ZIMMER BIOMET

Identity® Revision Shoulder System

Surgical Technique

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INTENDED USE

The Identity® Revision implants are intended for shoulder joint arthroplasty. Instruments are intended to facilitate the implantation and explantation of the corresponding compatible Zimmer Biomet implants. Instruments cases/trays are intended to facilitate the organization, identification, storage, transportation, and sterilization reprocessing of the compatible Zimmer Biomet Instruments.

INDICATIONS

Hemiarthoplasty/Conventional Total Application:

- 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, including cuff arthropathy, 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 may opt to use primary implants in a revision procedure.

Reverse Application:

Identity Revision Humeral Stem products are indicated for use in patients whose shoulder joint has a grossly deficient rotator cuff with severe arthropathy and/or previously failed shoulder joint replacement with a grossly deficient rotator cuff. The patient must be anatomically and structurally suited to receive the implants and a functional deltoid muscle is necessary.

The Identity Revision Humeral Stem is indicated for primary, fracture, or revision total shoulder replacement for the relief of pain and significant disability due to gross rotator cuff deficiency.

The assembled humeral component may be used alone for hemiarthroplasty or combined with a glenoid component or reverse components for total shoulder arthroplasty (anatomic or reverse applications). The humeral components may be used cemented or uncemented (biological fixation).

CONTRAINDICATIONS

This device is contraindicated for the following:

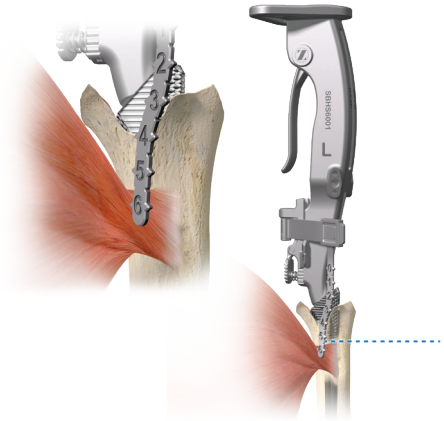
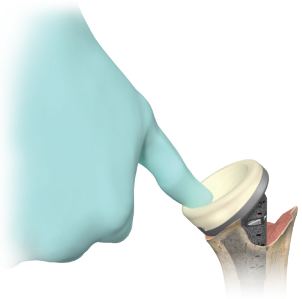
- Local/systemic infection
- Presence of significant injury to the upper brachial plexus
- Paralysis of the axillary nerve
- Marked bone loss
- Nonfunctional deltoid or external rotator muscles
- Any neuromuscular disease compromising the affected limb that would render the procedure unjustifiable

Introduction

The Identity Shoulder System is a platform system that enables implantation of a reverse or anatomic total shoulder configuration. The system can be revised from anatomic to reverse with instruments intended to preserve a well-fixed humeral stem. This technique focuses on the surgical steps to implant a reverse total shoulder in revision and fracture scenario.

The Identity Revision System is an extension of the Identity Shoulder system. This stem can be used for fracture scenarios, revisions, and primary reverse and anatomic procedures. The Identity Revision System consists of revision length stems which have features to facilitate stem fixation and humeral fracture repair. The Revision Stems are compatible with Identity Humeral Trays and Humeral Heads. This system is also compatible with existing Comprehensive, TM Reverse and TMR+ base plates and glenospheres, as well as anatomic Alliance Glenoids. The Identity Revision system can be utilized to achieve a 135° or 147° neck shaft angle in a reverse application.

Revision With Proximal Bone Loss Surgical Technique Summary

 S1: Humeral Reaming	 S2: Humeral Rasping	 S3: Trialing
 S4: Tray/Stem Mating	 S5: Implant Insertion	 S6: Bearing Insertion

Planning

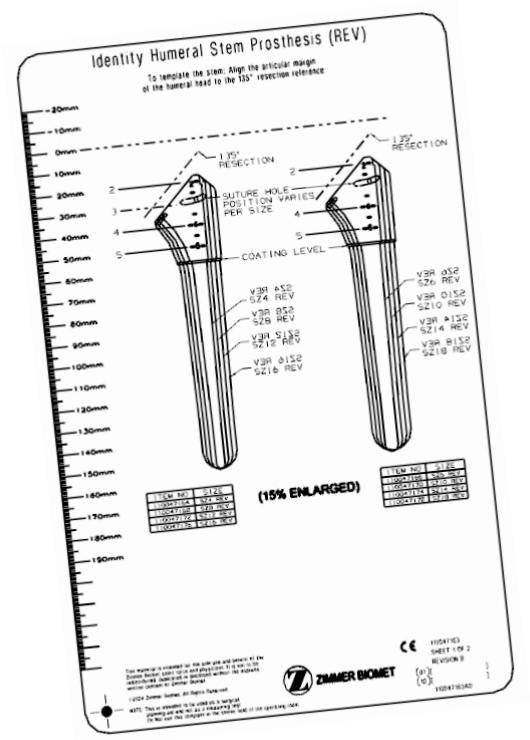


Figure 1

Pre-Operative Planning

Prior to surgery, obtain patient imaging to evaluate osseus anatomy for any deformities or acquired bone loss. Recommended x-rays include A/P, scapular Y, and axillary views. A CT scan with artifact reduction can be used to assess bone loss which may affect implant selection. The system includes x-ray templates to determine humeral stem size prior to surgery. The templates show stem Depth Marks to aid in potential bony landmark identification to guide insertion depth.

In fracture applications, utilize pre-op imaging to identify the fracture pattern and any involvement of the medial calcar. Identify osseus landmarks that may be used as a reference for instrument/implant insertion depth. Check the tuberosity position and, with the stem suture hole locations in mind, consider how they might aid in tuberosity fixation. If appropriate, obtain a contralateral x-ray to determine insertion depth.

Patient Positioning

Place the patient in a modified beach chair position at 30–45° after general or regional anesthetic have been induced. Lateralize the patient on the edge of the table so that the arm can be extended off the side (Figure 1). Ensure that the arm is off the table enough to get access to the shaft of the humerus so that when the arm is down by the side there is direct inline reaming access to the humerus.

Exposure

Utilize an extended deltopectoral incision referencing the coracoid and deltoid insertion. Dissect subcutaneous tissues and perform releases based on surgeon preference. If applicable, release the subscapularis tendon. In revision cases, however, the subscapularis might be deficient.

If the humeral head is present at the time of surgery, after removal or osteotomy, it should be saved as a l source of cancellous graft.

In case of fracture, the tuberosities are tagged, with the lesser tuberosity displaced medially and the greater tuberosity displaced superior laterally to facilitate fracture preparation.

