# Cigna Medical Coverage Policies – Musculoskeletal Shoulder Surgery – Arthroscopic and Open Procedures

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**Instructions for use**

The following coverage policy applies to health benefit plans administered by Cigna. Coverage policies are intended to provide guidance in interpreting certain standard Cigna benefit plans and are used by medical directors and other health care professionals in making medical necessity and other coverage determinations. Please note the terms of a customer's particular benefit plan document may differ significantly from the standard benefit plans upon which these coverage policies are based. For example, a customer's benefit plan document may contain a specific exclusion related to a topic addressed in a coverage policy.

In the event of a conflict, a customer's benefit plan document always supersedes the information in the coverage policy. In the absence of federal or state coverage mandates, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of:

1. The terms of the applicable benefit plan document in effect on the date of service
2. Any applicable laws and regulations
3. Any relevant collateral source materials including coverage policies
4. The specific facts of the particular situation

Coverage policies relate exclusively to the administration of health benefit plans. Coverage policies are not recommendations for treatment and should never be used as treatment guidelines.

This evidence-based medical coverage policy has been developed by eviCore, Inc. Some information in this coverage policy may not apply to all benefit plans administered by Cigna.

# CMM-315: Shoulder Surgery-Arthroscopic and Open Procedures





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## Definitions

- **Acromioplasty**: the removal of bone from the acromion and partial resection of the coracoacromial ligament.
- **Adhesive Capsulitis/Arthrofibrosis**: a condition of the shoulder characterized by stiffness, loss of motion (contracture), and pain due to scarring in and/or around the shoulder joint. Conditions that have been suggested to predispose an individual to adhesive capsulitis include trauma, surgery to the shoulder, inflammatory diseases, diabetes, hyperthyroidism, dyslipidemia. Often called frozen shoulder, adhesive capsulitis is clinically divided into classes:
  - Primary adhesive capsulitis is characterized by a significant limitation of both active and passive motions on the shoulder; individuals are typically unable to recall a possible cause of the condition (idiopathic adhesive capsulitis).
  - Secondary adhesive capsulitis is characterized by a trauma or a possible cause prior to the onset of the symptoms, such as fracture of the humerus, rotator cuff repair, shoulder girdle injury/surgery, or prolonged immobilization.
- **Distal Clavicle Excision**: the removal of the end of the clavicle at the acromioclavicular (AC) joint. The superior AC ligament remains intact so that the joint remains stable.
- **Impingement Syndrome**: a condition that commonly results from friction, abrasion, and inflammation of the rotator cuff and the long head of the biceps tendon with the subacromial arch (anterior lip of the acromion, coracoacromial ligament, and acromioclavicular joint) from acute trauma, repetitive use or degenerative changes.
- **Labral Tear**: a tear of the glenoid labrum. Tears are typically classified by the position of the tear in relation to the glenoid.
  - **Bankart Tear**: a tear in the labrum located in the front, lower (anterior, inferior) part of the glenoid. This type of tear occurs most commonly during a shoulder dislocation and makes the shoulder more prone to recurrent dislocations.
  - **SLAP Tear (Superior Labral, Anterior, and Posterior Tear)**: a tear in the labrum that covers the top part of the glenoid from the front to back. A SLAP tear occurs at the point where the long head of the biceps tendon attaches. This type of tear occurs most commonly during falls on an outstretched arm.
- **Non-Surgical Management** (with regard to the treatment of shoulder pain)**:** any provider-directed non-surgical treatment that has been demonstrated in the scientific literature to be efficacious and/or is considered reasonable care in the treatment of shoulder pain. The types of treatment involved can include, but are not limited to, the following: relative rest/activity modification; supervised physiotherapy modalities and therapeutic exercises; prescription and non-prescription medications; assistive devices; and/or, injections.

- **Rotator Cuff Arthropathy**: a condition that results from **ALL** of the following:
  - Rotator cuff dysfunction (e.g., secondary to unrepairable massive rotator cuff tear)
  - Advanced glenohumeral arthritis
  - Radiographically diminished acromio-humeral distance
- **Rotator Cuff Tear (RCT)**: a disruption of the tendon(s) of the rotator cuff muscles which attach the humerus to the scapula. These tendons are important in shoulder movements and maintaining glenohumeral joint stability. The supraspinatus tendon is most commonly involved, but the infraspinatus, teres minor, and subscapularis tendons can also be torn.
  - Defining whether a rotator cuff tear is acute has relevance to treatment. In evaluating individuals, the surgeon should attempt to properly identify individuals with acute tears as opposed to individuals with pre-existing chronic tears that become symptomatic after an injury event. A discrete traumatic event is more suggestive of acute tear. Physical exam findings including supraspinatus and infraspinatus muscle atrophy, as well as internal and external rotation lag signs, may be indicative of larger and more chronic rotator cuff tears.
  - Evaluation of rotator cuff muscle quality with CT or MRI is an important consideration. Chronic and larger tears are associated with muscle atrophy and fatty replacement, both of which correlate with inferior functional outcome after rotator cuff repair. It is thought that early repair of acute rotator cuff tears might mitigate the development of chronic tendon and muscle pathology and improve functional outcomes.
  - Classification of rotator cuff tears (based upon surgical findings):
    - Partial-thickness tears, also called incomplete tears (Ellman):
      - Grade 1: <3 mm deep (<25% thickness)
      - Grade 2: 3–6 mm in depth but not exceeding 50% of the tendon thickness
      - Grade 3: >6 mm deep (>50% thickness)
    - Full-thickness tears, also called complete tears (Cofield):
      - Small: <1 cm
      - Medium: 1-3 cm
      - Large: 3-5 cm
      - Massive: >5 cm
- **Shoulder Dislocation**: the complete loss of the humeral articulation with the glenoid fossa, usually as a result of acute trauma.
- **Shoulder Instability and/or Laxity**: a partial loss of the glenohumeral articulation of which there are two categories:
  - Post-traumatic shoulder instability includes an individual with a previous injury that has stretched or torn the ligaments of the shoulder.
  - Atraumatic instability and/or laxity includes an individual with generalized looseness of the joints “double-jointed” or “multi-directional instability” usually representing a type of congenital ligamentous laxity.
- **Shoulder Subluxation**: a partial loss of humeral articulation with the glenoid fossa (incomplete or partial dislocation) usually as a result of repetitive trauma to the degree that symptoms are produced.

- **Subacromial Decompression**: the removal of bone or other abnormality to enlarge the space between the rotator cuff musculature and the acromion.

## General Guidelines

### Application of Guideline

- The determination of medical necessity for the performance of shoulder surgery is always made on a case-by-case basis.
- For advanced imaging indications for conditions of the shoulder refer to **MS-19: Shoulder**.
- Manipulation of a shoulder joint under general anesthesia is included in all arthroscopic shoulder procedures and is therefore considered incidental to the base procedure requiring medical necessity review.

## Arthroscopic or Open Procedures for Fracture, Tumor, Infection, or Foreign Body

- Arthroscopic or open shoulder surgery may be considered **medically necessary** for individuals when surgery is being performed for fracture, tumor, infection, or foreign body that has led to or will likely lead to progressive destruction.

