Steinmann Pin. Prior to contacting bone, begin rotating the reamer (Figure 10). Carefully ream the anterior glenoid, ensuring sufficient bone removal for complete anterior contact between implant underside and glenoid bone. Since the implant is a half-wedge augment, it is critical that anterior reaming reaches to or slightly beyond the Steinmann pin.

Note: Avoid excess bone removal as this may decrease glenoid surface area and vault depth.

Remove the reamer assembly from the Steinmann Pin, leaving the pin in bone.

Figure 11

Figure 12

4-Peg Modular Augmented Glenoid (cont.)

To confirm proper anterior reaming depth, place the appropriately sized augment Check Guide over the Steinmann Pin (Figure 11). Augmented glenoid sizes range from 2–5. Align the Check Guide with the arrow pointing posteriorly. With the Check Guide fully seated anteriorly, determine if the posterior foot contacts bone. If the posterior foot contacts bone, then reaming depth is sufficient. If the posterior foot does not contact bone, then additional anterior reaming is required.

Glenoid Vault Prep

Using the second Reamer Driver with Driver Sleeve attached, thread the black Modular Center Post Reamer onto the Reamer Driver until fully seated. Slide the reamer assembly down the Steinmann Pin. Prior to establishing contact with bone, begin rotating the reamer (Figure 12). Ream until the Center Post Reamer bottoms out on the glenoid surface. Failure to fully seat the Center Post Reamer on bone may lead to the final implant sitting proud.

Technique Tip: To unthread both the Glenoid Reamer and Modular Center Post Reamer from the Reamer Driver, place the reamer into the Disassembly Puck so that it seats flush. The Disassembly Puck has two sides which are size-specific to the Glenoid Reamer – one side accommodates sizes 1–2, the other sizes 3–5. Rotate the reamer assembly counter-clockwise to disengage.

Figure 13

4-Peg Modular Augmented Glenoid (cont.)

Glenoid Vault Prep (cont.)

To prepare the peripheral holes, place the tip of the Glenoid Sizer Handle into the anterior hole (L or R based on operative side) of the black 4-peg Modular Drill Guide. Slide the assembly down the Steinmann Pin until fully seated in the vault and against the glenoid surface. Prior to drilling, ensure complete seating of the guide against bone. Due to posterior bone loss, pay particular attention to ensure full seating against the anterior bone.

The Modular Drill Guide should be orientated with the superior hole aligned to the superior/inferior axis of the glenoid. When drilling each peripheral peg, it is important to maintain axial alignment between the Steinmann Pin and the Drill Driver. Insert a quick-release Drill Bit into the magnetic Drill Driver. Drill the anterior inferior hole until the Drill Bit bottoms out on the Drill Guide (Figure 13). When the Drill Bit is static, bone will provide slight resistance, allowing the Drill Bit to disengage from the driver and remain in place for anti-rotation. Repeat the drilling process for the superior hole, then the posterior-inferior hole.

Using forceps or a kocher, remove all Drills from the Drill Guide. Slide the Drill Guide out over the Pin. Remove the Steinmann Pin.

Figure 14

Figure 15

4-Peg Modular Augmented Glenoid (cont.)

Posterior Reaming for Augment

To ream the posterior glenoid, select a single-use 4-peg Augment Reamer Guide that corresponds to the operative arm. Attach the reamer guide to the Augment Reamer Guide Inserter, gripping the reamer guide by its collar. The inserter handle should be aligned anteriorly against the reamer guide (Figure 14). Place the Augment Reamer Guide boss into the prepared center post hole, ensuring alignment between the backside anti-rotation peg and the anterior inferior peg hole. Confirm full seating and stability of the guide.

Select a Glenoid Augment Reamer size that matches the sizer and reamer previously used. Posterior glenoid reaming can be performed by hand or using power.

Attach the Augment Reamer to the Augment Reamer Guide Inserter. Place the pilot tip of the Augment Reamer into the Posterior Reamer Guide hole (Figure 15). Connect the ball hex Augment Reamer Driver to the reamer. Prior to establishing contact with the bone, begin rotating the reamer. Carefully ream the glenoid posteriorly until the reamer bottoms out onto the guide, ensuring sufficient bone removal for complete contact between implant underside and bone (Figure 16). Caution should be taken to avoid contact between the Reamer Driver shaft and the inner wall of the reamer hexalobe socket. Such contact may compromise stability of the Augment Reamer Guide.