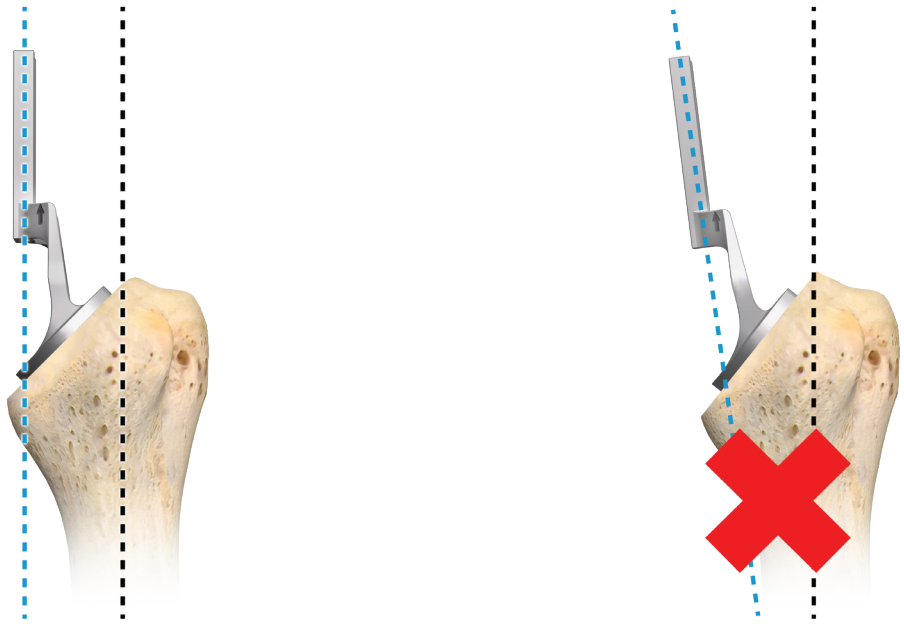


Figure 2

Revision Without Proximal Bone Loss

Explant the prior implant using that system's revision/removal instruments, or through use of general instruments. Remove any osteophytes which may have formed to reveal the original resection surface.

The Identity Revision stem was designed to be used with a 135° inclination resection. To check the resection angle, place the appropriately sized 135° reference foot on the resection surface by hand. Visually confirm that the reference foot is parallel to the axis of the humeral shaft (Figure 2).

If the inclination is less than 135°, then there will be a medial gap between bone and the reverse humeral tray.

Figure 3

Figure 4

Revision Without Proximal Bone Loss (cont.)

Utilizing the Identity Revision instruments, reference the Identity Shoulder System Reverse Total Shoulder surgical technique for humeral preparation, trialing and implantation steps but take note of two critical differences to that technique.

One: Identity Revision Rasps have distinct compatibilities with the 135° Reference Foot instruments. The proper Reference Foot size is based on the last Revision Reamer used:

Revision Reamer	Reference Foot
4-7mm	Small
8-14mm	Medium
15-18mm	Large

Two: If implanting a size 4 or 5 Revision Humeral Stem, the implant package includes a single use Back Table Sleeve. The sleeve should be placed into the Standard SZ 4-9 hole of the Back Table Assembly Block (Figure 3). The sleeve is intended to fill the gap between the Revision Humeral Stem and the inner diameter of the Standard SZ 4-9 hole (Figure 4).

Regardless of final stem diameter, care should be taken to utilize only the Standard stem length holes in the Assembly Block.