## Diagnostic Arthroscopy

### Diagnostic Arthroscopy Indications

Diagnostic arthroscopy is considered **medically necessary** as a stand-alone procedure when **ALL** of the following criteria have been met:

- MRI or CT is inconclusive for internal derangement/pathology
- Physical exam demonstrates **ANY** of the following findings (as compared to the non-involved side):
  - Functionally-limited range of motion (active or passive)
  - Measurable loss in strength
  - Positive Neer impingement test or Hawkins-Kennedy impingement test
- Symptoms include function-limiting pain (e.g., loss of shoulder function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment) for at least six (6) months duration
- Failure of provider-directed non-surgical management for at least three (3) months duration
- Other potential pathological conditions have been excluded including, but not limited to, the following: fracture, thoracic outlet syndrome, brachial plexus disorders, referred neck pain, and advanced glenohumeral osteoarthritis.

## Diagnostic Arthroscopy Non-Indications

### Not Medically Necessary

- Diagnostic arthroscopy is considered **not medically necessary** for **ANY** other indication or condition.

### Experimental, Investigational, or Unproven

- Based on the lack of scientific evidence of efficacy and safety, the following is considered **experimental, investigational, or unproven (EIU)**:
  - In-office diagnostic arthroscopy (e.g., Mi-Eye™, VisionScope®)

# Loose Body/Foreign Body Removal

## Loose Body/Foreign Body Removal Indications

Loose body or foreign body removal is considered **medically necessary** when **ALL** of the following criteria have been met:

- MRI or CT shows findings of a loose body or foreign body within the shoulder joint
- Symptoms include **BOTH** of the following:
  - Function-limiting pain (e.g., loss of shoulder function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment)
  - Mechanical symptoms including painful locking, clicking, catching, or popping
- Failure of provider-directed non-surgical management for at least three (3) months duration
  - **Criteria exception**: Three (3) months of provider-directed non-surgical management is **not required** if the loose body or foreign body has caused an acute restriction of shoulder joint range of motion (i.e., locking).
- Other potential pathological conditions have been excluded including, but not limited to, the following: fracture, thoracic outlet syndrome, brachial plexus disorders, referred neck pain, and advanced glenohumeral osteoarthritis.

## Loose Body/Foreign Body Removal Non-Indications

### Not Medically Necessary

- Loose body or foreign body removal is considered **not medically necessary** for **ANY** other indication or condition.

# Synovectomy

## Synovectomy Indications

Synovectomy (partial or complete) is considered **medically necessary** when **ALL** of the following criteria have been met:

- MRI or CT Arthrogram shows findings of synovitis
- Presence of **ANY** of the following conditionspsoriatic arthritis)
  - Pigmented villonodular synovitis (PVNS)
  - Synovial chondromatosis
  - Lyme synovitis
  - Hemophilia
  - Hemochromatosis
  - Non-specific synovitis (e.g., proliferative synovitis, post-operative synovitis as a sequela from a shoulder replacement, etc.)
  - Recurrent hemarthrosis
- Physical exam demonstrates functionally-limited range of motion (active or passive) (as compared to the non-involved side)
- Function-limiting pain (e.g., loss of shoulder function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment)
- Failure of provider-directed non-surgical management for at least three (3) months duration
- Other potential pathological conditions have been excluded including, but not limited to, the following: fracture, thoracic outlet syndrome, brachial plexus disorders, referred neck pain, and advanced glenohumeral osteoarthritis.

## Synovectomy Non-Indications

### Not Medically Necessary

- Synovectomy is considered **not medically necessary** for **ANY** other indication or condition.

# Debridement

## Debridement Indications

Debridement (limited or extensive) is considered **medically necessary** when **ALL** of the following criteria have been met:

- MRI or CT shows findings of underlying pathology which correlates with the individual's reported symptoms and physical exam findings

- Pysical exam demonstrates **BOTH** of the following findings (as compared to the non-involved side):
  - **EITHER** of the following findings:
    - Functionally-limited range of motion
    - Measurable loss of strength
  - **ANY** of the following positive orthopedic tests/signs:
    - Drop arm test
    - Painful arc test
    - Jobe or empty can test
    - External rotation lag sign (dropping sign)
    - Lift-off test
    - Belly-press test (Napoleon)
    - Cross body adduction test
    - Resisted AC joint extension test
    - Neer impingement test
    - Hawkins-Kennedy impingement test
    - O'Brien's test
    - Biceps load test
    - Clunk test
    - Anterior slide test
    - Compression rotation test
    - Speed's test
    - Upper cut test
    - Yergason's test
    - Proximal biceps (groove) tenderness
    - Modified dynamic labral shear
- Function-limiting pain (e.g., loss of shoulder function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment)
- Failure of provider-directed non-surgical management for at least three (3) months duration
- Other potential pathological conditions have been excluded including, but not limited to, the following: fracture, thoracic outlet syndrome, brachial plexus disorders, referred neck pain, and advanced glenohumeral osteoarthritis.

## Debridement Non-Indications

### Not Medically Necessary

- Debridement is considered **not medically necessary** for **ANY** other indication or condition.

# Rotator Cuff Repair

## Rotator Cuff Repair Indications

Rotator cuff repair is **considered medically necessary** when **ALL** of the following criteria have been met:

- MRI or CT shows **EITHER** of the following findings:
  - Grade 2 or 3 partial-thickness rotator cuff tear (Ellman classification)
  - Full-thickness rotator cuff tear (Cofield classification)
- Physical exam demonstrates **BOTH** of the following findings (as compared to the non-involved side):
  - **EITHER** of the following findings:
    - Functionally-limited range of motion
    - Measurable loss of strength of the rotator cuff musculature
  - **ANY** of the following positive orthopedic tests/signs:
    - Drop arm test
    - Painful arc test
    - Jobe or empty can test
    - External rotation lag sign (dropping sign)
    - Internal rotation lag sign
    - Lift-off test
    - Bear hug test
    - Belly-press test (Napoleon)
    - Belly-off test
    - Neer impingement test
    - Hawkins-Kennedy impingement test
    - Hornblower test (Patte)
- Function-limiting pain (e.g., loss of shoulder function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment)
- Failure of provider-directed non-surgical management for at least three (3) months duration
  - **Criteria exception**: Three (3) months of provider-directed non-surgical management is **not required** for an individual who suffers a discrete traumatic event that results in an acute full-thickness rotator cuff tear without evidence of a pre-existing chronic rotator cuff tear.
    - Note: The presence of fatty infiltration and/or muscle atrophy on MRI or CT is considered **evidence of pre-existing chronic rotator cuff tear**.
      - Therefore, **when fatty infiltration and/or muscle atrophy is also present on MRI or CT**, three (3) months of provider-directed non-surgical management **is required**, regardless of whether a discrete traumatic event occurred.
- Other potential pathological conditions have been excluded including, but not limited to, the following: fracture, thoracic outlet syndrome. brachial plexus disorders, referred neck pain, and advanced glenohumeral osteoarthritis.

## Rotator Cuff Repair Non-Indications

### Not Medically Necessary

- Rotator cuff repair is considered not **medically necessary** for **ANY** other indication or condition.