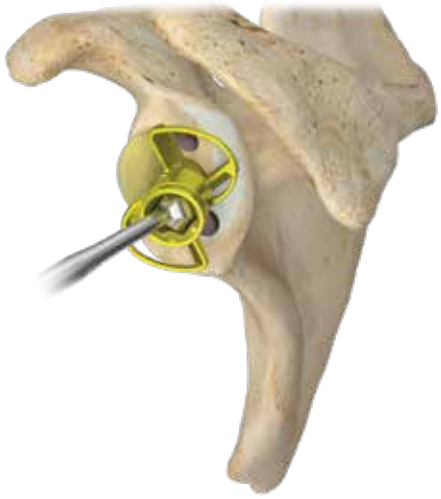


Figure 16

Figure 17

4-Peg Modular Augmented Glenoid (cont.)

Remove the Posterior Reamer Guide from the bone using the inserter. Prior to trialing, visually inspect the glenoid surface to ensure the anterior and posterior halves of the glenoid have been completely reamed.

Using the Glenoid Inserter, place the appropriate size 4-peg augmented Glenoid Trial into bone ensuring it does not overhang the glenoid (Figure 17). The trial is translucent to allow visual confirmation of uniform and complete seating against the prepared bone. Confirm stability of the trial in bone. Perform a trial range of motion.

If there is not complete contact between the trial underside and glenoid bone, then repeat all necessary bone preparation steps. If the non-contact area is on the posterior half of the glenoid, then reinsert the Steinmann Pin, re-ream the anterior glenoid, re-ream the center post, re-drill the peripheral holes, re-insert the Posterior Reamer Guide and re-ream the posterior glenoid. If the non-contact is anterior, then repeat the posterior reaming steps.

Figure 18a

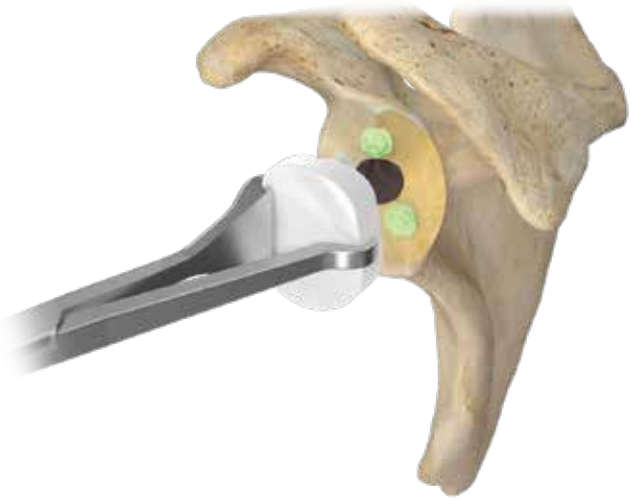


Figure 18b

4-Peg Modular Augmented Glenoid (cont.)

Glenoid Implantation

Select a final glenoid implant based on the size-specific instruments used previously. Thread a Trabecular Metal or Porous Plasma Spray modular post into the backside boss of the glenoid implant using the Modular Center Post Driver (Figure 18a). Care should be taken to fully seat the center post without excessive force.

Lavage the prepared glenoid and dry the peripheral peg holes with a thrombin-soaked sponge. Using a syringe, inject cement only into the peripheral holes and digitally pressurize. Cement should not be placed into the central hole.

Grasp the final glenoid implant using the Glenoid Inserter (Figure 18b). Insert the glenoid into bone. Ensure the center post is aligned and that the peripheral pegs are aligned to their respective holes prior to implant impaction. Using the Glenoid Impactor and a mallet, impact the glenoid until fully and uniformly seated. Remove all excess cement and assess circumferential seating. If a gap exists, re-impact the glenoid to close the gap.

Figure 19

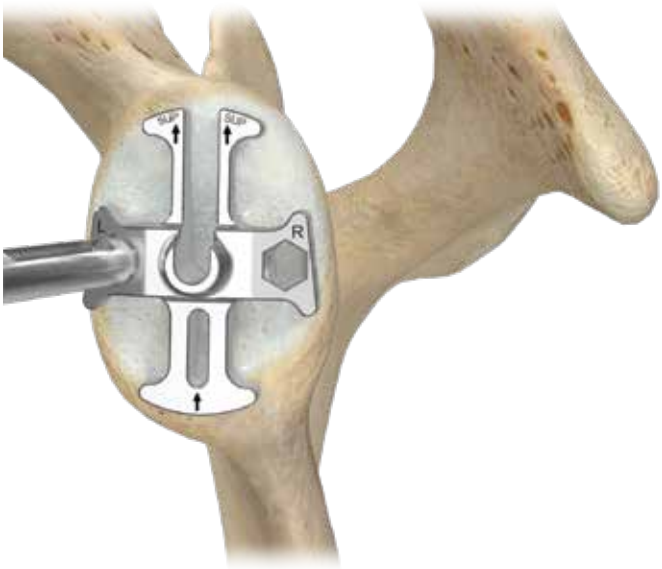


Figure 20

3-Peg Modular Glenoid

Glenoid Surface Preparation

Using the Glenoid Scraper, remove all cartilage from the glenoid fossa (Figure 19).