REVISION WITH PROXIMAL BONE LOSS

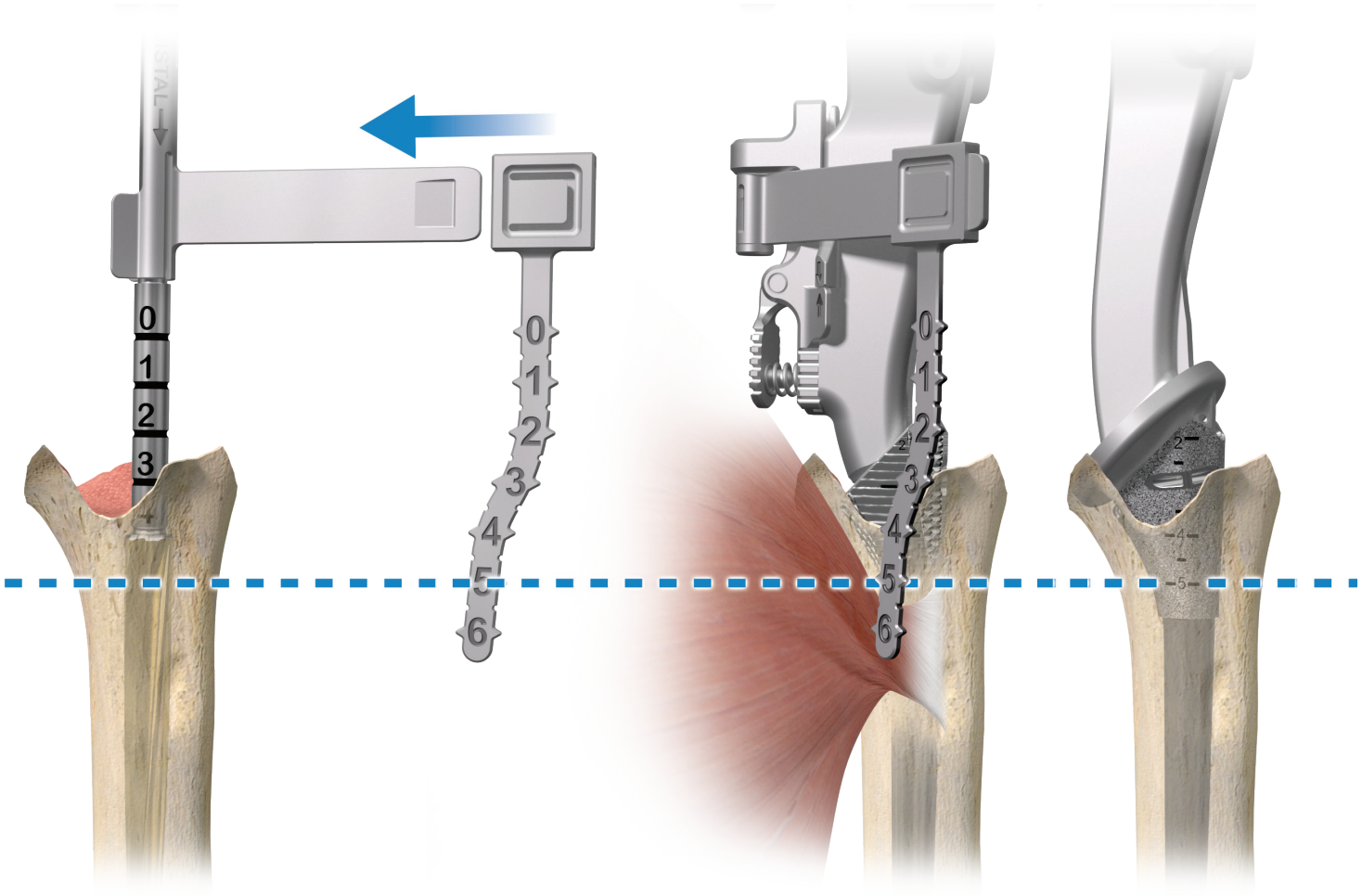


Figure 5a

Figure 5b

Figure 5c

Depth Mark Alignment Overview

Identity Revision utilizes Depth Marks to provide for consistent bone preparation and accurate final implant placement. Identity Revision Reamers, Revision Rasps, Revision Ruler and Identity Revision Stems all feature these compatible scale lines to replicate proper insertion depth each time (Figures 5a, 5b, 5c).

Various anatomical landmarks can be chosen as a reference to set depth, including the Pectoralis Major Tendon insertion (PMT). Initial depth, once determined, can be utilized in various steps of the procedure with compatible depth markings.

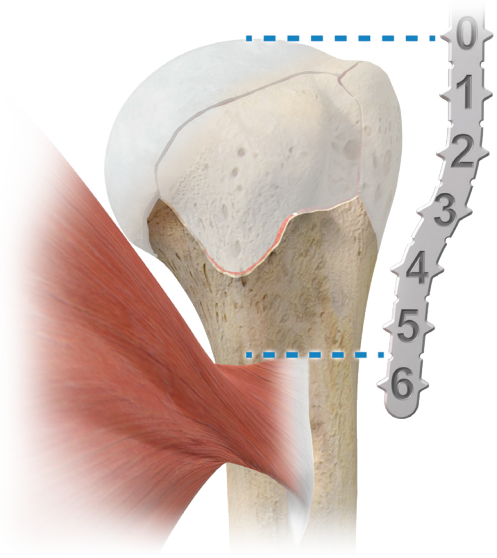


Figure 6

Figure 7

Figure 8

Depth Marks Defined

- 0: Indicates location of the crown of the native humeral head (Figure 6). This marking is consistent with the engraved groove on the Identity Shoulder System Intramedullary Reamer shafts.
- 2-5: Present on Revision Rasps and Humeral Stems. These can be used to reference a bony landmark.
- 6: This mark is only on the Ruler and it can be used to guide insertion depth so that the PMT is positioned between the "5" and "6" depth marks. The PMT insertion has been shown in several studies to be about 5.6cm distal to the crown of the humeral head [1-3].

Revision Ruler Assembly Compatibility

The Identity Ruler assembled with the Ruler Reamer Clamp enables Ruler use with Identity Revision Reamers (Figure 7). The Identity Ruler assembled with the Ruler Inserter Clamp allows Ruler use with the Rasp Inserter and 135° Humeral Stem Inserter (for anatomic applications). (Figure 8)

Note: The Identity Ruler and Ruler Inserter Clamp assembly can be utilized with both Revision and Standard length Humeral Rasps.

Caution: The Ruler and Ruler Inserter Clamp are not compatible with the Identity Reverse Tray Inserter.

Figure 9

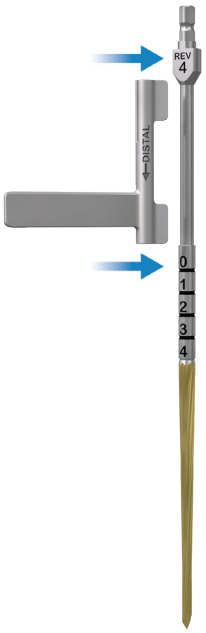


Figure 10

Figure 11

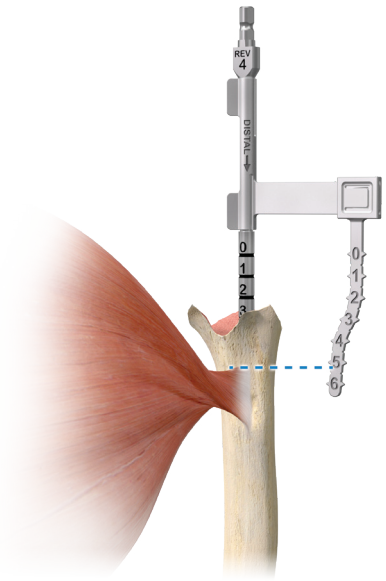


Figure 12

Humeral Preparation – Revision Reamers

- Attach the Revision Reamer to a ratcheting T-Handle (Figure 9).
- Clip the Ruler Reamer Clamp to the shaft of the Revision Reamer. The distal arrow must be pointing down (Figure 10).
- Slide the Ruler over the blade of the Ruler Reamer Clamp following the arrows engraved on the Ruler. The Ruler will only slide on the Ruler Reamer Clamp in one orientation (Figure 11) .
- The Ruler is properly orientated when the Depth Marks on the Ruler and Revision Reamer are aligned.
- To disengage the Ruler from the Ruler Reamer Clamp, quickly pull the Ruler over the indent feature on the Reamer Clamp.

In alignment with the humeral axis, insert the Reamer until the PMT insertion is between the “5” and “6” Depth Marks on the Ruler. (Figure 12).

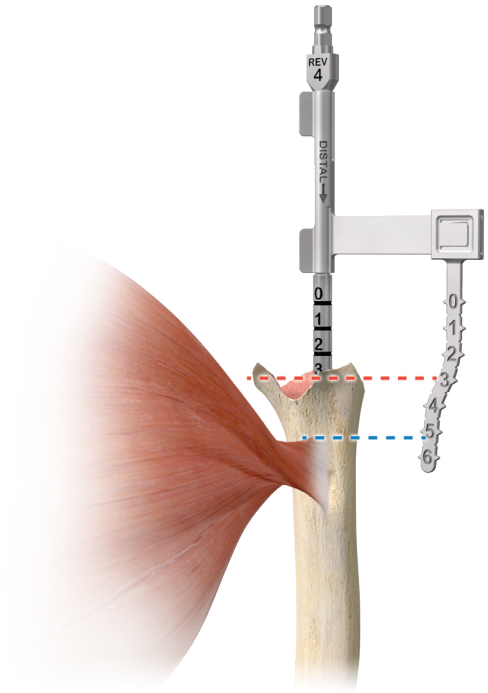


Figure 13

Figure 14

Humeral Preparation – Revision Reamers (cont.)

