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Copeland/ Copeland EAS

Humeral Resurfacing Head

Surgical Technique

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The general considerations, surgical technique and postoperative management instructions herein are those described by Stephen A. Copeland, F.R.C.S., Director Reading Shoulder Unit, Berkshire UK, Chairman International Board Shoulder and Elbow Surgeons (IBSES). Biomet does not practice medicine and does not recommend any particular orthopedic implant or surgical techniuqe for use on a specific patient. The surgeon is responsible for determining the appropriate devices and techniques for each individual patient.

The EAS Humeral Head surgical technique and postoperative management instructions are those utilized by David Bailie, M.D., The Orthopedic Clinic Association, Scottsdale, AZ. Biomet does not practice medicine and does not recommend any particular orthopedic implant or surgical techniuqe for use on a specific patient. The surgeon is responsible for determining the appropriate devices and techniques for each individual patient. The Copeland™ Surface Replacement Arthroplasty (CSRA) of the shoulder was developed by Stephen A. Copeland, F.R.C.S., Director Reading Shoulder Unit, Berkshire UK, Chairman International Board Shoulder and Elbow Surgeons (IBSES).

Patient Positioning and Approaches

Figure 1

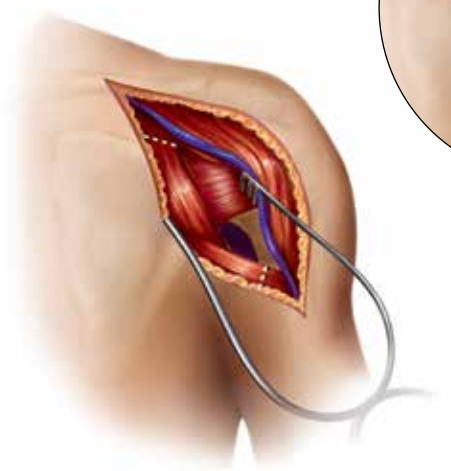


Figure 2

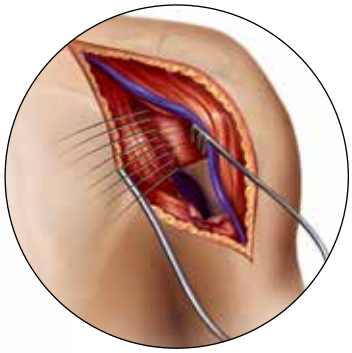


Figure 2a

Surgical Position

Place the patient in a semi-sitting or beach chair position.

General Considerations

The prosthesis may be inserted using either technique listed below:

A. The standard anterior deltopectoral approach

B. The antero-superior "Mackenzie" approach

If the rotator cuff is intact or a repairable rotator cuff defect is present, make an anterior acromioplasty with partial resection of the coracoacromial ligament. If there is complete loss of rotator cuff, do not disturb the coracoacromial arch. If preoperative X-rays indicate an arthritic change at the acromioclavicular joint and symptoms suggest this is a site of pain, perform an excision arthroplasty at this stage to improve exposure.

Deltopectoral Approach

Surgical Incision

Make a 15 cm incision from the clavicle down across the tip of the coracoid and continue in a straight line to the anterior border of the insertion of the deltoid (Figure 1).

Approach

Laterally mobilize the cephalic vein in the deltopectoral groove and retract laterally with the deltoid. Abduct the arm 40 to 60 degrees and incise the clavipectoral fascia. Clear the subacromial space and place a broad elevator beneath the acromion as a retractor. At this stage, divide the proximal 2 cm of the insertion of pectoralis major to obtain improved exposure (Figure 2). Flex the shoulder and externally rotate to facilitate coagulation of the anterior circumflex humeral vessels. Insert stay sutures into the subscapularis muscle to control retraction (Figure 2a).

Figure 3

Figure 4

Deltopectoral Approach (cont.)