Mark superior/inferior and anterior/posterior lines that intersect to identify center of the glenoid fossa. To determine glenoid implant size, attach the Glenoid Sizer Handle to the anterior hole of a cruciate-shaped Glenoid Sizer. The Sizers range from size 1–5. By thumb, depress the plunger on the Sizer Handle to enable connection to the Sizer. The Sizer is pear-shaped to mimic the glenoid anatomy and implant shape. The superior arm of the Sizer is an open channel. Ensure this open channel is aligned superiorly. Place the Glenoid Sizer against bone in the desired version based on pre-operative imaging. The Sizer should be centered both superiorly/inferiorly and anteriorly/posteriorly (Figure 20). The anterior and posterior edges of the Sizer should slightly under hang the glenoid bone. If the Sizer overhangs bone, use a smaller Sizer. If between sizes, choose the smaller of the two sizes.

Insert a 3.2 mm threaded Steinmann Pin through the Glenoid Sizer central hole and into bone until medial cortical engagement. If the Pin fails to make medial cortical contact, it may disengage from bone during center post drilling.

Remove the Glenoid Sizer from the Steinmann Pin.

Figure 21

3-Peg Modular Glenoid (cont.)

Alternative Pin Placement

Optional: If an anterior medial reference point for pin placement is desired, the Glenoid Vault Guide can be attached to the Sizer Handle. Tighten the thumb screw so that the pin-hole arm is locked in place. Position the Vault Guide along the anterior medial side of the glenoid with the pin-holes aligned to the center of the fossa. Insert the Steinmann Pin through the pin-hole that best aligns to the center of the fossa. Insert the pin until medial cortical engagement. To disengage the Vault Guide from the Steinmann Pin, loosen the thumb screw with the 3.5 mm ball hex end of the Modular Center Post Driver. Remove the Vault Guide from the Steinmann Pin.

Slide a plastic Reamer Driver Sleeve over the Reamer Driver shaft, then thread the size-specific Glenoid Reamer onto the Reamer Driver until fully seated. The Glenoid Reamer size must match the Glenoid Sizer used previously.

Glenoid reaming can be performed using power or by hand. If hand reaming, connect the reamer assembly to a ratchet T-Handle. Slide the reamer assembly over the Steinmann Pin (Figure 21). Prior to contacting bone, begin rotating the reamer. Carefully ream the glenoid, ensuring sufficient bone removal for complete contact between implant underside and glenoid bone.

Note: Avoid excess bone removal as this may decrease glenoid surface area and vault depth.

Remove the reamer assembly from the Steinmann Pin, leaving the Pin in bone.

Figure 22

Figure 23

3-Peg Modular Glenoid (cont.)

Glenoid Vault Prep

Using the second Reamer Driver with Driver Sleeve attached, thread the black Modular Center Post Reamer onto the Reamer Driver until fully seated. Slide the reamer assembly down the Steinmann Pin. Prior to establishing contact with bone, begin rotating the reamer (Figure 22). Ream until the Center Peg Reamer bottoms out on the glenoid surface. Failure to fully seat the Center Peg Reamer on bone may lead to the final implant sitting proud.

Technique Tip: To unthread both the Glenoid Reamer and Modular Center Post Reamer from the Reamer Driver, place the reamer into the Disassembly Puck so that it seats flush. The Disassembly Puck has two sides which are size-specific to the Glenoid Reamer – one side accommodates sizes 1–2, the other sizes 3–5. Rotate the reamer assembly counter-clockwise to disengage.

To prepare the superior and inferior holes, place the tip of the Glenoid Sizer Handle into the anterior hole of the black 3-Peg Modular Drill Guide. Sizes 2-5 use the same Drill Guide because the peg splay remains the same across these sizes. Size 1 has a unique peg splay and a dedicated Size 1 Drill Guide. Ensure the Drill Guide size matches the sizer and reamer previously used. Slide the assembly down the Steinmann Pin until fully seated in the vault and against the glenoid surface. Prior to drilling, ensure complete seating of the guide against bone.