If utilizing an alternate anatomic landmark for subsequent steps is preferred, once the proper Reamer depth has been established using the PMT, check to see if a different humeral landmark aligns to a specific Depth Mark (ie -the medial calcar aligns to number "3" Depth Mark (Figure 13). Align the chosen Depth Mark to that same anatomical landmark for each successive Reamer and Revision Rasp step, as well as implant insertion.

Use progressively larger Reamers in 1mm increments until initial cortical resistance. Once the final Revision Reamer size has been determined, remove the reamer from the canal. Unclip the Ruler Reamer Clamp and disengage the Ruler for subsequent use during Rasp insertion.

Humeral Rasping

Note: The Revision Rasps or the Standard sized Identity Shoulder System Rasps can be utilized to rasp the humerus (Figure 14).

Caution: The Revision Rasps have Depth Marks 2 through 5, however, it may be necessary to use the Ruler if none of the Depth Marks are visible when the Rasp is properly seated.

Figure 15

Figure 16

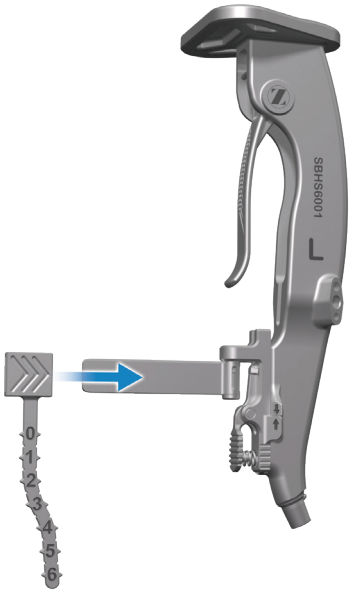


Figure 17

Humeral Rasping (cont.)

Position the Ruler Inserter Clamp below the Rasp Inserter so that the rails of the Ruler Inserter Clamp are in line with the rails of the Rasp Inserter (Figure 15). Press the button on the Ruler Inserter Clamp and slide up over the Rasp Inserter rails. The Ruler Inserter Clamp Is fully seated when the arrows are touching (Figure 16).

Attach the Ruler to the Ruler Inserter Clamp by sliding it over the blade of the Ruler Inserter Clamp. Follow the arrows on the Ruler. The Ruler will only slide on the Ruler Inserter Clamp in one orientation. (Figure 17).

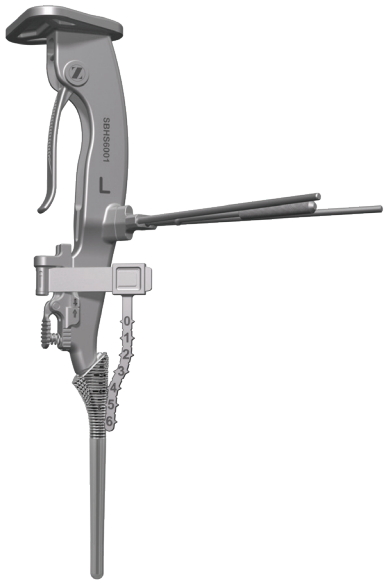


Figure 18

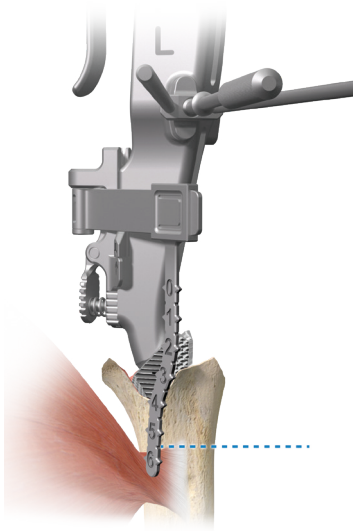


Figure 19

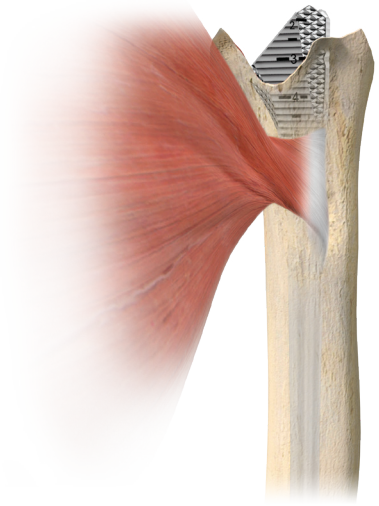


Figure 20

Humeral Rasping (cont.)

Thread the Version Rod Coupling into the Rasp Inserter hole with the appropriate side engraving ("R" for right shoulder, "L" for left shoulder) facing up (Figure 18). The holes are polarized to ensure proper side orientation.

Select a Revision Rasp or Standard Rasp that is three sizes smaller than the last Revision Reamer used. With the Inserter handle fully open, align the lateral side of the Rasp with the small hook on the Rasp Inserter tip, and attach the Rasp to the Rasp Inserter. Close the Inserter handle to rigidly mate with the Rasp.

Sequentially rasp the humerus in 1mm increments, ensuring each Rasp is fully seated (Figure 19). The Rasp is fully seated when aligned to the predetermined Depth Mark from the reaming step. Rasp until achieving full seating and rotational stability.

Note: It is common for a Rasp one or two sizes smaller than the last IM Reamer used to achieve rotational stability in the humerus. Care should be taken to avoid forcing a Rasp into the humerus when encountering resistance in the canal.

If the final Rasp feels too tight and will not fully seat, then revert to the previous size Rasp. If the final Rasp feels unstable, remove it from the canal and use a Revision Reamer one size larger than previously used. Now go back to rasping and use one size larger Rasp. Once resistance in the canal and rotational stability are observed, disengage the Rasp Inserter from the Rasp, leaving the Rasp in place (Figure 20)

Disengage the Ruler and Ruler Inserter Clamp from the Rasp Inserter.

Optional: Place the appropriately sized Humeral Protector over the resection during glenoid preparation. If necessary, gently use a mallet to achieve full seating.

Figure 21

Figure 22

Reverse Glenoid Preparation

The Identity Revision Shoulder System is compatible with Identity reverse humeral trays and bearings, which are compatible with glenospheres from the Comprehensive® Reverse Shoulder System (Figure 21), the Trabecular Metal® Reverse Shoulder System, and TMR+ System (Figure 22).