### Experimental, Investigational, or Unproven (EIU)

- Based on the lack of scientific evidence of efficacy and safety, the following is considered **experimental, investigational, or unproven (EIU)**:
  - Superior capsular reconstruction using any type of graft (e.g., autograft, allograft, xenograft, or synthetic)

# Distal Clavicle Excision/Subacromial Decompression/Acromioplasty

## Distal Clavicle Excision Indications

Distal clavicle excision is considered **medically necessary** when **ALL** of the following criteria have been met:

- Imaging shows **BOTH** of the following findings:
  - Plain radiographs show findings of underlying pathology in the subacromial space and/or at the AC joint
  - MRI or CT shows findings of underlying pathology (e.g., AC joint arthritis, impingement, etc.) which correlates with the individual's reported symptoms and physical exam findings
    - **Criteria exception**: Advanced diagnostic imaging is **not required** for an **isolated** distal clavicle excision when the procedure is not associated with subacromial decompression/acromioplasty surgery.
- Physical exam demonstrates **BOTH** of the following findings (as compared to the non-involved side):
  - Localized tenderness to palpation of the acromioclavicular (AC) joint
  - **ANY** of the following positive orthopedic tests/signs:
    - Cross body adduction test
    - Resisted AC joint extension test
    - Neer impingement test
    - Hawkins-Kennedy impingement test
- Function-limiting pain (e.g., loss of shoulder function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment)
- Failure of provider-directed non-surgical management for at least three (3) months duration
- Other potential pathological conditions have been excluded including, but not limited to, the following: fracture, thoracic outlet syndrome, brachial plexus disorders, referred neck pain, and advanced glenohumeral osteoarthritis.

## Subacromial Decompression/Acromioplasty Indications

Subacromial decompression/acromioplasty is considered **medically necessary** when **ALL** of the following criteria have been met:

- When requested as an arthroscopic procedure (add-on procedure), it is required to be performed with other medically necessary **primary** arthroscopic shoulder surgical procedures
- Imaging shows **BOTH** of the following findings:
  - Plain radiographs show findings of underlying pathology in the subacromial space and/or at the AC joint
  - MRI or CT shows findings of underlying pathology (e.g., AC joint arthritis, impingement, etc.) which correlates with the individual's reported symptoms and physical exam findings
- Physical exam demonstrates **ANY** of the following positive orthopedic tests/signs (as compared to the non-involved side):
  - Cross body adduction test
  - Resisted AC joint extension test
  - Neer impingement test
  - Hawkins-Kennedy impingement test
- Function-limiting pain (e.g., loss of shoulder function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment)
- Failure of provider-directed non-surgical management for at least three (3) months duration
- Other potential pathological conditions have been excluded including, but not limited to, the following: fracture, thoracic outlet syndrome, brachial plexus disorders, referred neck pain, and advanced glenohumeral osteoarthritis.

## Distal Clavicle Excision/Subacromial Decompression/ Acromioplasty Non-Indications

### Not Medically Necessary

- Distal clavicle excision/subacromial decompression/acromioplasty is considered **not medically necessary** for **ANY** other indication or condition.
- Arthroscopic subacromial decompression/acromioplasty is considered **not medically necessary** as a stand-alone procedure.

# Labral Repair

## Labral Repair Indications

Labral repair is considered **medically necessary** when **ALL** of the following criteria have been met:

- MRI or CT shows labral tear (e.g., SLAP) and correlates with the individual's reported symptoms and physical exam findings
- Physical exam demonstrates **BOTH** of the following findings (as compared to the non-involved side):
  - Minimally limited or full shoulder range of motion
  - **ANY** of the following positive orthopedic tests/signs:
    - O'Brien's test
    - Biceps load test
    - Clunk test
    - Anterior slide test
    - Compression rotation test
    - Speed's test
    - Modified dynamic labral shear
- Symptoms include function-limiting pain (e.g., loss of shoulder function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment)
- Failure of provider-directed non-surgical management for at least three (3) months duration
- Other potential pathological conditions have been excluded including, but not limited to, the following: fracture, thoracic outlet syndrome, brachial plexus disorders, referred neck pain, cervical radiculopathy, and advanced glenohumeral osteoarthritis.

## Labral Repair Non-Indications

- Labral repair is considered **not medically necessary** for **ANY** other indication or condition.

# Biceps Tenodesis

## Biceps Tenodesis Indications

Biceps tenodesis is considered **medically necessary** when **ALL** of the following criteria have been met:

- MRI or CT shows labral tear/biceps tendon pathology (e.g., SLAP, full-thickness subscapularis tear) and correlates with the individual's reported symptoms and physical exam findings
- Physical exam demonstrates **BOTH** of the following findings (as compared to the non-involved side):
  - Minimally limited or full shoulder range of motion
  - **ANY** of the following positive orthapedic tests/signs:
    - O'Brien's test
    - Biceps load test
    - Clunk test
    - Anterior slide test
    - Compression rotation test
    - Speed's test
    - Upper cut test
    - Yergason's test
    - Proximal biceps (groove) tenderness
    - Modified dynamic labral shear
    - Popeye sign
- Function-limiting pain (e.g., loss of shoulder function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment)
- Failure of provider-directed non-surgical management for at least three (3) months duration
  - **Criteria exception**: Three (3) months of provider-directed non-surgical management is **not required** for an individual who suffers a discrete traumatic event that results in an acute proximal biceps tendon rupture**.**
- Other potential pathological conditions have been excluded including, but not limited to, the following: fracture, thoracic outlet syndrome, brachial plexus disorders, referred neck pain, cervical radiculopathy, and advanced glenohumeral osteoarthritis.

## Biceps Tenodesis Non-Indications

- Biceps tenodesis is considered **not medically necessary** for **ANY** other indication or condition.

# Arthroscopic or Open Surgical Procedures for Shoulder Instability and/or Laxity

## Arthroscopic or Open Surgical Procedures for Shoulder Instability and/or Laxity Indications

Arthroscopic or open surgical procedures for shoulder instability and/or laxity are considered **medically necessary** when **ALL** of the following criteria have been met:

- MRI or CT shows labral/capsular pathology (e.g., Bankart, capsular tear) and correlates with the individual's reported symptoms and physical exam findings
- Physical exam demonstrates **ANY** of the following positive orthopedic tests/signs (as compared to the non-involved side):
  - Anterior or posterior apprehension test
  - Sulcus sign
  - Load and shift test
- Documented history of "post-traumatic" or "atraumatic" instability and/or laxity that has resulted in function-limiting pain (e.g., loss of shoulder function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment)
- Failure of provider-directed non-surgical management for at least three (3) months duration that includes shoulder stabilization/strengthening exercises
  - **Criteria exception**: Three (3) months of provider-directed non-surgical management is **not required** in an acute traumatic injury setting when **EITHER** of the following conditions are present:
    - Irreducible shoulder dislocation
    - Anterior shoulder instability in competitive contact or collision athletes
- Other potential pathological conditions have been excluded including, but not limited to, the following: fracture, thoracic outlet syndrome, brachial plexus disorders, referred neck pain, cervical radiculopathy, and advanced glenohumeral osteoarthritis.

## Arthroscopic or Open Surgical Procedures for Shoulder Instability and/or Laxity Non-Indications

### Not Medically Necessary

- Arthroscopic or open surgical procedures for shoulder instability and/or laxity are considered **not medically necessary** for **ANY** other indication or condition.