The Modular Drill Guide should be oriented with the superior hole aligned to the superior/inferior axis of the glenoid. Insert a quick-release Drill Bit into the magnetic Drill Driver. Drill the inferior hole until the Drill Bit bottoms out on the Drill Guide (Figure 23). When the Drill Bit is static, bone will provide slight resistance, allowing the Drill Bit to disengage from the driver and remain in place for anti-rotation. Repeat the drilling process for the superior peg hole.

Figure 24

Figure 25a

Figure 25b

3-Peg Modular Glenoid (cont.)

Using forceps or a kocher, remove all Drills from the Drill Guide. Slide the Drill Guide out over the Pin. Remove the Steinmann Pin.

Place the appropriate size Glenoid Trial into glenoid bone (Figure 24). The trial is translucent to allow visual confirmation of uniform and complete seating against the prepared bone. If desired, perform a trial range of motion.

Glenoid Implantation

Remove the Glenoid Trial from bone. Select a final glenoid implant based on the size-specific instruments used previously. Thread a Trabecular Metal or Porous Plasma Spray modular post into the backside boss of the glenoid implant using the Modular Center Post Driver (Figure 25a). Care should be taken to fully seat the center post without excessive force.

Lavage the prepared glenoid and dry the peripheral peg holes with a thrombin-soaked sponge. Inject cement only into the peripheral holes and digitally pressurize. Cement should not be placed into the central hole.

Grasp the final glenoid implant using the Glenoid Inserter(Figure 25b). Insert the glenoid into bone. Ensure the center post is aligned and that the peripheral pegs are aligned to their respective holes prior to implant impaction. Using the Glenoid Impactor and a mallet, impact the glenoid until fully and uniformly seated. Remove all excess cement and assess circumferential seating. If a gap exists, re-impact the glenoid to close the gap.

Figure 26

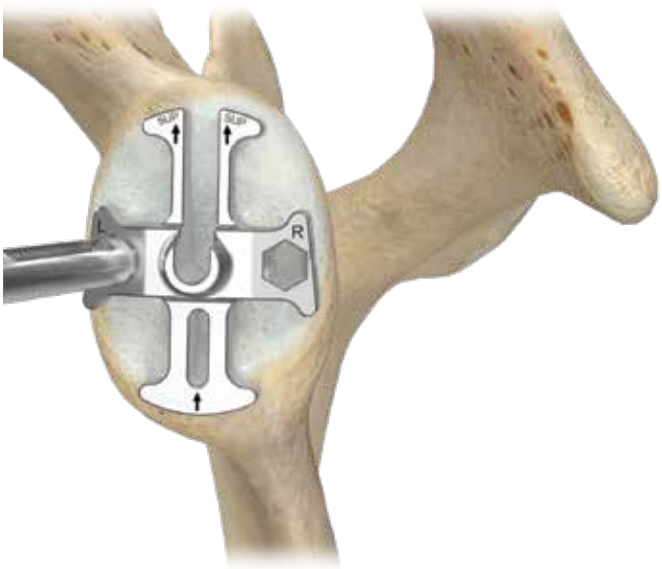


Figure 27

3-Peg Monoblock Glenoid

Glenoid Surface Preparation

Using the Glenoid Scraper, remove all cartilage from the glenoid fossa (Figure 26).

Mark superior/inferior and anterior/posterior lines that intersect to identify center of the glenoid fossa. To determine glenoid implant size, attach the Glenoid Sizer Handle to the anterior hole of a cruciate-shaped Glenoid Sizer. The Sizers range from size 1–5. By thumb, depress the plunger on the Sizer Handle to enable connection to the Sizer. The Sizer is pear-shaped to mimic the glenoid anatomy and implant shape. The superior arm of the Sizer is an open channel. Ensure this open channel is aligned superiorly. Place the Glenoid Sizer against bone in the desired version based on pre-operative imaging. The Sizer should be centered both superiorly/inferiorly and anteriorly/posteriorly (Figure 27). The anterior and posterior edges of the Sizer should slightly under hang the glenoid bone. If the Sizer overhangs bone, use a smaller Sizer. If between sizes, choose the smaller of the two sizes.

Insert a 3.2 mm threaded Steinmann Pin through the Glenoid Sizer central hole and into bone until medial cortical engagement. If the Pin fails to make medial cortical contact, it may disengage from bone during center post drilling.