The Uniform Thickness Bearings are only compatible with the Comprehensive® Reverse Shoulder System and the TMR+ Shoulder System glenospheres.

For glenoid preparation and trialing instructions, refer to the respective surgical techniques posted on zimmerbiomet.com.

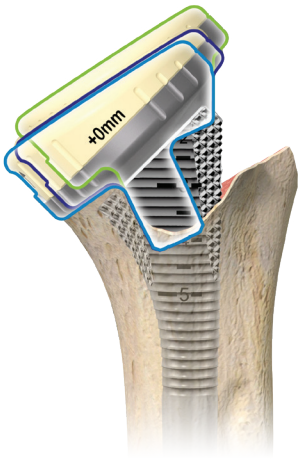


Figure 23

Figure 24

Figure 25

Humeral Trialing

The Identity Shoulder System includes Standard (STD), Extended (EXT) and Extra Extended (XEXT) humeral trays (Figure 23). The Standard trays are onlay trays which do not require proximal humeral reaming. They come in +0mm, +6mm, and +12mm heights. The EXT trays lateralize the humerus by 4mm compared to the STD trays. They come in -6mm, +0mm, +6mm, and +12mm heights.

The -6mm EXT tray is an inset humeral tray which may require proximal humeral reaming with the dedicated white, "N" Tray Reamer Guide (Figure 24). The XEXT Trays lateralize the humerus by 6mm compared to the STD Trays. They come in -6mm, +0mm and +6mm heights. The -6mm XEXT tray is also inset which may require proximal humeral reaming using it's dedicated orange "XEXT" Tray Reamer Guide (Figure 25).

Note: Proximal humeral reaming is only required for the inset trays (-6mm EXT and -6mm XEXT).

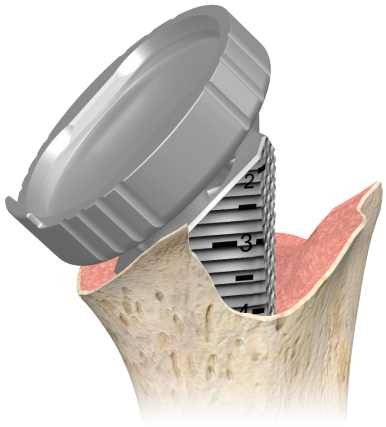


Figure 26

Figure 27

Tray & Bearing Trial Selection

Note: Use a rongeur to ensure there is no prominent bone that would prevent full seating of the reverse components. Utilize the tray trial to confirm there is no impingement. Ensure the tray trial is fully seated to the Rasp. (Figure 26).

To determine tray and bearing height, place a +0 bearing trial into a +0 EXT tray trial. Gently reduce the arm while externally rotated 10-20 degrees. Assess deltoid tension and range of motion. If the joint is too lax, either add height through additional bearing/ tray thicknesses or switch to a +0 XEXT Tray Trial with a +0-bearing trial. To disengage the bearing trial, use thumb pressure on "PUSH" engraving on the media side of the trial (Figure 27).

If the joint feels too tight with the +0 EXT Tray/+0 Bearing assembly, then switch to a -6mm EXT tray. Alternately, the humerus can be medialized by trialing a +0 STD tray trial.

Note: There are no retentive Uniform Thickness Bearings. For cases of instability when using a Uniform Thickness Bearing, switch to either a 12° bearing or a 12° retentive bearing. Retentive Bearings capture more of the glenosphere and have polyethylene walls which are 2–3 mm higher than standard bearings but do not add joint tension.

Iterate combinations of tray and bearing thicknesses until achieving the desired deltoid tension and range of motion.

Figure 28

Figure 29

Tray & Bearing Trial Selection (cont.)

Disengage the Humeral Tray and Bearing Trials from the Rasp. Attach the Rasp Inserter to the Rasp and remove it from the humerus (Figure 28).

Note: If unable to engage the Rasp, then refer to Appendix 5 (Removing a Stuck Rasp/Stem) of the Identity Shoulder System Reverse Total Shoulder surgical technique.

Humeral Component Implantation

The Humeral Stem implant has multiple suture holes which can be utilized as needed. There is 1 medial hole and 2 lateral holes (Figure 29).

If press-fitting, select a Humeral Stem size that matches the last Rasp used.

If cementing, select a Humeral Stem two sizes smaller than the last Rasp used.

Figure 30

Figure 31

Humeral Component Implantation (cont.)

Place the stem into the appropriately sized Standard hole in the Back Table Assembly Block (Figure 30). Identity Revision stems can only be placed in Standard stem holes in the Assembly Block.

Caution: If a size 4 or 5 Revision Stem is selected, a Back Table Sleeve is packaged with the implant. Insert the Sleeve into the Standard SZ 4-9 hole of the Assembly Block, and then insert the Identity Revision Stem into the Back Table Sleeve (Figure 31). The Back Table Sleeve is NOT TO BE IMPLANTED. This step applies ONLY for size 4 and 5 Identity Revision stems.

Caution: If the stem is inserted into a hole which is too small in diameter, the stem may get stuck in the Assembly Block.

Figure 32

Figure 33

Humeral Component Implantation (cont.)

Select a Humeral Tray implant that corresponds to the final Humeral Tray Trial used previously. Using the Humeral Tray Inserter with the handle fully open (Figure 32), attach the Humeral Tray to the Inserter with the "MEDIAL" etch mark aligned to the anti-rotation tab on the Humeral Tray. Close the Inserter handle to rigidly mate with the implant.

Place the Humeral Tray implant into the Humeral Stem with the suture hole fin aligned laterally (Figure 33). Using a mallet, firmly strike the Inserter until the Morse taper junction is secure. Remove the Humeral Stem/Humeral Tray construct from the Back Table Assembly Block.

Figure 34

Figure 35

Humeral Component Implantation (cont.)

Thread the Version Rod Coupling into the Humeral Tray Inserter hole with the appropriate side engraving ("R" for right shoulder, "L" for left shoulder) (Figure 34).

If press-fitting, insert the implant into the canal with the appropriate version. Impact until the previously identified depth mark on the Revision Stem is aligned to the chosen anatomical landmark and implant stability is achieved (Figure 35).

If cementing, use lavage and suction to clean the humeral canal. Dry the canal and retrograde fill it with doughy cement. Insert the implant into the canal. Impact until the Stem is fully seated. Remove all excess cement. Allow the cement to fully cure prior to implanting the Humeral Bearing.