### Experimental, Investigational, or Unproven (EIU)

- Based on the lack of scientific evidence of efficacy and safety, the following is considered **experimental, investigational, or unproven (EIU):**
  - Superior capsular reconstruction using any type of graft (e.g., autograft, allograft, xenograft, or synthetic)

# Arthroscopic Capsular Release/Lysis of Adhesions

## Arthroscopic Capsular Release/Lysis of Adhesions Indications

### Arthroscopic Capsular Release/Lysis of Adhesions

Arthroscopic capsular release/lysis of adhesions is considered **medically necessary** when **ALL** of the following criteria have been met:

- Individual has documented chronic refractory adhesive capsulitis/arthrofibrosis which has resulted from disease, injury, or surgery
- Physical exam demonstrates functionally-limited and painful global loss of active and passive range of motion of at least 50% (as compared to the non-involved side)
- Function-limiting pain (e.g., loss of shoulder function which interferes with the ability to carry out age-appropriate activities of daily living and/or demands of employment) for at least six (6) months duration
- Failure of provider-directed non-surgical management for at least three (3) months duration, including a combination of anti-inflammatory medication, cortisone injection, and a trial of physical therapy (i.e., active exercise and manual therapy designed to increase joint mobility and range of motion)
- Other potential pathological conditions have been excluded including, but not limited to, the following: fracture, thoracic outlet syndrome, brachial plexus disorders, referred neck pain, cervical radiculopathy, and advanced glenohumeral osteoarthritis.

## Arthroscopic Capsular Release/Lysis of Adhesions Non-Indications

### Not Medically Necessary

- Arthroscopic capsular release/lysis of adhesions is considered **not medically necessary** for **ANY** other indication or condition.

# Arthroscopic or Open Coracoplasty/Subcoracoid Decompression Non-Indications

### Experimental, Investigational, or Unproven (EIU)

- Based on lack of scientific evidence of efficacy and safety, arthroscopic or open coracoplasty/subcoracoid decompression for the treatment of subcoracoid impingement is considered **experimental, investigational, or unproven (EIU)**.

## Codes (CMM-315)

The inclusion of any code in this table does not imply that the code is under management or requires prior authorization. Refer to the applicable health plan for management details. Prior authorization of a code listed in this table is not a guarantee of payment. The Certificate of Coverage or Evidence of Coverage policy outlines the terms and conditions of the member's health insurance policy.[TTDV1]

| Code | Code Description/Definition |
|---|---|
| **23000** | Removal of subdeltoid calcareous deposits, open |
| **23020** | Capsular contracture release (e.g., Sever type procedure) |
| **23120** | Claviculectomy; partial |
| **23125** | Claviculectomy; total |
| **23130** | Acromioplasty or acromionectomy, partial, with or without coracoacromial ligament release |
| **23145** | Excision or curettage of bone cyst or benign tumor of clavicle or scapula; with autograft (includes obtaining graft) |
| **23155** | Excision or curettage of bone cyst or benign tumor of proximal humerus; with autograft (includes obtaining graft) |
| **23172** | Sequestrectomy (e.g., for osteomyelitis or bone abscess), scapula |
| **23174** | Sequestrectomy (e.g., for osteomyelitis or bone abscess), humeral head to surgical neck |
| **23190** | Ostectomy of scapula, partial (e.g., superior medial angle) |
| **23195** | Resection, humeral head |
| **23395** | Muscle transfer, any type, shoulder or upper arm; single |
| **23397** | Muscle transfer, any type, shoulder or upper arm; multiple |
| **23405** | Tenotomy, shoulder area; single tendon |
| **23406** | Tenotomy, shoulder area; multiple tendons through same incision |
| **23410** | Repair of ruptured musculotendinous cuff (e.g., rotator cuff) open; acute |
| **23412** | Repair of ruptured musculotendinous cuff (e.g., rotator cuff) open; chronic |
| **23415** | Coracoacromial ligament release, with or without acromioplasty |
| **23420** | Reconstruction of complete shoulder (rotator) cuff avulsion, chronic (includes acromioplasty) |
| **23430** | Tenodesis of long tendon of biceps |
| **23440** | Resection or transplantation of long tendon of biceps |
| **23450** | Capsulorrhaphy, anterior; Putti-Platt procedure or Magnuson type operation |
| **23455** | Capsulorrhaphy, anterior; with labral repair (e.g., Bankart procedure) |
| **23460** | Capsulorrhaphy, anterior, any type; with bone block |
| **23462** | Capsulorrhaphy, anterior, any type; with coracoid process transfer |
| **23465** | Capsulorrhaphy, glenohumeral joint, posterior, with or without bone block |
| **23466** | Capsulorrhaphy, glenohumeral joint, any type multi-directional instability |
| **23480** | Osteotomy, clavicle, with or without internal fixation |
| **23485** | Osteotomy, clavicle, with or without internal fixation; with bone graft for nonunion or malunion (includes obtaining graft and/or necessary fixation) |
| **29805** | Arthroscopy, shoulder, diagnostic, with or without synovial biopsy (separate procedure) |
| **29806** | Arthroscopy, shoulder, surgical; capsulorrhaphy |
| **29807** | Arthroscopy, shoulder, surgical; repair of SLAP lesion |
| **29819** | Arthroscopy, shoulder, surgical; with removal of loose body or foreign body |
| **29820** | Arthroscopy, shoulder, surgical; synovectomy, partial |
| **29821** | Arthroscopy, shoulder, surgical; synovectomy, complete |
| **29822** | Arthroscopy, shoulder, surgical; debridement, limited, 1 or 2 discrete structures (e.g., humeral bone, humeral articular cartilage, glenoid bone, glenoid articular cartilage, biceps tendon, biceps anchor complex, labrum, articular capsule, articular side of the rotator cuff, bursal side of the rotator cuff, subacromial bursa, foreign body[ies]) |

| Code | Code Description/Definition |
|---|---|
| **29823** | Arthroscopy, shoulder, surgical; debridement, extensive, 3 or more discrete structures (e.g., humeral bone, humeral articular cartilage, glenoid bone, glenoid articular cartilage, biceps tendon, biceps anchor complex, labrum, articular capsule, articular side of the rotator cuff, bursal side of the rotator cuff, subacromial bursa, foreign body[ies]) |
| **29824** | Arthroscopy, shoulder, surgical; distal claviculectomy including distal articular surface (Mumford procedure) |
| **29825** | Arthroscopy, shoulder, surgical; with lysis and resection of adhesions, with or without manipulation |
| **29826** | Arthroscopy, shoulder, surgical; decompression of subacromial space with partial acromioplasty, with coracoacromial ligament (i.e., arch) release when performed (List separately in addition to code for primary procedure) |
| **29827** | Arthroscopy, shoulder, surgical; with rotator cuff repair |
| **29828** | Arthroscopy, shoulder, surgical; biceps tenodesis |