Remove the Glenoid Sizer from the Steinmann Pin.

Figure 28

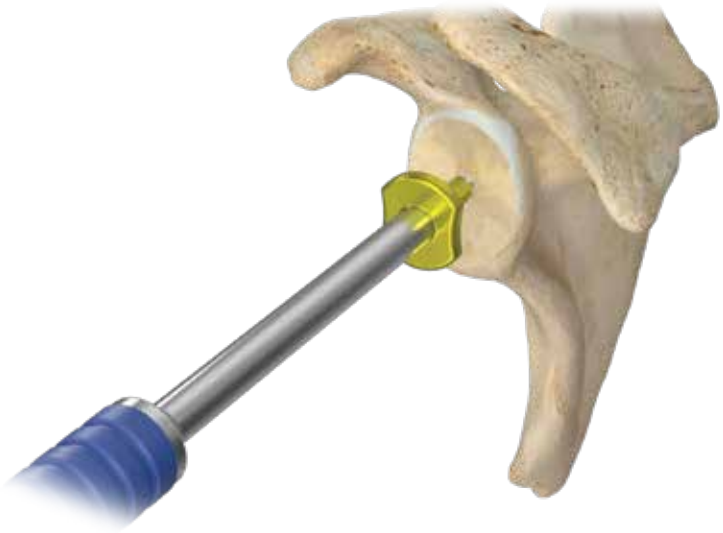


Figure 29

3-Peg Monoblock Glenoid (cont.)

Alternative Pin Placement

Optional: If an anterior medial reference point for pin placement is desired, the Glenoid Vault Guide can be attached to the Sizer Handle. Tighten the thumb screw so that the pin-hole arm is locked in place. Position the Vault Guide along the anterior medial side of the glenoid with the pin-holes aligned to the center of the fossa. Insert the Steinmann Pin through the pin-hole that best aligns to the center of the fossa. Insert the pin until medial cortical engagement. To disengage the Vault Guide from the Steinmann Pin, loosen the thumb screw with the 3.5 mm ball hex end of the Modular Center Post Driver. Remove the Vault Guide from the Steinmann Pin.

Slide a plastic Reamer Driver Sleeve over the Reamer Driver shaft, then thread the size-specific Glenoid Reamer onto the Reamer Driver until fully seated. The Glenoid Reamer size must match the Glenoid Sizer used previously.

Glenoid reaming can be performed using power or by hand. If hand reaming, connect the reamer assembly to a ratchet T-Handle. Slide the reamer assembly over the Steinmann Pin. Prior to contacting bone, begin rotating the reamer. Carefully ream the glenoid, ensuring sufficient bone removal for complete contact between implant underside and glenoid bone.

Note: Avoid excess bone removal as this may decrease glenoid surface area and vault depth.

Remove the reamer assembly from the Steinmann Pin, leaving the pin in bone.

Glenoid Vault Prep

Using the second Reamer Driver with Driver Sleeve attached, thread the gold Monoblock Center Peg Reamer onto the Reamer Driver until fully seated. Slide the reamer assembly down the Steinmann Pin. Prior to establishing contact with bone, begin rotating the reamer (Figure 29). Ream until the Center Peg Reamer bottoms out on the glenoid surface. Failure to fully seat the Center Peg Reamer on bone may lead to the final implant sitting proud.

Technique Tip: To unthread both the Glenoid Reamer and Monoblock Center Peg Reamer from the Reamer Driver, place the reamer into the Disassembly Puck so that it seats flush. The Disassembly Puck has two sides which are size-specific to the Glenoid Reamer – one side accommodates sizes 1–2, the other sizes 3–5. Rotate the reamer assembly counter-clockwise to disengage.

Figure 30

3-Peg Monoblock Glenoid (cont.)

Glenoid Vault Prep (cont.)

To prepare the peripheral holes, place the tip of the Glenoid Sizer Handle into the anterior hole of the gold 3-Peg Monoblock Drill Guide. Sizes 2-5 use the same Drill Guide because the peg splay remains the same across these sizes. Size 1 has a unique peg splay and a dedicated Size 1 Drill Guide. Ensure the Drill Guide size matches the sizer and reamer previously used. Slide the assembly down the Steinmann Pin until fully seated in the vault and against the glenoid surface (Figure 30). Prior to drilling, ensure complete seating of the guide against bone.