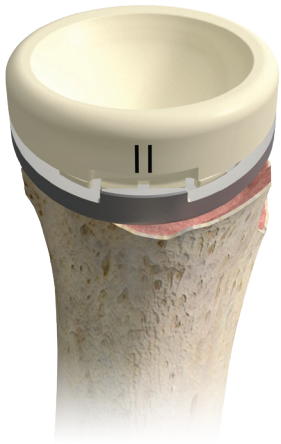


Figure 36

Figure 37

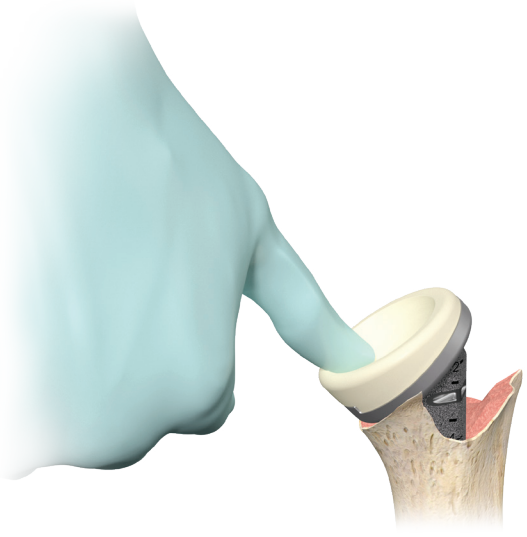


Figure 38

Humeral Component Implantation (cont.)

Align the selected Humeral Bearing implant double etch marks to the medial double etch marks on the Humeral Tray implant (Figure 36).

Tilt the Bearing so that the lateral “toe” engages into the lateral undercut of the Humeral Tray (Figure 37). Using finger pressure, press down on the medial side of the Bearing to seat the implant (Figure 38). The Bearing will make an audible click when it fully seats into the Humeral Tray.

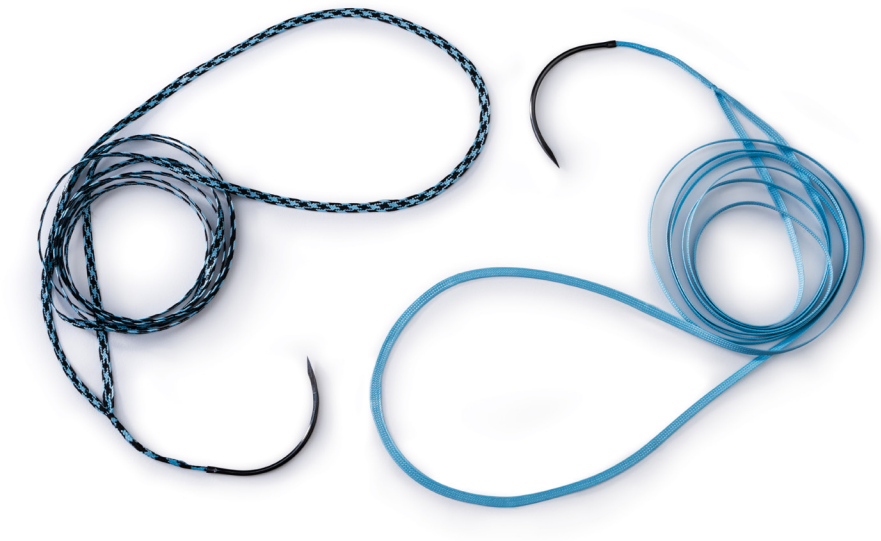


Figure 39

Reverse for Fracture

Zimmer Biomet offers a Fracture Repair Kit (Figure 39) which includes the following:

- 2.3mm Broadband Tape Loops w/ CCS needles
- 1.5mm Broadband Tape w/ MO-4 needles

Note: It is very difficult to pass sutures through the implant once it is fully seated into bone. Consider passing sutures prior to humeral component implantation.

Note: The suture technique described later is optional. Alternate techniques may be utilized based on surgeon preference.

Exposure

Expose the humerus using a deltapectoral approach. During dissection, take care to avoid injuring the neurovascular structures as bony landmarks may appear distorted. Identify the long head of the biceps tendon and tenodese to the upper border of the PMT. Depending on the fracture pattern, identify the tuberosities and tag them with sutures at the musculotendinous junction.

Remove the humeral head and save it for any subsequent autograft needs. Retract the greater and lesser tuberosities posteriorly and medially, respectively, to facilitate glenoid exposure and humeral preparation.

Humeral Preparation

Utilize the surgical steps detailed in the Revision with Proximal Bone Loss section of this surgical technique, with special attention paid to the additional humeral trialing considerations detailed below.

After humeral preparation, drill two suture holes in the shaft, one anterior and one lateral to the bicipital groove at the appropriate height. Pass two sutures through one hole into the humeral canal and out the other hole.

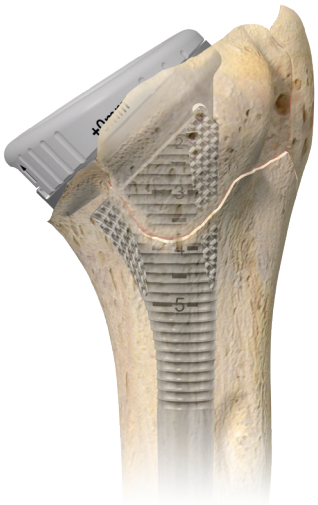


Figure 40

Figure 41

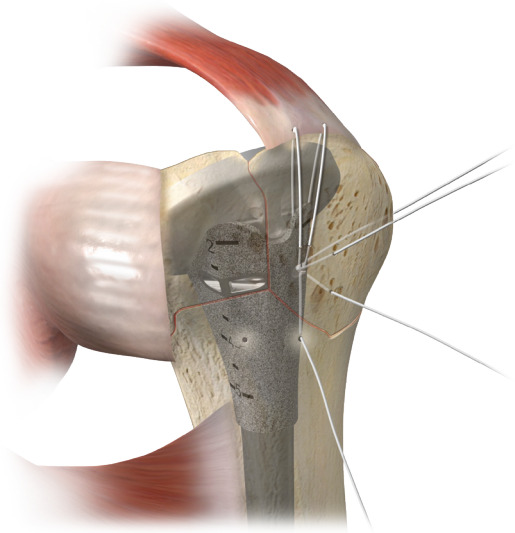


Figure 42

Humeral Trialing

Prior to performing an initial joint reduction and trial range of motion, confirm ability to properly position the tuberosities against the Rasp and Humeral Tray Trial. If trialing an inset tray (-6mm), confirm that when the tuberosities are fully reduced, the tray trial appears partially countersunk into the tuberosities (Figure 40).