## References (CMM-315)


1. American Academy of Orthopaedic Surgeons (AAOS); AAOS Clinical Practice Guidelines Unit. *Optimizing the Management of Rotator Cuff Problems: Guideline and Evidence Report*. Dec 2010. Rosemont, IL. ©American Academy of Orthopaedic Surgeons (AAOS).
2. Altintas B, Anderson N, Pitta R, et al. Repair of Rotator Cuff Tears in the Elderly: Does It Make Sense? A Systematic Review. *Am J Sports Med*. 2019;48(3):744-753. doi:10.1177/0363546519834574.
3. Arciero RA, Wheeler JH, Ryan JB, et al. Arthroscopic Bankart Repair versus Nonoperative Treatment for Acute, Initial Anterior Shoulder Dislocations. *Am J Sports Med*. 1994;22(5):589-594.
4. Audenaert E, Nuffel JV, Schepens A, Verhelst M, Verdonk R. Reconstruction of massive rotator cuff lesions with a synthetic interposition graft: a prospective study of 41 patients. *Knee Surg Sports Traumatol Arthrosc*. 2005;14(4):360-364. doi:10.1007/s00167-005-0689-7.
5. Belk JW, Wharton BR, Houck DA, et al. Shoulder Stabilization Versus Immobilization for First-Time Anterior Shoulder Dislocation: A Systematic Review and Meta-analysis of Level 1 Randomized Controlled Trials. *Am J Sports Med*. 2023;51(6):1634-1643. doi:10.1177/03635465211065403.
6. Berk AN, Cregar WM, Gachigi KK, et al. Outcomes of subacromial balloon spacer implantation for irreparable rotator cuff tears: a systematic review and meta-analysis. *J Shoulder Elbow Surg*. 2023;32(10):2180-2191. doi:10.1016/j.jse.2023.04.016.
7. Bi AS, Anil U, Colasanti CA, et al. Comparison of Multiple Surgical Treatments for Massive Irreparable Rotator Cuff Tears in Patients Younger Than 70 Years of Age: A Systematic Review and Network Meta-analysis. *Am J Sports Med*. 2024;52(11):2919-2930. doi:10.1177/03635465231204623.
8. Boileau P, Baque F, Valerio L, et al. Isolated Arthroscopic Biceps Tenotomy or Tenodesis Improves Symptoms in Patients with Massive Irreparable Rotator Cuff Tears. *J Bone Joint Surg Am*. 2007;89(4):747-757.
9. Boorman RS, More KD, Hollinshead RM, et al. What happens to patients when we do not repair their cuff tears? Five-year rotator cuff quality-of-life index outcomes following nonoperative treatment of patients with full-thickness rotator cuff tears. *J Shoulder Elbow Surg*. 2018;27:444-448. doi:10.1016/j.jse.2017.10.009.
10. Brealey S, Northgraves M, Kottam L, et al. Surgical treatments compared with early structured physiotherapy in secondary care for adults with primary frozen shoulder: the UK FROST three-arm RCT. *Health Technol Assess (Rockv)*. 2020;24(71):1-162. doi:10.3310/hta24710.
11. Brolin T, Updegrove G, Horneff J. Classifications in Brief: Hamada Classification of Massive Rotator Cuff Tears. *Clin Orthop Relat Res*. 2017;475(11):2819-2823. doi:10.1007/s11999-017-5340-7.
12. Budoff J, Nirschl R, Guidi E. Current Concepts Review-Debridement of Partial-Thickness Tears of the Rotator Cuff without Acromioplasty. Long-term follow-up and review of the literature. *J Bone Joint Surg Am*. 1998;80(5):733-748.
13. Burkhart S, Pranckun J, Hartzler R. Superior Capsular Reconstruction for the Operatively Irreparable Rotator Cuff Tear: Clinical Outcomes Are Maintained 2 Years After Surgery. *Arthroscopy*. 2020;36(2):373-380. doi:10.1016/j.arthro.2019.08.035.
14. Burnier M, Elhassan B, Sanchez-Sotelo J. Surgical Management of Irreparable Rotator Cuff Tears. *J Bone Joint Surg*. 2019;101(17):1603-1612. doi:10.2106/jbjs.18.01392.
15. Carver TJ, Kraeutler MJ, Smith JR, Bravman JT, Mccarty EC. Nonarthroplasty Surgical Treatment Options for Massive, Irreparable Rotator Cuff Tears. *Orthop J Sports Med*. 2018;6(11):232596711880538. doi:10.1177/2325967118805385.
16. Cvetanovich G, Waterman B, Verma N, Romeo A. Management of the Irreparable Rotator Cuff Tear. *JAAOS*. 2019;27(24):909-917. doi:10.5435/jaaos-d-18-00199.
17. Choi L. Overuse injuries. In: DeLee J, et al. *DeLee and Drez's Orthopaedic Sports Medicine*. 3rd ed. Philadelphia, Pa. Saunders Elsevier. 2009.
18. Cofield RH. Subscapular muscle transposition for repair of chronic rotator cuff tears. *Surg Gynecol Obstet*. 1982;154(5):667–672.
19. Coory J, Parr A, Wilkinson M, Gupta A. Efficacy of suprascapular nerve block compared with subacromial injection: a randomized controlled trial in patients with rotator cuff tears. *J Shoulder Elbow Surg*. 2019;28(3):430-436. doi:10.1016/j.jse.2018.11.051.
20. Cvetanovich G, Waterman B, Verma N, Romeo A. Management of the Irreparable Rotator Cuff Tear. *J Am Acad Orthop Surg*. 2019;27(24):909-917. doi:10.5435/jaaos-d-18-00199.
21. Denard PJ, Brady PC, Adams CR, et al. Preliminary results of arthroscopic superior capsule reconstruction with dermal allograft. *Arthroscopy*. 2018;34(1):93-99.
22. DeOrio JK, Cofield RH. Results of a second attempt at surgical repair of a failed initial rotator-cuff repair. *J Bone Joint Surg Am*. 1984;66(4):563–567.
23. Dunn WR, Kuhn JE, Sanders R, et al. 2013 Neer Award: predictors of failure of nonoperative treatment of chronic, symptomatic, full-thickness rotator cuff tears. *J Shoulder Elbow Surg*. 2016;25:1303-1311.
24. Ernstbrunner L, Suter A, Catanzaro S, Rahm S, Gerber C. Reverse Total Shoulder Arthroplasty for Massive, Irreparable Rotator Cuff Tears Before the Age of 60 Years. *J Bone Joint Surg*. 2017;99(20):1721-1729. doi:10.2106/jbjs.17.00095.

