# Cohere Medicare Advantage Policy - Shoulder Arthroscopy

*Clinical Guidelines for Medical Necessity Review*

**Version:** 2
**Effective Date:** June 10, 2024

# Important Notices

## Notices & Disclaimers:

**GUIDELINES SOLELY FOR COHERE'S USE IN PERFORMING MEDICAL NECESSITY REVIEWS AND ARE NOT INTENDED TO INFORM OR ALTER CLINICAL DECISION MAKING OF END USERS.**

Cohere Health, Inc. ("**Cohere**") has published these clinical guidelines to determine medical necessity of services (the "**Guidelines**") for informational purposes only, and solely for use by Cohere's authorized "**End Users**". These Guidelines (and any attachments or linked third party content) are not intended to be a substitute for medical advice, diagnosis, or treatment directed by an appropriately licensed healthcare professional. These Guidelines are not in any way intended to support clinical decision making of any kind; their sole purpose and intended use is to summarize certain criteria Cohere may use when reviewing the medical necessity of any service requests submitted to Cohere by End Users. Always seek the advice of a qualified healthcare professional regarding any medical questions, treatment decisions, or other clinical guidance. The Guidelines, including any attachments or linked content, are subject to change at any time without notice. This policy may be superseded by existing and applicable Centers for Medicare & Medicaid Services (CMS) statutes.



---

## Other Notices:



---

## Guideline Information:

**Specialty Area:** Disorders of the Musculoskeletal System
**Guideline Name:** Cohere Medicare Advantage Policy - Shoulder Arthroscopy

**Literature review current through**: 6/10/2024
**Document last updated:** 6/10/2024
**Type:** [**X**] Adult (18+ yo) | [_] Pediatric (0-17yo)

**Table of Contents**

# Medical Necessity Criteria

***Service: Shoulder Arthroscopy***

## Benefit Category

Not applicable

## Recommended Clinical Approach

A shoulder arthroscopy may involve one or more of several procedures, such as the repair of shoulder components such as the rotator cuff, labrum, ligaments, shoulder instability, or inflamed tissue or cartilage. The surgeon is able to thoroughly visualize the shoulder and treat several conditions involving the structures of the joint.[1-8]

Arthroscopy may be appropriate when shoulder pain has not responded to nonsurgical treatment. This includes rest, limiting motion, physical therapy, or medications administered orally or by injection directly to the shoulder.

## Evaluation of Clinical Benefits and Potential Harms

Cohere Health uses the criteria below to ensure consistency in reviewing the conditions to be met for coverage of shoulder arthroscopy. This process helps to prevent both incorrect denials and inappropriate approvals of medically necessary services. Specifically, limiting incorrect approvals reduces the risks associated with unnecessary procedures, such as complications from surgery, infections, and prolonged recovery times.

The potential clinical harms of using these criteria may include:

- Inadequate management of shoulder conditions, leading to complications like progression of degenerative joint disease, recurrent dislocations, worsening pain, and reduced mobility. Decreased shoulder range of motion secondary to pain or a functional impairment can impact activities of daily living. Untreated full thickness rotator cuff tears can progress to rotator cuff arthropathy that may require a total shoulder arthroplasty.
- Risks with inappropriate surgical procedures include infection, bleeding, injury to neurovascular structures, injury to the articular cartilage, implant (anchor) migration, stiffness or adhesions, anesthetic risk and

need for repeat or additional procedures. Redler et al recommend nonsurgical management for adhesive capsulitis as most patients will have complete resolution of symptoms.[7] There are significant surgical complications for adhesive capsulitis including fracture, glenoid and labral injuries, neuropraxic injuries and rotator cuff injuries.
- Increased healthcare costs and complications from the inappropriate use of emergency services and additional treatments.

The clinical benefits of using these criteria include:
- Improved patient outcomes by ensuring timely and appropriate access to shoulder arthroscopy for managing various shoulder conditions such as rotator cuff tear. According to the American Academy of Orthopedic Surgeons (AAOS) evidence based clinical guidelines there is moderate evidence to support healed rotator cuff repairs show improved patient reported and functional outcomes compared to physical therapy and unhealed rotator cuff repairs.[5]
- Reduction in complications and adverse effects from unnecessary procedures. The AAOS notes strong evidence to support patient reported outcomes (PRO) improve with physical therapy in symptomatic patients with full thickness rotator cuff tears, therefore conservative therapy should be attempted before surgery.[5] They also note strong evidence supports that older age is associated with higher failure rates and poorer patient reported outcomes after rotator cuff repair.
- Subacromial balloon spacers value remain uncertain. Piekaar et al report that while patients report good outcomes at 3 years postoperatively, the specific contribution of the balloon needs further investigation.[23]
- Enhanced overall patient satisfaction and healthcare experience.

This policy includes provisions for expedited reviews and flexibility in urgent cases to mitigate risks of delayed access. Evidence-based criteria are employed to prevent inappropriate denials, ensuring that patients receive medically necessary care. The criteria aim to balance the need for effective treatment with the minimization of potential harms, providing numerous clinical benefits in helping avoid unnecessary complications from inappropriate care.