If trialing an onlay tray (sizes +0mm or greater), confirm the proximal portion of the tuberosities fit underneath the tray trial (Figure 41).

There should be no gaps between the greater and lesser tuberosities and the humeral shaft.

Note: It's important to avoid over tensioning the joint. Since the tuberosities are not attached to the humerus, there is more laxity prior to final tuberosity reduction. Once you reduce the tuberosities around the implant, this will allow for more tension like a native joint.

Tuberosity Repair

After seating the final humeral component, place multiple horizontal sutures and one longitudinal suture through each tuberosity to enable fixation to the humeral stem and the proximal humeral shaft (Figure 42).

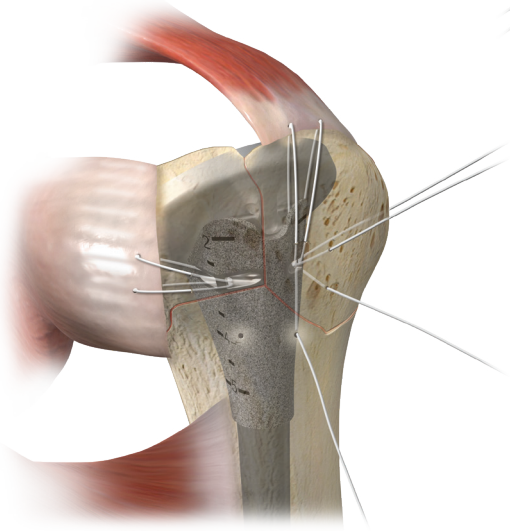


Figure 43

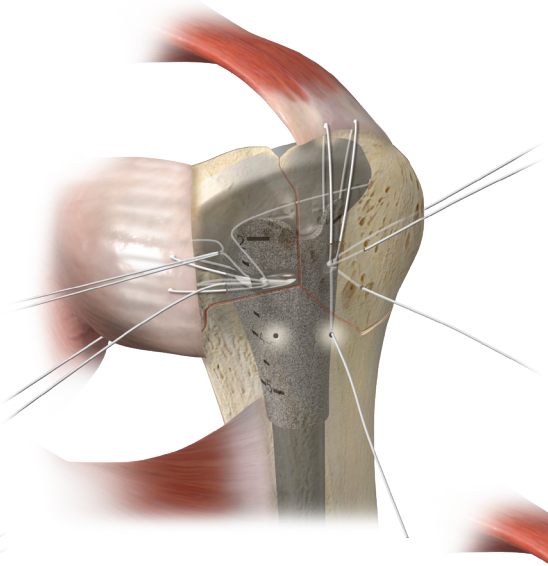


Figure 44

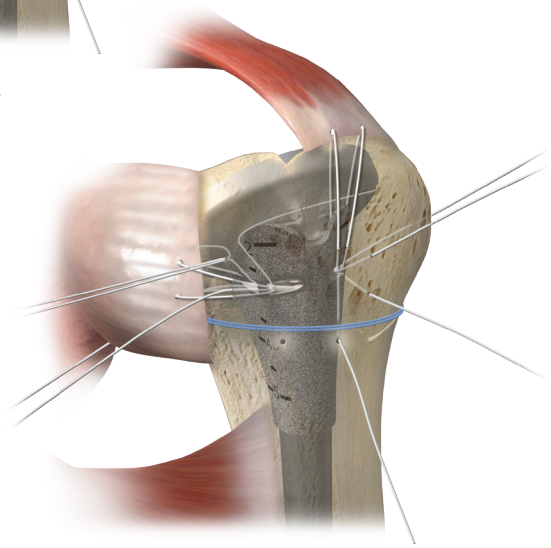


Figure 45

Tuberosity Repair

Wrap the more proximal greater tuberosity sutures around the underside of the humeral tray. The more distal greater tuberosity suture can be passed through the posterolateral suture hole in the stem (Figure 43). A lesser tuberosity suture can be passed through the anterolateral suture hole in the stem (Figure 44).

Per the instructions detailed previously, insert the humeral bearing implant into the humeral tray. Reduce the joint.

If desired, use autograft from the humeral head to augment the tuberosities prior to final placement. Place the greater tuberosity in the desired position. Provisionally tighten the greater tuberosity only sutures, moving from distal to proximal. When satisfied with greater tuberosity placement, definitively tighten the sutures. Using the remaining greater tuberosity sutures, insert them through the musculotendon junction of the lesser tuberosity. Affix the lesser tuberosity to the greater tuberosity.

Use a final cerclage suture around both tuberosities. Perform any desired repairs of the rotator cuff interval (Figure 45).