Divide the tendon 2 cm medial to the bicipital groove. If it appears tight, divide the subscapularis in an oblique or "Z" manner to allow repair with lengthening of the tendon. Release the joint capsule anteriorly and inferiorly, while protecting the axillary nerve with a blunt elevator where it passes through the quadrilateral space. Dislocate the glenohumeral joint anteriorly by external rotation and extension, allowing full exposure of the humeral head and neck.

Antero-Superior "Mackenzie" Approach

Surgical Incision

Make a skin incision that extends distally in a straight line from just posterior to the acromioclavicular joint for a distance of 9 cm (Figure 3).

Approach

Split the anterior deltoid fibers for a distance of not more than 6 cm and place a loose No. 1 stay suture in the distal end of the split to prevent further extension and possible injury to axillary nerve. Using an osteo-periosteal flap, lift the acromial attachment of the deltoid to expose the anterior acromion and preserve the superior acromioclavicular ligament (Figure 4). Perform an anterior acromioplasty according to the Neer technique. If further exposure is necessary, excise the lateral end of 1 cm of clavicle.

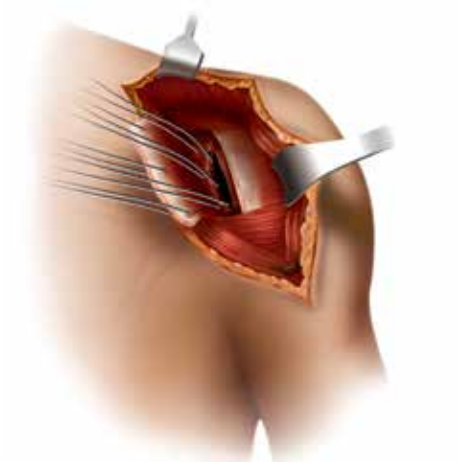
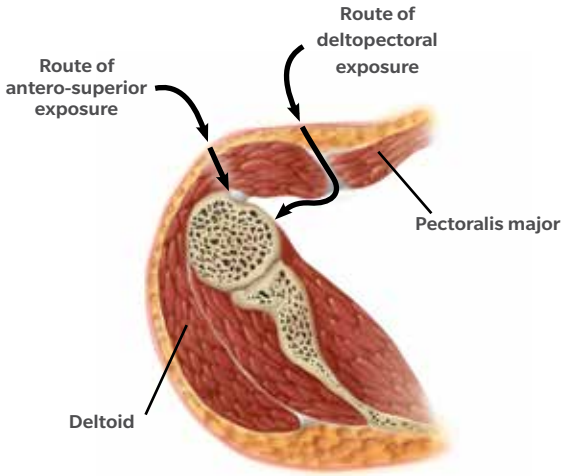


Figure 5



Approach Comparisons

Both Approaches

Identify the rotator interval and longitudinally incise along the line of the long head of the biceps to identify the exact insertion of the subscapularis. Using stay sutures, hold the subscapularis and disinsert (Figure 5). Dislocate the shoulder anteriorly. If intact, dislocate the long head of the biceps posteriorly over the humeral head.