In addition, the use of these criteria is likely to decrease inappropriate denials by creating a consistent set of review criteria, thereby supporting optimal patient outcomes and efficient healthcare utilization.

## Medical Necessity Criteria

### Indications

- ➔ **Shoulder arthroscopy** is considered appropriate if **ANY** of the following is **TRUE**:
  - ◆ **Capsular release/lysis of adhesions** is considered appropriate if **ALL** of the following are **TRUE**[6-8]:
    - Significant pain and/or functional impairment that impacts activities of daily living; **AND**
    - Significant loss of both active AND passive shoulder range of motion on exam; **AND**
    - Failure of conservative management (e.g., rest, analgesics, physical therapy, oral or injectable corticosteroids) must be documented for a period of greater than 6 months. Documentation should include detailed evidence of the measures taken, rather than solely a physician's statement; **AND**
    - Imaging findings (e.g., radiographs, CT, or MRI) do not identify any other shoulder pathology (e.g. severe arthritis, rotator cuff tear, labral tear, etc.) as the primary source of the symptoms; **OR**
  - ◆ **Diagnostic arthroscopy** is considered appropriate if **ALL** of the following are **TRUE**:
    - Significant pain and/or functional impairment that impact activities of daily living; **AND**
    - The patient has **ANY** of the following positive exam findings:
      - Instability; **OR**
      - Weakness; **OR**
      - Decreased range of motion; **OR**
      - Painful shoulder range of motion; **AND**
    - Failure of conservative management (e.g., rest, analgesics, physical therapy, oral or injectable corticosteroids) must be documented for a period of greater than 6 months. Documentation should include detailed evidence of the measures taken, rather than solely a physician's statement; **AND**

- Imaging findings (e.g., radiographs, CT, or MRI) are inconclusive as to the source of shoulder pain; **OR**

- **Rotator cuff repair (RCR)** is considered appropriate if **ANY** of the following is **TRUE**[1-2]:
  - **Acute rotator cuff tear** and **ALL** of the following after an inciting event or injury:
    - Significant pain and/or functional impairment that impacts activities of daily living; **AND**
    - The patient has **ANY** of the following positive exam tests[10]:
      - Drop arm test; **OR**
      - Full can test; **OR**
      - Jobe/empty can test; **OR**
      - Weakness of external rotation; **OR**
      - Belly-press test; **OR**
      - Hawkins (Hawkins-Kennedy) sign/test; **OR**
      - Neer/Neer impingement test; **OR**
      - Lift-off/Gerber's test; **AND**
    - Advanced diagnostic imaging (e.g., MRI, CT) demonstrates **ANY** of the following:
      - High-grade partial thickness rotator cuff tear; **OR**
      - Full-thickness rotator cuff tear; **OR**
  - **Chronic rotator cuff tear** and **ALL** of the following[11]:
    - Significant pain and/or functional impairment that impacts activities of daily living; **AND**
    - The patient has **ANY** of the following positive exam tests[10]:
      - Drop arm test; **OR**
      - Full can test; **OR**
      - Jobe/empty can test; **OR**
      - Weakness of external rotation; **OR**
      - Belly-press test; **OR**
      - Hawkins (Hawkins-Kennedy) sign/test; **OR**
      - Neer/Neer impingement test; **OR**
      - Lift-off/Gerber's test; **AND**
    - Failure of conservative management (e.g., rest, analgesics, physical therapy, oral or injectable corticosteroids) must be documented for a period of greater than 6 weeks. Documentation should include detailed evidence of the measures taken, rather than solely a physician's statement; **AND**

        - Advanced diagnostic imaging (e.g., MRI, CT) demonstrates **ANY** of the following:
            - High-grade partial-thickness rotator cuff tear; **OR**
            - A full-thickness rotator cuff tear (Cofield classification); **OR**
    - **Revision of a previous rotator cuff repair** is considered appropriate if **ANY** of the following is **TRUE**[12]:
        - Advanced diagnostic imaging findings of a recurrent rotator cuff tear; **OR**
        - Suspected postsurgical complication; **OR**
- **Distal clavicle resection** is considered appropriate if **ALL** of the following are **TRUE**[5]:
    - Significant pain and/or functional impairment that impact activities of daily living; **AND**
    - The patient demonstrates localized tenderness to palpation of the acromioclavicular (AC) joint and **ANY** of the following positive orthopedic tests on physical examination when compared to the non-involved side:
        - Cross-body adduction test; **OR**
        - Resisted AC joint extension test; **OR**
        - Neer impingement test; **OR**
        - Hawkins-Kennedy impingement test; **AND**
    - Failure of conservative management (e.g., rest, analgesics, physical therapy, oral or injectable corticosteroids) must be documented for a period of greater than 3 months. Documentation should include detailed evidence of the measures taken, rather than solely a physician's statement; **AND**
    - Imaging findings (e.g., radiographs, CT, or MRI) demonstrate **ANY** of the following findings consistent with pathology in the subacromial space or at the AC joint[13]:
        - Cystic formation in the distal clavicle; **OR**
        - Presence of osteophytes; **OR**
        - Moderate to severe degenerative changes in the AC joint; **OR**
- **Biceps tenodesis/tenotomy** is considered appropriate if **ALL** of the following are **TRUE**[14]:
    - Significant pain and/or functional impairment that impact activities of daily living; **AND**