The Monoblock Drill Guide should be oriented with the superior hole aligned to the superior/inferior axis of the glenoid. When drilling each peripheral peg, it is important to maintain axial alignment between the Steinmann Pin and the Drill Driver. Insert a quick-release Drill Bit into the magnetic Drill Driver. Drill the inferior hole until the Drill Bit bottoms out on the Drill Guide. When the Drill Bit is static, bone will provide slight resistance, allowing the Drill Bit to disengage from the driver and remain in place for anti-rotation. Repeat the drilling process for the superior peg hole.

Using forceps or a kocher, remove both Drills from the Drill Guide. Slide the Drill Guide out over the Pin. Remove the Steinmann Pin.

Figure 31

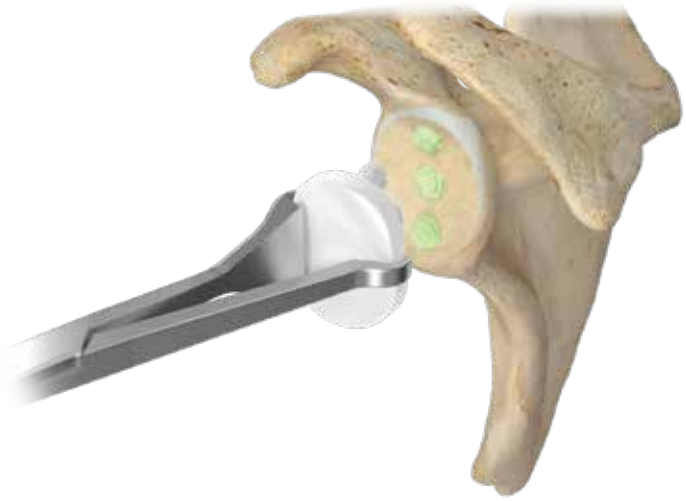


Figure 32

3-Peg Monoblock Glenoid (cont.)

Glenoid Vault Prep (cont.)

Place the appropriate size 3-peg monoblock Glenoid Trial into glenoid bone (Figure 31). The trial is translucent to allow visual confirmation of uniform and complete seating against the prepared bone. If desired, perform a trial range of motion.

Glenoid Implantation

Remove the Glenoid Trial from bone. Select a final glenoid implant based on the size-specific instruments used previously.

Lavage the prepared glenoid and dry all three peg holes with a thrombin-soaked sponge. Inject cement into each peg hole and digitally pressurize.

Grasp the final glenoid implant using the Glenoid Inserter (Figure 32). Insert the glenoid into bone. Ensure the center peg is aligned and that the peripheral pegs are aligned to their respective holes prior to implant impaction. Using the Glenoid Impactor and a mallet, impact the glenoid until fully and uniformly seated. Remove all excess cement and assess circumferential seating. If a gap exists, re-impact the glenoid to close the gap.

Figure 33

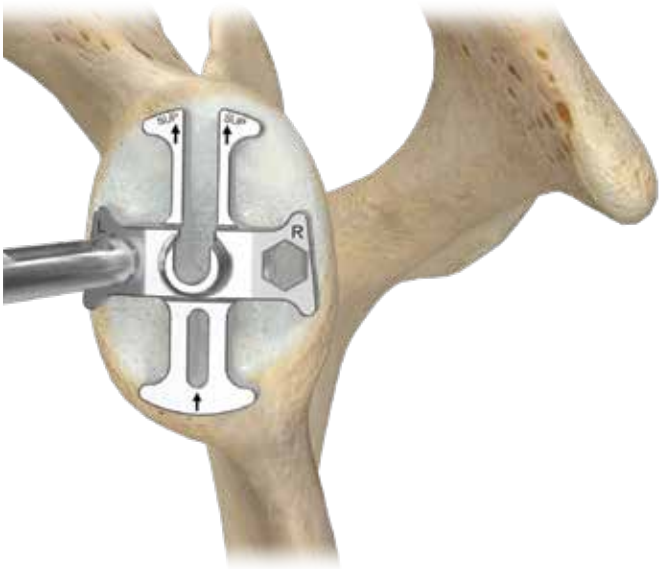


Figure 34

2-Peg Monoblock Glenoid

Glenoid Surface Preparation

Using the Glenoid Scraper, remove all cartilage from the glenoid fossa (Figure 33).