Copeland Humeral Resurfacing Head

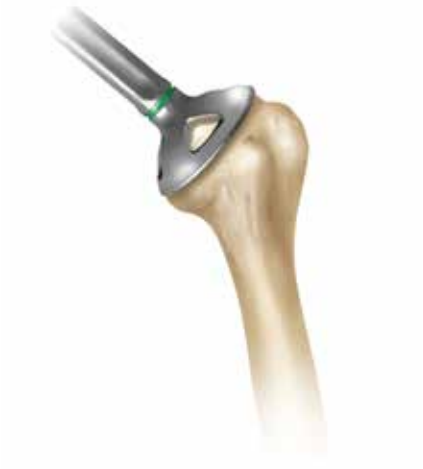


Figure 6

Figure 7

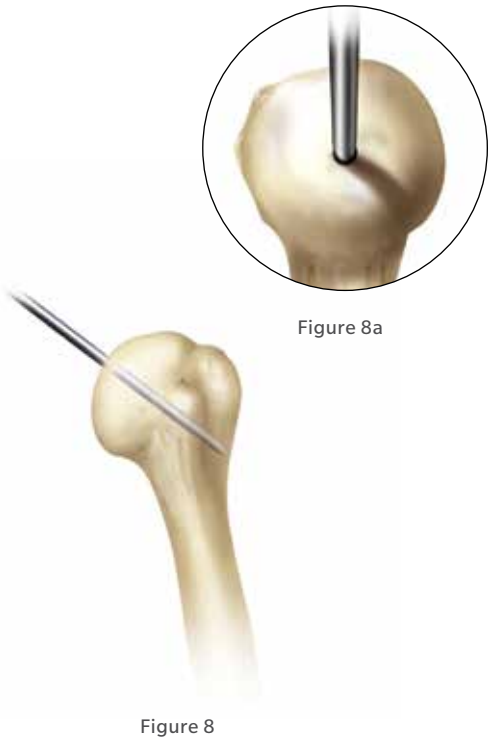


Figure 8

Figure 8a

Humeral Head Preparation

Define the anatomic neck of the humerus by removing any osteophytes, which is essential for determining the anatomical neck but not for shaping the humeral head. This also allows for more accurate positioning of the humeral drill guide.

Place a cannulated humeral drill guide on top of the humeral head. Orient the bottom edge of the guide parallel to the anatomical neck (Figure 6). After assessing for anterior/posterior placement, center the guide on the humeral head (Figure 7). This position automatically builds in the anatomical degrees of retroversion and inclination. Pass a 7/64" Steinmann pin guide wire down through the humeral head guide into the humeral head to the lateral cortex to provide stability.

Note the degree of natural retroversion between the angle of the guide wire and the forearm when flexed at 90 degrees. Do not attempt a fixed degree of version, as the goal is reproduction of the anatomic version (ranging from 5 to 55 degrees of retroversion). Remove the humeral drill guide and check the position of the Steinmann pin to ensure that it is both anatomic and centered in the humeral head (Figures 8 and 8a).

Surgical Technique

Figure 9

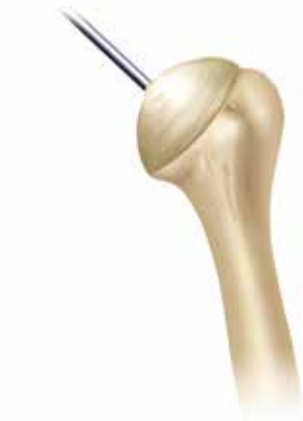


Figure 10

Figure 11

Figure 11a

Using a cannulated power drill with a ¼" Jacobs chuck or Hudson adapter, shape the humeral head by passing the cannulated humeral surface cutter over the Steinmann pin. Holding the sleeve of the surface reamer tightly, gently press down onto the humeral head while the reamer is rotating (Figure 9). Bone will begin to appear through the holes in the surface cutter. The humeral surface cutter facilitates complete bony apposition to the undersurface of the prosthesis and also delineates the edge of where the prosthesis will meet the bone. The edge of this cut will appear beneath the native surface of the bone (Figure 10).

Note: It may be necessary to remove bone from the periphery of the head. If possible, the hard subchondral plate should be left intact, as this provides good prosthetic support.

Note: Room temperature saline may be used during surface reaming to reduce heat generation.

Pass the cannulated spade bit over the guide wire and make the central peg hole down to the "stop" of the bit (Figures 11 and 11a). Remove the bit and guide wire. Morselized bone generated by making this pilot hole may be saved for later grafting.

To continue to the Copeland EAS Head Surgical Technique refer to page 10.

Figure 12

Figure 12a

Figure 13

Humeral Head Insertion

The thickness of the prosthesis should build up the recently cut surface of the humeral head back to the anatomical surface of the bone. Place the trial humeral prosthesis onto the prepared bone and perform a trial reduction (Figure 12). At this time, evaluate stability and range of motion. Also, check the prosthesis for stability in flexion/extension. If a sizing adjustment is needed, use the surface cutter guide for additional reaming (Figure 12a).