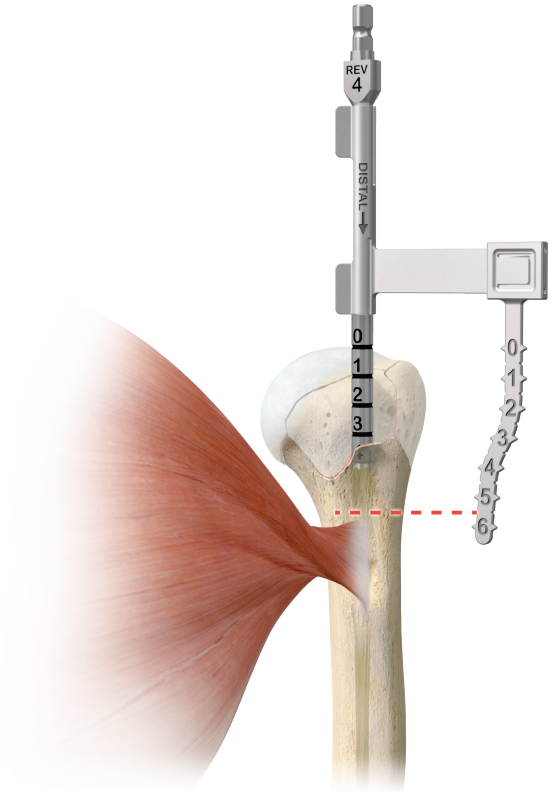


Figure 46

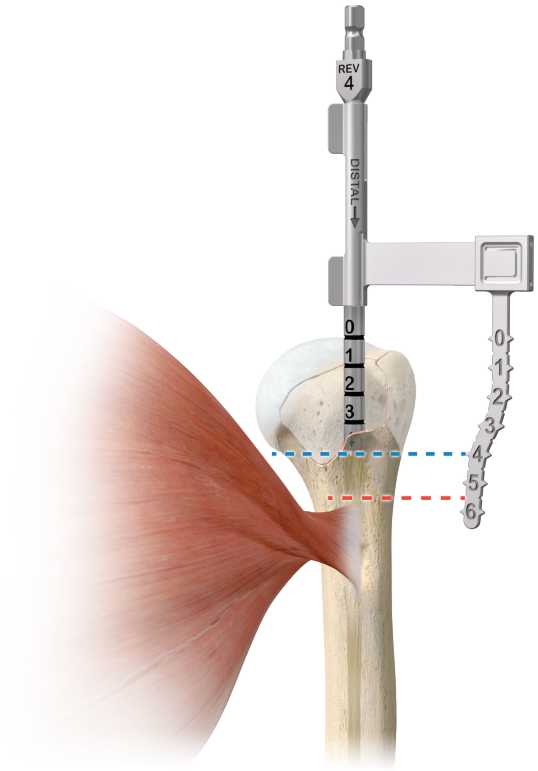


Figure 47

Appendix: Hemi for Fracture

Utilize the surgical steps detailed in the Revision with Proximal Bone Loss section of this surgical technique for humeral preparation with the Ruler. As noted in the Depth Mark Overview section, the "0" mark on the Ruler represents the crown of the native humeral head to aid in instrument insertion depth. Use of the Ruler is critical to guide proper insertion depth.

As previously described, use the Ruler and Reamer Clamp mated to the Revision Reamer to determine proper insertion depth. Using the Ruler, determine the Revision Reamer insertion depth such that the Ruler's "5" and "6" depth marks align to the top of the PMT insertion (Figure 46). With the final Revision Reamer inserted to the proper depth, identify an alternate proximal humeral landmark and it's alignment to one of the Depth Marks between "2" and "5" (Figure 47).

Ensure the chosen Depth Mark aligns to this landmark during rasping and final implant insertion. The Revision Rasps and humeral stem implant have Depth Marks "2" through "5."

Utilize the humeral head trialing, implant assembly and implant insertion steps detailed in the Identity Shoulder System Fixed Angle Adapter surgical technique. Be certain to note the rotational orientation of the chosen offset letter when trialing the head.

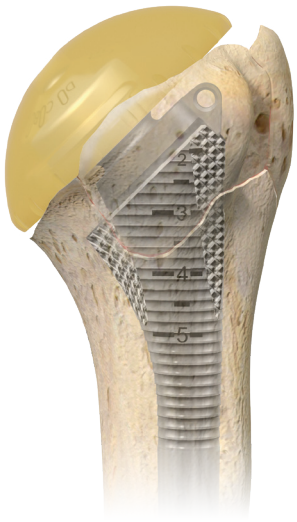


Figure 48

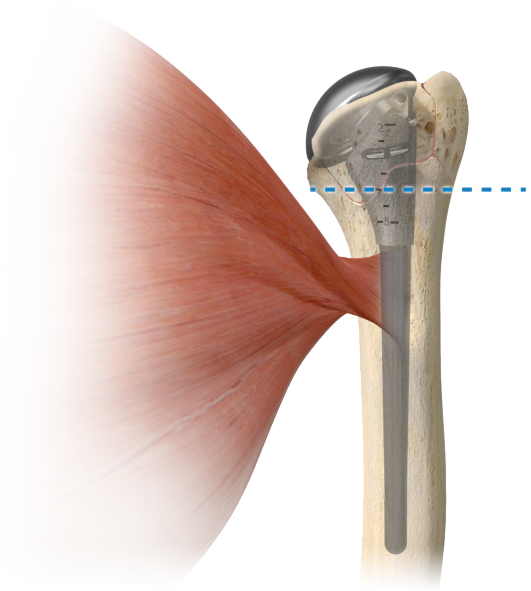


Figure 49

Appendix: Hemi for Fracture (cont.)

To confirm humeral trial construct height, ensure both tuberosities can be placed immediately below the Humeral Head Trial and that there is no gap between the distal portion of the tuberosities and the humeral shaft. (Figure 48).

After mating the Humeral Stem Adapter to the Revision Stem on the back table, the Inserter Clamp and Ruler may be assembled to the Stem Inserter to aid in implant insertion depth. During final implant insertion, ensure precise alignment between the chosen proximal landmark and Depth Mark (Figure 49).

Utilize the suture method detailed in the Reverse for Fracture section of this technique, wrapping sutures underneath the humeral head implant.

Implants

Product	Description	Size	Part Number
	**Revision Humeral Stem**	4mm	110047164
		5mm	110047165
		6mm	110047166
		7mm	110047167
		8mm	110047168
		9mm	110047169
		10mm	110047170
		11mm	110047171
		12mm	110047172
		13mm	110047173
		14mm	110047174
		15mm	110047175
		16mm	110047176
		17mm	110047177
		18mm	110047178
	Fracture Repair Kit		110046456*

Templates

Product	Description	Part Number
	X-Ray Template	110047163

Instruments

Product	Description	Size	Part Number
	**Revision Reamer**	4mm	110047129
		5mm	110047130
		6mm	110047131
		7mm	110047132
		8mm	110047133
		9mm	110047134
		10mm	110047135
		11mm	110047136
		12mm	110047137
		13mm	110047138
		14mm	110047139
		15mm	110047140
		16mm	110047141
		17mm	110047142
		18mm	110047143
	Reamer Clamp	–	110047182
	Ruler	–	110047183
	Inserter Clamp	–	110047184
	Revision Rasp	4mm	110047146
		5mm	110047147
		6mm	110047148
		7mm	110047149
		8mm	110047150
		9mm	110047151
		10mm	110047152
		11mm	110047153
		12mm	110047154
		13mm	110047155
		14mm	110047156
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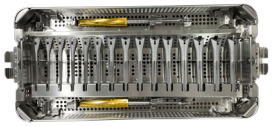
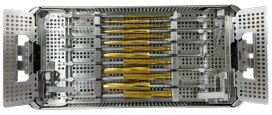
		17mm	110047159
		18mm	110047160
	Instrument Base	–	110047128
	Instrument Case Insert	–	110047185
	Lid	–	110031221**

Notes

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1. Murachovsky *et al.* Pectoralis major tendon reference (PMT): A new method for accurate restoration of humeral length with hemiarthroplasty for fracture. J Shoulder Elbow Surg 2006;6:675-8.
2. Torrens *et al.* The pectoralis major tendon as a reference for restoring humeral length and retroversion with hemiarthroplasty for fracture. J Shoulder Elbow Surg 2008;6:947-50.
3. Sahu *et al.* The Distance between the Pectoralis Major Tendon Insertion and the Top of the Humeral Head is a Reliable Landmark: An Anatomic Study. Joints 2019;7:37-40

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