25. Forsythe B, Agarwalla A, Puzzitiello RN, Sumner S, Romeo AA, Mascarenhas R. The Timing of Injections Prior to Arthroscopic Rotator Cuff Repair Impacts the Risk of Surgical Site Infection. *J Bone Joint Surg*. 2019;101(8):682-687. doi:10.2106/jbjs.18.00631.
26. Galatz LM Ball C, Teefey S, et al. The outcome and repair integrity of completely arthroscopically repaired large and massive rotator cuff tears. *J Bone Joint Surg Am*. 2004;86(2):219-224.
27. Galvin J, Kenney R, Curry E, et al. Superior Capsular Reconstruction for Massive Rotator Cuff Tears. *JBJS Rev*. 2019;7(6):e1. doi:10.2106/jbjs.rvw.18.00072.
28. Garofalo R, Conti M, Massazza G, Cesari E, Vinci E, Castagna A. Subcoracoid impingement syndrome: a painful shoulder condition related to different pathologic factors. *Musculoskelet Surg*. 2011;95 Suppl 1:S25-S29.
29. Garrigues G. The Superior Capsule Reconstruction. *J Bone Joint Surg*. 2019;101(21):e116. doi:10.2106/jbjs.19.00883.
30. Gartsman G, TavernaE: The incidence of glenohumeral joint abnormalities associated with complete, reparable rotator cuff tears. *Arthroscopy*. 1997;12:575-579.
31. Godeneche A, Elia F, Kempf J, et al. Fatty infilitration of stage 1 or higher significantly compromises long-term healing of supraspinatus repairs. *J Shoulder Elbow Surg*. 2017;26:1818-1825. doi:10.1016/j.jse.2017.03.024.
32. Green A. Is the Devil in the Details?. *J Bone Joint Surg*. 2019;101(21):e117. doi:10.2106/jbjs.19.01120.
33. Guevara J, Entezari V, Ho J, Derwin K, Iannotti J, Ricchetti E. An Update on Surgical Management of the Repairable Large-to-Massive Rotator Cuff Tear. *J Bone Joint Surg*. 2020;102(19):1742-1754. doi:10.2106/jbjs.20.00177.
34. Gupta AK, Hug K, Berkoff DJ, et al. Dermal Tissue Allograft for the Repair of Massive Irreparable Rotator Cuff Tears. *Am J Sports Med*. 2012;40(1):141-147. doi:10.1177/0363546511422795.
35. Hamada K, Fukuda h, Mikasa M, Kobayashi Y. Roentgenographic Findings in Massive Rotator Cuff Tears: A Long-Term Observation. *Clin Orthop Relat Res*. 1990;(254):92-96. doi:10.1097/00003086-199005000-00014.
36. Hartzler R, Burkhart S. Superior Capsular Reconstruction. *Orthopedics*. 2017;40(5):271-280. doi:10.3928/01477447-20170920-02.
37. Herbery-Davies J, Teefey SA, Steger-May K, et al. Progression of fatty muscle degeneration in atraumatic rotator cuff tears. *J Bone Joint Surg Am*. 2017;99:832-839. doi:10.2106/JBJS.16.00030.
38. Hippensteel KJ, Brophy R, Smith MV, et al. A comprehensive review of physical examination tests of the cervical spine, scapula, and rotator cuff. *J Am Acad Orthop Surg*. 2019;27:385-94. doi:10.5435/JAAOS-D-17-00090.
39. Hirahara AM, Andersen WJ, Panero AJ. Superior capsular reconstruction: clinical outcomes after minimum 2-year follow-up. *Am J Orthop*. 2017:266-278.
40. Hovelius L, Olofsson A, Sandström B. Nonoperative treatment of primary anterior shoulder dislocation in patients forty years of age and younger. a prospective twenty-five-year follow-up. *J Bone Joint Surg Am*. 2008;90(5):945-952.
41. Hovis W, Dean M, Mallon W, Hawkins R. Posterior instability of the shoulder with secondary impingement in elite golfers. *Am J Sports Med*. 2002;30(6):886-890.
42. Hsieh LF, Kuo YC, Huang YH, Liu YF, Hsieh TL. Comparison of corticosteroid injection, physiotherapy and combined treatment for patients with chronic subacromial bursitis - A randomised controlled trial. *Clin Rehabil*. 2023;37(9):1189-1200. doi:10.1177/02692155231166220.
43. Jain N, Ayers G, Fan R, et al. Comparative Effectiveness of Operative Versus Nonoperative Treatment for Rotator Cuff Tears: A Propensity Score Analysis From the ROW Cohort. *Am J Sports Med*. 2019;47(13):3065-3072. doi:10.1177/0363546519873840.
44. Jeong J, Kim S, Yoon T, Eum K, Chun Y. Arthroscopic Repair of Large and Massive Rotator Cuff Tears. *J Bone Joint Surg*. 2020;102(14):1248-1254. doi:10.2106/jbjs.19.01014.
45. Johns WL, Ailaney N, Lacy K, Golladay GJ, Vanderbeck J, Kalore NV. Implantable Subacromial Balloon Spacers in Patients With Massive Irreparable Rotator Cuff Tears: A Systematic Review of Clinical, Biomechanical, and Financial Implications. *Arthrosc Sports Med Rehabil*. 2020;2(6):e855-e872. doi:10.1016/j.asmr.2020.06.011.
46. Kalson N, Borthwick L, Mann D, et al. International consensus on the definition and classification of fibrosis of the knee joint. *Bone Joint J*. 2016;98-B(11):1479-1488. doi:10.1302/0301-620x.98b10.37957.
47. Karjalainen TV, Jain NB, Page CM, et al. Subacromial decompression surgery for rotator cuff disease. *Cochrane Database Syst Rev*. 2019;1:CD005619.
48. Keener JD, Galatz LM, Teefey SA, et al. A Prospective Evaluation of Survivorship of Asymptomatic Degenerative Rotator Cuff Tears. *J Bone Joint Surg Am*. 2015;97:89-98.
49. Keener JD, Patterson BM, Orvets N, Chamberlain AM. Degenerative Rotator Cuff Tears. *J Am Acad Orthop Surg*. 2019;27(5):156-165. doi:10.5435/jaaos-d-17-00480.
50. Khazzam M, Kane SM, Smith MJ. Open Shoulder Stabilization Using bone block technique for treatment of chronic glenohumeral instability associated with glenoid deficiency. *Am J Orthop*. 2009;38(7):329-335.
51. Kibler WB, Sciascia A, Hester P, Dome D, Jacobs C. Clinical Utility of Traditional and New Tests in the Diagnosis of Biceps Tendon Injuries and Superior Labrum Anterior and Posterior Lesions in the Shoulder. *Am J Sports Med*. 2009;37(9):1840-1847. doi:10.1177/0363546509332505.