Remove the trial humeral component and examine the humeral head. If desired place bone slurry within the peg hole. Prior to impaction of both the glenoid and humeral components any hard sclerotic areas are drilled through to cancellous bone to make these surfaces more reactive with the bone graft. Press-fit the component by placing the resurfacing head implant onto the prepared humeral head and seating the component about two-thirds of the way with finger pressure. (When cementing, fill the peg hole with the desired amount of cement before placing the component.) Impact the humeral prosthesis until it is flush against the bone (Figure 13).

Copeland EAS Humeral Resurfacing Head

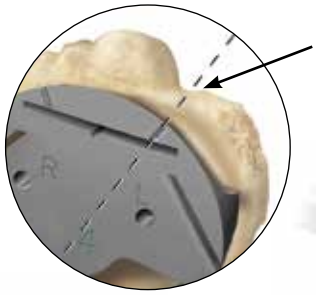


Figure 14a

Figure 14

Figure 15

Figure 16

Place the appropriate EAS cutting guide (based on STD resurfacing technique) onto the prepared surface (Figure 14). Make sure the central guide slot is over the superior portion of the greater tuberosity that is to be removed. The left (L) or right (R) markings should line up with the bicipital groove (Figure 14a) depending on operative side.

Note: If doing a left shoulder, the left line would be targeted at the bicipital groove. To hold the EAS cutting guide in the desired position, insert two quick release guide pins—one on the surface and another in the inferior rim. Make the superior cut* (Figure 15). An optional depth guide is available to maximize bone conservation. Lay the depth gauge on the superior portion of the cutting guide and mark the humerus with an electrocautery at the appropriate color-coded marking on the depth gauge. Next, make the anterior and posterior cuts* with the saw angled proximally toward the lateral cut to insure the proper amount of bone removal (Figure 16).

*An 85x13x.89 mm Stablecut® sawblade, part number 506090, is recommended.

Figure 17

Figure 18

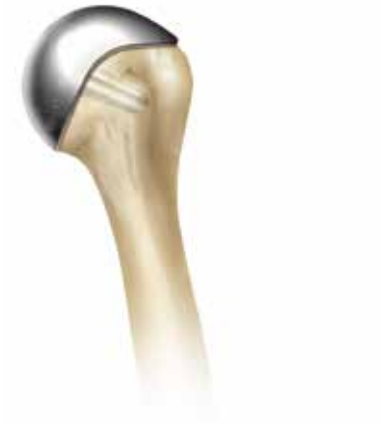


Figure 19

Humeral Head Insertion

The thickness of the prosthesis should build up the recently cut surface of the humeral head back to the normal anatomic surface of the bone (Figure 17). Place the trial humeral prosthesis onto the prepared bone and perform a trial reduction (Figure 18). At this time, evaluate stability and range of motion. Also, check the prosthesis for stability in flexion/extension. Finally, ensure the subacromial articulation is accurate so the lateral wing of the implant rides smoothly beneath the acromion with abduction. The goal is to maximize contact of the implant with the glenoid and acromion simultaneously.

Remove the trial humeral component and examine the humeral head. If desired place bone slurry within the peg hole. Press-fit the component by placing the resurfacing head prosthesis onto the prepared humeral head and seating the component about two-thirds of the way with finger pressure. (When cementing, partially fill the peg hole with cement before placing the component.) Impact the humeral prosthesis until it is flush against the bone (Figure 19).

Closure and Postoperative Care

Closure

While applying tension to the subscapularis stay sutures, assess the position of reattachment to the subscapularis. Due to the resultant lateralization of the center of rotation, attempt to gain relative length in the subscapularis by performing either a Z-plasty on the subscapularis when entering the joint or by medializing the insertion of the subscapularis to the free edge of the prosthesis.