Mark superior/inferior and anterior/posterior lines that intersect to identify center of the glenoid fossa. To determine glenoid implant size, attach the Glenoid Sizer Handle to the anterior hole of a cruciate-shaped Glenoid Sizer. The Sizers range from size 1–5. By thumb, depress the plunger on the Sizer Handle to enable connection to the Sizer. The Sizer is pear-shaped to mimic the glenoid anatomy and implant shape. The superior arm of the Sizer is an open channel. Ensure this open channel is aligned superiorly. Place the Glenoid Sizer against bone in the desired version based on pre-operative imaging. The Sizer should be centered both superiorly/inferiorly and anteriorly/posteriorly (Figure 34). The anterior and posterior edges of the Sizer should slightly under hang the glenoid bone. If the Sizer overhangs bone, use a smaller Sizer. If between sizes, choose the smaller of the two sizes.

Insert a 3.2 mm threaded Steinmann Pin through the Glenoid Sizer central hole and into bone until medial cortical engagement.

Remove the Glenoid Sizer from the Steinmann Pin.

Figure 35

2-Peg Monoblock Glenoid (cont.)

Alternative Pin Placement

Optional: If an anterior medial reference point for pin placement is desired, the Glenoid Vault Guide can be attached to the Sizer Handle. Tighten the thumb screw so that the pin-hole arm is locked in place. Position the Vault Guide along the anterior medial side of the glenoid with the pin-holes aligned to the center of the fossa. Insert the Steinmann Pin through the pin-hole that best aligns to the center of the fossa. Insert the pin until medial cortical engagement. To disengage the Vault Guide from the Steinmann Pin, loosen the thumb screw with the 3.5 mm ball hex end of the Modular Center Post Driver. Remove the Vault Guide from the Steinmann Pin.

Slide a plastic Reamer Driver Sleeve over the Reamer Driver shaft, then thread the size-specific Glenoid Reamer onto the Reamer Driver until fully seated. The Glenoid Reamer size must match the Glenoid Sizer used previously.

Glenoid reaming can be performed using power or by hand. If hand reaming, connect the reamer assembly to a ratchet T-Handle. Slide the reamer assembly over the Steinmann Pin. Prior to contacting bone, begin rotating the reamer (Figure 35). Carefully ream the glenoid, ensuring sufficient bone removal for complete contact between implant underside and glenoid bone.

Note: Avoid excess bone removal as this may decrease glenoid surface area and vault depth.

Remove the reamer assembly from the Steinmann Pin, leaving the Pin in bone.

Technique Tip: To unthread the Glenoid Reamer from the Reamer Driver, place the reamer into the Disassembly Puck so that it seats flush. The Disassembly Puck has two sides which are size-specific to the Glenoid Reamer – one side accommodates sizes 1–2, the other sizes 3–5. Rotate the reamer assembly counter-clockwise to disengage.

Figure 36

2-Peg Monoblock Glenoid (cont.)

Superior & Inferior Peg Prep

To prepare the peg holes, place the tip of the Glenoid Sizer Handle into the anterior hole of the silver 2-Peg Monoblock Drill Guide. If preparing for a size 1 implant, there is a dedicated size 1 silver 2-Peg Monoblock Drill Guide. Sizes 2–5 use the same Drill Guide. Ensure the Drill Guide size matches the sizer and reamer previously used. Slide the assembly down the Steinmann Pin until fully seated against the glenoid surface (Figure 36). Prior to drilling, ensure complete seating of the guide against bone.

The Monoblock Drill Guide should be oriented with the superior hole aligned to the superior/inferior axis of the glenoid. When drilling each peripheral peg, it is important to maintain axial alignment between the Steinmann Pin and the Drill Driver. Insert a quick-release Drill Bit into the magnetic Drill Driver. Drill the inferior hole until the Drill Bit bottoms out on the Drill Guide. When the Drill Bit is static, bone will provide slight resistance, allowing the Drill Bit to disengage from the driver and remain in place for anti-rotation. Repeat the drilling process for the superior peg hole.

Using forceps or a kocher, remove both Drills from the Drill Guide. Slide the Drill Guide out over the Pin. Remove the Steinmann Pin. After Steinmann Pin removal, check for any bony prominence around the Pin hole. If necessary, use the Glenoid Scraper to remove the prominence.