52. Kim H, Teefey S, Zelig A, et al. Shoulder strength in asymptomatic individuals with intact compared with torn rotator cuffs. *J Bone Joint Surg Am*. 2009;91(2):289-296.
53. Kim SJ, Choi YR, Jung M, Yoon Y, Chun YM. Concomitant coracoplasty during arthroscopic subscapularis repair does not yield better clinical outcomes and structural integrity. *Knee Surg Sports Traumatol Arthrosc*. 2018;26(1):56-62.
54. Kragh JF Jr, Doukas WC, Basamania CJ. Primary coracoid impingement syndrome. *Am J Orthop*. 2004;33(5):229-232.
55. Kuhn JE, Dunn WR, Sanders R, et al. 2024 Kappa Delta Ann Doner Vaughan Award: Nonsurgical Treatment of Symptomatic, Atraumatic Full-Thickness Rotator Cuff Tears-a Prospective Multicenter Cohort Study With 10-Year Follow-Up. *J Am Acad Orthop Surg*. 2024;32(23):1061-1073. doi:10.5435/JAAOS-D-24-00841.
56. Kuhn JE, Dunn WR, Sanders R, et al. The Predictors of Surgery for Symptomatic, Atraumatic Full-Thickness Rotator Cuff Tears Change Over Time: Ten-Year Outcomes of the MOON Shoulder Prospective Cohort. *J Bone Joint Surg Am*. 2024;106(17):1563-1572. doi:10.2106/jbjs.23.00978.
57. Kuhn JE, Dunn WR, Sanders R, et al. Effectiveness of physical therapy in treating atraumatic full-thickness rotator cuff tears: a multicenter prospective cohort study. *J Shoulder Elbow Surg*. 2013;22(10):1371-1379. doi:10.1016/j.jse.2013.01.026.
58. Kukkonen J, Joukainen A, Lehtinen J, et al. Treatment of Nontraumatic Rotator Cuff Tears: A Randomized Control Trial with Two Years of Clinical and Imaging Follow-up. *J Bone Joint Surg Am*. 2015;97:1729-1737.
59. Kukkonen J, Ryösä A, Joukainen A, et al. Operative versus conservative treatment of small, nontraumatic supraspinatus tears in patients older than 55 years: over 5-year follow-up of a randomized controlled trial. *J Shoulder Elbow Surg*. 2021;30(11):2455-2464. doi:10.1016/j.jse.2021.03.133.
60. Lee SJ, Min YK. Can inadequate acromiohumeral distance improvement and poor posterior remnant tissue be the predictive factors of re-tear? Preliminary outcomes of arthroscopic superior capsular reconstruction. *Knee Surg Sports Traumatol Arthrosc*. 2018;26(7):2205-2213.
61. Leland D, Bernard C, Keyt L, et al. An Age-Based Approach to Anterior Shoulder Instability in Patients Under 40 Years Old: Analysis of a US Population. *Am J Sports Med*. 2019;48(1):56-62. doi:10.1177/0363546519886861.
62. Leroux, TS, Saltzman BM, Meyer M, et al. The Influence of Evidence-Based Surgical Indications and Techniques on Failure Rates After Arthroscopic Shoulder Stabilization in the Contact or Collision Athlete with Anterior Shoulder Instability. *Am J Sports Med*. 2017;45(5):1218-1225.
63. Lewington MR, Ferguson DP, Smith TD, Burks R, Coady C, Wong IH-B. Graft Utilization in the Bridging Reconstruction of Irreparable Rotator Cuff Tears: A Systematic Review. *Am J Sports Med*. 2017;45(13):3149-3157. doi:10.1177/0363546517694355.
64. Lim S, Alramadhan H, Kwak J-M, Hong H, Jeon I-H. Graft tears after arthroscopic superior capsule reconstruction (ASCR): pattern of failure and its correlation with clinical outcome. *Arch Orthop Trauma Surg*. 2018;139(2):231-239. doi:10.1007/s00402-018-3025-7.
65. Lin J, Sun Y, Chen Q, Liu S, Ding Z, Chen J. Outcome Comparison of Graft Bridging and Superior Capsule Reconstruction for Large to Massive Rotator Cuff Tears: A Systematic Review. *Am J Sports Med*. 2019;48(11):2828-2838. doi:10.1177/0363546519889040.
66. MacDonald P, McRae S, Old J, et al. Arthroscopic Bankart repair with and without arthroscopic infraspinatus remplissage in anterior shoulder instability with a Hill-Sachs defect: a randomized controlled trial. *J Shoulder Elbow Surg*. 2021;30(6):1288-1298. doi:10.1016/j.jse.2020.11.013.
67. MacDonald P, Verhulst F, McRae S, et al. Biceps Tenodesis Versus Tenotomy in the Treatment of Lesions of the Long Head of the Biceps Tendon in Patients Undergoing Arthroscopic Shoulder Surgery: A Prospective Double-Blinded Randomized Controlled Trial. *Am J Sports Med*. 2020;48(6):1439-1449. doi:10.1177/0363546520912212.
68. Maman E, Safran O, Beyth S, et al. Biceps Tenotomy Does not Affect the Functional Outcomes of Patients Treated with Spacer Implantation Due to Massive Irreparable Rotator Cuff Tears. *Open Orthop J*. 2017;11:1577-1584. doi:10.2174/1874325001711011577.
69. McKee M, Yoo D. The effect of surgery for rotator cuff disease on general health status. Results of a prospective trial. *J Bone Joint Surg Am*. 2000;82(7):970-979.
70. McKernan M, Schickendantz M, Frangiamore S. Diagnosis and Management of Subcoracoid Impingement. *J Am Acad Orthop Surg*. 2020;29(3):100-107. doi:10.5435/jaaos-d-20-00008.
71. Metcalfe A, Parsons H, Parsons N, et al. Subacromial balloon spacer for irreparable rotator cuff tears of the shoulder (START:REACTS): a group-sequential, double-blind, multicentre randomised controlled trial. *Lancet*. 2022;399(10339):1954-1963. doi:10.1016/s0140-6736(22)00652-3.
72. Mihata T, Lee T, Hasegawa A, et al. Five-Year Follow-up of Arthroscopic Superior Capsule Reconstruction for Irreparable Rotator Cuff Tears. *J Bone Joint Surg*. 2019;101(21):1921-1930. doi:10.2106/jbjs.19.00135.
73. Mihata T, Lee TQ, Watanabe C, et al. Clinical results of arthroscopic superior capsule reconstruction for irreparable rotator cuff tears. *Arthroscopy*. 2013;29(3):459-470. doi:10.1016/j.arthro.2012.10.022.
74. Mishra D, Fanton G. Two-year outcome of arthroscopic Bankart repair and electrothermal-assisted capsulorrhaphy for recurrent traumatic anterior shoulder instabili*ty. Arthroscopy*. 2001;17(8):844-849.