Deltopectoral Approach

Repair the subscapularis using No. 1 suture material (absorbable PDSII® or non-absorbable) without plicating the subscapularis or through bone sutures. Close the rotator interval. If rotator cuff deficiency is present, perform routine rotator cuff repair at this stage. Make every attempt to close the rotator cuff completely. Close the deltopectoral interval using two or three interrupted absorbable sutures. Oppose subcutaneous fat with absorbable sutures and undertake appropriate skin closure with intradermal continuous absorbable sutures (Johnson & Johnson Corporation's 3/0 Monocryl).

Antero-Superior "Mackenzie" Approach

Repair the subscapularis using No. 1 suture material (absorbable Johnson & Johnson corporation's PDSII or non-absorbable) without plicating the subscapularis or through bone sutures. Close the rotator cuff interval. If rotator cuff deficiency is present, perform routine rotator cuff repair at this stage. Make every attempt to close the rotator cuff completely. Reattach the deltoid to the acromion with No. 1 absorbable sutures (Johnson & Johnson Corporation's PDSII) through bone. Approximate the deltoid split with 2/0 absorbable sutures. Oppose subcutaneous fat with absorbable sutures and undertake appropriate skin closure with intradermal continuous absorbable sutures (Johnson & Johnson Corporation's 3/0 Monocryl).

Postoperative

Place the patient in a sling with bodybelt and use brachial block analgesia. Passive mobilizing is recommended for the first 48 hours, with passive assistance for five days thereafter. Reintroduce active movement as pain allows and abandon the sling at three weeks. Begin a stretching and strengthening program as standard for all shoulder replacements.

Implants

Product	Description	Size	Part Number
	**Copeland Macrobond Coated Humeral |Resurfacing Head**	1 2 3 4 5 6 7 8	11-114621 11-114622 11-114623 11-114624 11-114625 11-114626 11-114627 11-114628
	**Copeland HA Coated Humeral Resurfacing Head**	1 2 3 4 5 6 7 8	11-114641 11-114642 11-114643 11-114644 11-114645 11-114646 11-114647 11-114648
	**Copeland EAS Macrobond/HA Coated Humeral Resurfacing Head**	1 2 3 4 5 6 7 8	11-114661 11-114662 11-114663 11-114664 11-114665 11-114666 11-114667 11-114668

Instruments

Product	Description	Size	Part Number
	Steinmann Pin/Trocar Point	7/64" x 9"	27-361478
	**Copeland Humeral Drill Guide**	1	402600
	Copeland Humeral Drill Guide	2	402601
	Copeland Humeral Drill Guide	3	402602
	Copeland Humeral Drill Guide	4	402604
	Copeland Humeral Drill Guide	5	402606
	Copeland Humeral Drill Guide	6	402607
	Copeland Humeral Drill Guide	7	402609
	Copeland Humeral Drill Guide	8	402608
	**Copeland Surface Cutter**	1	402620
	Copeland Surface Cutter	2	402621
	Copeland Surface Cutter	3	402622
	Copeland Surface Cutter	4	402624
	Copeland Surface Cutter	5	402626
	Copeland Surface Cutter	6	402627
	Copeland Surface Cutter	7	402629
	Copeland Surface Cutter	8	402628
	**Spade Cutter**	–	402610
	Spade Cutter	–	402612
	**Copeland Surface Cutter Guide**	1, 2	402642
	Copeland Surface Cutter Guide	3, 4, 5, 6, 7, 8	402644
	**Copeland Humeral Provisional**	1	402630
	Copeland Humeral Provisional	2	402631
	Copeland Humeral Provisional	3	402632
	Copeland Humeral Provisional	4	402634
	Copeland Humeral Provisional	5	402636
	Copeland Humeral Provisional	6	402637
	Copeland Humeral Provisional	7	402639
	Copeland Humeral Provisional	8	402638
	**Bio-Modular Humeral Head Impactor**	–	406514
	**Copeland Humeral Extractor**	–	402640
	**Fukada Retractor**	–	406699

Instruments (cont.)