Figure 37

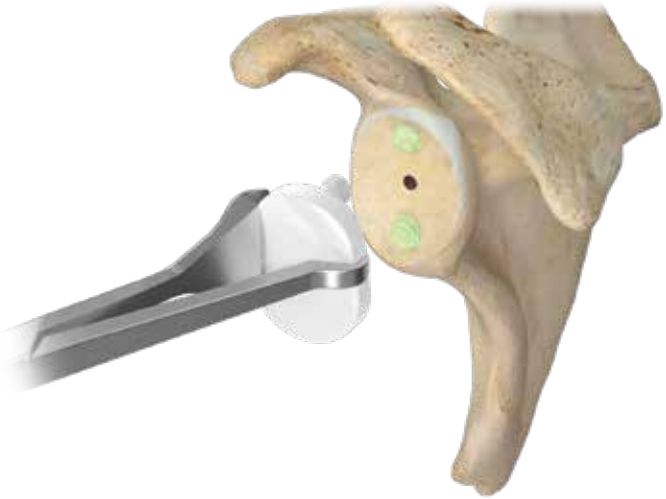


Figure 38

2-Peg Monoblock Glenoid (cont.)

Place the appropriate size 2-peg monoblock Glenoid Trial into glenoid bone (Figure 37). The trial is translucent to allow visual confirmation of uniform and complete seating against the prepared bone. If desired, perform a trial range of motion.

Glenoid Implantation

Remove the Glenoid Trial from bone. Select a final glenoid implant based on the size-specific instruments used previously. Lavage the prepared glenoid and dry the peg holes with a thrombin-soaked sponge. Inject cement into the holes and digitally pressurize.

Grasp the final glenoid implant using the Glenoid Inserter (Figure 38). Insert the glenoid into bone. Ensure the superior and inferior pegs are aligned to their respective holes prior to implant impaction. Using the Glenoid Impactor and a mallet, impact the glenoid until fully and uniformly seated. Remove all excess cement and assess circumferential seating. If a gap exists, re-impact the glenoid to close the gap.

Figure 39

Figure 40

Figure 41

Glenoid Revision

After exposing the glenoid, use an osteotome or oscillating saw to section off the peripheral pegs. If revising an in-line 3-peg glenoid, then make two parallel cuts to section off the superior and inferior pegs. If revising a 4-peg glenoid, then make three triangular cuts to section off all three peripheral pegs (Figure 39). Use a thin osteotome or rongeur to remove the outer sections of the polyethylene/cemented peripheral pegs. The central portion of the polyethylene can now be unthreaded from the well-fixed Trabecular Metal or Plasma Spray Modular Post (Figure 40).

Thread the Trephine Guide onto the Modular Post. Attach the Removal Trephine to power and slide it over the Trephine Guide. Prior to establishing contact with bone, begin rotating the Removal Trephine (Figure 41). Advance the Trephine until it bottoms out on the Guide. Detach the Removal Trephine from the Guide. Grasping the Guide, remove the exposed Modular Post from the glenoid vault.

References

1. Knowles Ferreira Athwal. Augmented glenoid component designs for type B2 erosions: a computational comparison by volume of bone removal and quality of remaining bone. *J Shoulder Elbow Surg*;24:1218-26.
2. Clavert *et al*. Glenoid resurfacing: what are the limits to asymetric reaming for posterior erosion? *J Shoulder Elbow Surg* 2007;16:843-8.
3. Gillespie, Lyons, Lazarus. Eccentric reaming in total shoulder arthroplasty: a cadaveric study. Orthopedics 2009 Jan;32:21.
4. Ghoraishian *et al*. Augmented glenoid implants in anatomic total shoulder arthroplasty: review of available implants and current literature. *J Shoulder Elbow Surg* 2019;28:387-95.
5. Walch *et al*. Results of anatomic nonconstrained prosthesis in primary osteoarthritis with biconcave glenoid. *J Shoulder Elbow Surg* 2012;21:1526-33.

For indications, contraindications, warnings, precautions, potential adverse effects and patient counselling information, see the package insert or contact your local representative; visit www.zimmerbiomet.com for additional product information. Check for country product clearances and reference product specific instructions for use.

Zimmer Biomet does not practice medicine. This technique was developed in conjunction with health care professionals. This document is intended for surgeons and is not intended for laypersons. Each surgeon should exercise his or her own independent judgment in the diagnosis and treatment of an individual patient, and this information does not purport to replace the comprehensive training surgeons have received. As with all surgical procedures, the technique used in each case will depend on the surgeon's medical judgment as the best treatment for each patient. Results will vary based on health, weight, activity and other variables. Not all patients are candidates for this product and/or procedure. Caution: Federal (USA) law restricts this device to sale by or on the order of a surgeon. Rx only.

ZIMMER BIOMET
Your progress. Our promise.®

Legal Manufacturer
Zimmer
1800 W. Center Street
Warsaw, Indiana 46580
USA

2872.2-GLBL-en-REV0220

zimmerbiomet.com