75. Moon AS, Patel HA, Ithurburn MP, Brabston EW, Ponce BA, Momaya AM. Subacromial Spacer Implantation for the Treatment of Massive Irreparable Rotator Cuff Tears: A Systematic Review. *Arthroscopy*. 2019;35(2):607-614. doi:10.1016/j.arthro.2018.08.006.
76. Moosmayer S, Gartner AV, Tariq R. The natural course of nonoperatively treated rotator cuff tears: an 8.8 year follow-up of tear anatomy and clinical outcome in 49 patients. *J Shoulder Elbow Surg*. 2017;26:627-634. doi:10.1016/j.jse.2016.10.002.
77. Moosmayer S, Lund G, Seljom U, et al. At a 10-Year Follow-up, Tendon Repair Is Superior to Physiotherapy in the Treatment of Small and Medium-Sized Rotator Cuff Tears. *J Bone Joint Surg*. 2019;101(12):1050-1060. doi:10.2106/jbjs.18.01373.
78. Nakhaei Amroodi M, Salariyeh M. Predictors of failure after conservative treatment of symptomatic partial-thickness rotator cuff tear. *J Shoulder Elbow Surg*. 2020;29(1):113-120. doi:10.1016/j.jse.2019.05.009.
79. Neumann JA, Zgonis MH, Rickert KD, et al. Interposition Dermal Matrix Xenografts: A Successful Alternative to Traditional Treatment of Massive Rotator Cuff Tears. *Am J Sports Med*. 2017;45(6):1261-1268. doi:10.1177/0363546516683945.
80. Ono Y, LeBlanc J, Bois AJ, et al. Graft Healing Is More Important Than Graft Technique: Superior Capsular Reconstruction Versus Bridging Grafts—A Prospective Randomized Controlled Trial. *Arthroscopy*. 2022;38(12):3109-3117. doi:10.1016/j.arthro.2022.06.033.
81. Park M, Jun B, Park C, et al. Biomechanical Analysis of a Knotless Transtendon Interimplant Mattress Repair for Partial-Thickness Articular-Sided Rotator Cuff Tears. *Am J Sports Med*. 2009;37(12):2427-2434.
82. Park JY, Lhee SH, Oh KS, Kim NR, Hwang JT. Is arthroscopic coracoplasty necessary in subcoracoid impingement syndrome? Arthroscopy. 2012;28(12):1766-1775.
83. Pennington WT, Bartz BA, Pauli JM, et al. Arthroscopic superior capsular reconstruction with acellular dermal allograft for the treatment of massive irreparable rotator cuff tears, short-tern clinical outcomes and the radiographic parameter of superior capsular distance. *Arthroscopy*. 2018;34(6):1764-1773.
84. Petrera A, Dwyer T, Tsuji MRS, et al. Outcomes of Arthroscopic Bankart Repair in Collision Versus Noncollision Athletes. *Orthopedics*. 2013;36(5):e621-e626.
85. Petri M, Greenspoon J, Moulton S, Millett P. Patch-Augmented Rotator Cuff Repair and Superior Capsule Reconstruction. *Open Orthop J*. 2016;10(1):315-323. doi:10.2174/1874325001610010315.
86. Piekaar RSM, Bouman ICE, van Kampen PM, van Eijk F, Huijsmans PE. The subacromial balloon spacer for massive irreparable rotator cuff tears: approximately 3 years of prospective follow-up. *Musculoskelet Surg*. 2020;104(2):207-214. doi:10.1007/s12306-019-00614-1.
87. Plancher K, Shanmugam J, Briggs K, Petterson S. Diagnosis and Management of Partial Thickness Rotator Cuff Tears: A Comprehensive Review. *JAAOS*. 2021;29(24):1031-1043. doi:10.5435/jaaos-d-20-01092.
88. Ranebo MC, Hallgren HCB, Norlin R, Adolfsson LE. Long-term clinical and radiographic outcome of rotator cuff repair with a synthetic interposition graft: a consecutive case series with 17 to 20 years of follow-up. *J Shoulder Elbow Surg*. 2018;27(9):1622-1628. doi:10.1016/j.jse.2018.03.011.
89. Raval P, Gibbs VN, Pandey R. Preoperative partial-thickness rotator cuff tears do not compromise anatomic total shoulder replacement outcomes: medium-term follow-up. *J Shoulder Elbow Surg*. 2021;30(4):871-876. doi:10.1016/j.jse.2020.07.037. Epub 2020 Aug 7.
90. Rees J. The pathogenesis and surgical treatment of tears of the rotator cuff. *J Bone Joint Surg Br*. 2008;90-B(7):827-832.
91. Rhon DI, Boyles RB, Cleland JA. One-year outcome of subacromial corticosteroid injection compared with manual physical therapy for the management of the unilateral shoulder impingement syndrome: a pragmatic randomized trial. *Ann Intern Med*. 2014;161(3):161-169.
92. Rosas S, Krill M, Amoo-Achampong K, Kwon K, Nwachukwu B, McCormick F. A practical, evidence- based, comprehensive (PEC) physical examination for diagnosing pathology of the long head of the biceps. *J Shoulder Elbow Surg*. 2017;26(8):1484-1492. doi:10.1016/j.jse.2017.03.002.
93. Sachs RA, Lin D, Stone ML, et al. Can the Need for Future Surgery for Acute Traumatic Anterior Shoulder Dislocation Be Predicted? *J Bone Joint Surg Am*. 2007;89:1665-1674.
94. Sanchez-Sotelo J, Cofield RH, Rowland CM. Shoulder Hemiarthroplasty for Glenohumeral Arthritis Associated with Severe Rotator Cuff Deficiency. *J Bone Joint Surg Am*. 2001 Dec;83(12):1814-1822. doi:10.2106/00004623-200112000-00008.
95. Senekovic V, Poberaj B, Kovacic L, Mikek M, Adar E, Dekel A. Prospective clinical study of a novel biodegradable sub-acromial spacer in treatment of massive irreparable rotator cuff tears. *Eur J Orthop Surg Traumatol*. 2013;23(3):311-316. doi:10.1007/s00590-012-0981-4.
96. Shen P, Lien S, Shen H, et al. Long-term functional outcomes after repair of rotator cuff tears correlated with atrophy of the supraspinatus muscles on magnetic resonance images. *J Shoulder Elbow Surg*.2008;17(1 Suppl):1S–7S.
97. Sochacki KR, Mcculloch PC, Lintner DM, Harris JD. Superior Capsular Reconstruction for Massive Rotator Cuff Tear Leads to Significant Improvement in Range of Motion and Clinical Outcomes: A Systematic Review. *Arthroscopy*. 2019;35(4):1269-1277. doi:10.1016/j.arthro.2018.10.129.
98. Song A, DeClercq J, Ayers G, et al. Comparative Time to Improvement in Nonoperative and Operative Treatment of Rotator Cuff Tears. *J Bone Joint Surg*. 2020;102(13):1142-1150. doi:10.2106/jbjs.19.01112.

99. Stewart RK, Kaplin L, Parada SA, Graves BR, Verma NN, Waterman BR. Outcomes of Subacromial Balloon Spacer Implantation for Massive and Irreparable Rotator Cuff Tears: A Systematic Review. *Orthop J Sports Med*. 2019;7(10):2325967119875717. doi:10.1177/2325967119875717.
100. Streubel PN, Krych AJ, Simone JP, et al. Anterior Glenohumeral Instability: A Pathology-based Surgical Treatment Strategy. *J Am Acad Orthop Surg*. 2014;22(5):283-294.
101. Suenaga N, Minami A, Kaneda K. Postoperative subcoracoid impingement syndrome in patients with rotator cuff tear. *J Shoulder Elbow Surg*. 2000;9(4):275-278.
102. Tokish J, Makovicka J. The Superior Capsular Reconstruction: Lessons Learned and Future Directions. *J Am Acad Orthop Surg*. 2020;28(13):528-537. doi:10.5435/jaaos-d-19-00057.
103. Ueda Y, Sugaya H, Takahashi N, et al. Rotator Cuff Lesions in Patients with Stiff Shoulders: A Prospective Analysis of 379 Shoulders. *J Bone Joint Surg Am*. 2015;97:1233-1237.
104. van der List JP, Kok LM, Alta TDW, van der List MPJ, van Noort A. Role of Delay Between Injury and Surgery on the Outcomes of Rotator Cuff Repair: A Systematic Review and Meta-analysis. *Am J Sports Med*. 2023;51(5):1328-1339. doi:10.1177/03635465211069560.
105. Venouziou AI, Kokkalis ZT, Sotereanos DG. Human dermal allograft interposition for the reconstruction of massive irreparable rotator cuff tears. *Am J Orthop*. 2013;42(2):63-70.
106. Verma N, Srikumaran U, Roden CM, et al. InSpace Implant Compared with Partial Repair for the Treatment of Full-Thickness Massive Rotator Cuff Tears: A Multicenter, Single-Blinded, Randomized Controlled Trial. *J Bone Joint Surg Am*. 2022;104(14):1250-1262. doi:10.2106/JBJS.21.00667.
107. Vitale M, Arons R, Hurwitz S, et al. The Rising Incidence of Acromioplasty. *J Bone Joint Surg*. 2010;92(9):1842-1850.
108. Werner BC, Brockmeier SF, Miller MD. Etiology, Diagnosis, and Management of Failed SLAP Repair. *J Am Acad Orthop Surg*. 2014;22(9):554-565.
109. Whittle S, Buchbinder R. In the Clinic: Rotator Cuff Disease. *Ann Intern Med*. 2015;162(1):ITC1-ITC15. doi:10.7326/AITC201501060.
110. Work Loss Data Institute. *Shoulder (acute and chronic)*. Corpus Christi (TX): Work Loss Data Institute; 2008.
111. Wright MA, Keener JD, Chamberlain AM. Comparison of Clinical Outcomes After Anatomic Total Shoulder Arthroplasty and Reverse Shoulder Arthroplasty in Patients 70 Years and Older With Glenohumeral Osteoarthritis and an Intact Rotator Cuff. *J Am Acad Orthop Surg*. 2020;28(5):e222-e229. doi:10.5435/jaaos-d-19-00166.
112. Wylie JD, Suter T, Potter MQ, et al. Mental Health Has a Stronger Association with Patient-Reported Shoulder Pain and Function Than Tear Size in Patients with Full-Thickness Rotator Cuff Tears. *J Bone Joint Surg Am*. 2016;98:251-256.
113. Yapp L, Nicholson J, Robinson C. Primary Arthroscopic Stabilization for a First-Time Anterior Dislocation of the Shoulder. *J Bone Joint Surg*. 2019;102(6):460-467. doi:10.2106/jbjs.19.00858.