Product	Description	Size	Part Number
	**Bent Ring Retractor**	–	994500850
	**Copeland EAS Cutting Guide**	1	402651
	Copeland EAS Cutting Guide	2	402652
	Copeland EAS Cutting Guide	3	402653
	Copeland EAS Cutting Guide	4	402654
	Copeland EAS Cutting Guide	5	402655
	Copeland EAS Cutting Guide	6	402656
	Copeland EAS Cutting Guide	7	402657
	Copeland EAS Cutting Guide	8	402658
	**Copeland EAS Provisional**	1	402661
	Copeland EAS Provisional	2	402662
	Copeland EAS Provisional	3	402663
	Copeland EAS Provisional	4	402664
	Copeland EAS Provisional	5	402665
	Copeland EAS Provisional	6	402666
	Copeland EAS Provisional	7	402667
	Copeland EAS Provisional	8	402668
	**Quick Release Trocar Pin**	–	402672
	**Steinmann Pin Threaded Tip (optional)**	–	406669
	**Pin Inserter/Extractor**	–	32-420160

Instruments (cont.)

Product	Description	Size	Part Number
	**Quick Release Attachment**	–	32-486259
	**Depth Gauge**	–	402674
	**Stablecut Sawblade**	85 x 13 x .89 mm	506090
	Copeland Instrument Case Outer	–	595210
	Copeland Upper Instrument Tray	–	595212
	Copeland Lower Instrument Tray	–	595213
	Copeland EAS Instrument Case*	–	595214

*Includes outer, upper, and inner trays.

Copeland HA Coated Humeral Resurfacing Heads and Copeland Macrobond Coated Humeral Resurfacing Heads (not available in the EU)

INDICATIONS

The Copeland Resurfacing Heads are indicated for the following conditions where the humeral head and neck are of sufficient bone stock and there is presence of an intact or reconstructable rotator cuff, which is necessary for proper functioning and dislocation resistance:

1. Non-inflammatory degenerative joint disease including osteoarthritis and avascular necrosis.
2. Rheumatoid arthritis
3. Correction of functional deformity
4. Reconstructable rotator cuff
5. Treatment of fractures of the humeral head
6. Traumatic arthritis

Implants with Interlok/hydroxyapatite are cleared for uncemented applications. Implants with MacroBond and MacroBond coating with hydroxyapatite are cleared for cemented and uncemented applications; however, cement should only be applied to the surfaces that do not contain hydroxyapatite coating (i.e. stem).

Copeland EAS Macrobond/HA Coated Humeral Resurfacing Heads

INDICATIONS

The Copeland Extended Articulating Surface (EAS) Resurfacing Heads are indicated for hemi-shoulder replacement in patients with massive, irreparable rotator cuff tears and arthritis.

Specific indications include:

1. Cuff tear arthropathy.
2. Difficult clinical management problems where other methods of treatment may not be suitable or may be inadequate.

CONTRAINDICATIONS

Absolute contraindications include: infection, sepsis, and osteomyelitis. Relative contraindications include: 1) uncooperative patient or patient with neurologic disorders who are incapable of following directions, 2) osteoporosis, 3) metabolic disorders which may impair bone formation, 4) osteomalacia, 5) distant foci of infections which may spread to the implant site, 6) rapid joint destruction, marked bone loss or bone resorption apparent on roentgenogram, 7) revision procedures where other devices or treatments have failed, 8) intact or reconstructable rotator cuff and 9) lack of functional deltoid.

Notes

Notes

Notes

Check for country product clearances and reference product specific instructions for use. For complete product information, including indications, contraindications, warnings, precautions, and potential adverse effects, see the package insert and Biomet's website.

This technique was prepared in conjunction with a licensed health care professional. Biomet does not practice medicine and does not recommend any particular orthopedic implant or surgical technique for use on a specific patient. The surgeon is responsible for determining the appropriate device(s) and technique(s) for each individual patient.

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