- The patient has **2 or more** of the following positive exam tests:
    - Anterior slide test; **OR**
    - Biceps load test; **OR**
    - Biceps tendon tenderness in the bicipital groove; **OR**
    - Clunk test; **OR**
    - Compression rotation test; **OR**
    - O'Brien's test; **OR**
    - Speed's test; **OR**
    - Uppercut test; **OR**
    - Yergason test; **AND**
- Failure of conservative management (e.g., rest, analgesics, physical therapy, oral or injectable corticosteroids) must be documented for a period of greater than 3 months. Documentation should include detailed evidence of the measures taken, rather than solely a physician's statement; **AND**
- Advanced diagnostic imaging (e.g., MRI, CT) demonstrates biceps tendon pathology that correlates with the patient's reported symptoms and physical exam findings including **ANY** of the following:
    - Biceps tendon subluxation; **OR**
    - Biceps tendinopathy/tearing; **OR**
    - Superior labrum anterior and posterior (SLAP) tear; **OR**

◆ **Debridement** is considered appropriate if **ALL** of the following are **TRUE**[2]:

- **ANY** of the following:
    - The procedure coincides with the indicated repair of a rotator cuff injury; **OR**
    - There is a need for decompression and debridement after a full-thickness rotator cuff tear; **OR**
    - Subacromial impingement syndrome, including **ALL** of the following:
        - ◆ Significant pain and/or functional impairment that impacts activities of daily living; **AND**
        - ◆ The patient demonstrates **ANY** of the following positive exam tests when compared to the non-involved side[11]:
            - Neer impingement sign/test; **OR**

- Hawkins (Hawkins-Kennedy) impingement sign/test; **AND**

◆ Imaging studies demonstrate **ANY** of the following findings consistent with pathology in the subacromial space:

- Subacromial spurs/osteophytes; **OR**
- Type III (hooked) acromion; **OR**
- Acromioclavicular osteoarthritis with inferior osteophyte formation; **AND**

- Significant pain and/or functional impairment that impacts activities of daily living; **AND**
- Failure of conservative management (e.g., rest, analgesics, physical therapy, oral or injectable corticosteroids) must be documented for a period of greater than 3 months. Documentation should include detailed evidence of the measures taken, rather than solely a physician's statement; **AND**
- Imaging studies (e.g., radiographs, MRI, CT) demonstrate bony and/or soft tissue pathology that correlates with symptoms and physical exam findings; **OR**

◆ **Removal of loose body** is considered appropriate if **ALL** of the following are **TRUE**:

- Shoulder pain and mechanical symptoms (e.g., catching, locking, clicking); **AND**
- Imaging findings (e.g., radiographs, CT, or MRI) demonstrate the presence of a loose body; **OR**

◆ **Superior labrum anterior and posterior (SLAP)** repair is considered appropriate if **ALL** of the following are **TRUE**[15-16]:

- Significant pain and/or functional impairment that impacts activities of daily living; **AND**
- The patient has **ANY** of the following positive exam tests:
  - O'Brien's test; **OR**
  - Biceps load test; **OR**
  - Crank test; **OR**
  - Modified dynamic labral shear test; **OR**
  - Anterior slide test; **AND**
- Failure of conservative management (e.g., rest, analgesics, physical therapy, oral or injectable corticosteroids) must be documented for a period of greater than 3 months.

Documentation should include detailed evidence of the measures taken, rather than solely a physician's statement; **AND**

- Advanced imaging (e.g., MRI, CT) demonstrates a SLAP lesion that correlates with symptoms and exam findings; **OR**

- **Subacromial decompression** is considered appropriate if **ANY** of the following is **TRUE**[17]:
  - The procedure coincides with the indicated repair of a rotator cuff injury; **OR**
  - There is a need for decompression and debridement after a full-thickness rotator cuff tear; **OR**
  - Subacromial impingement syndrome, including **ALL** of the following:
    - Significant pain and/or functional impairment that impacts activities of daily living; **AND**
    - The patient demonstrates **ANY** of the following positive exam tests when compared to the non-involved side[18]:
      - Neer impingement sign/test; **OR**
      - Hawkins (Hawkins-Kennedy) impingement sign/test; **AND**
    - Failure of conservative management (e.g., rest, analgesics, physical therapy, oral or injectable corticosteroids) must be documented for a period of greater than 3 months. Documentation should include detailed evidence of the measures taken, rather than solely a physician's statement; **AND**
    - Imaging (radiographs, CT, MRI) demonstrates **ANY** of the following findings consistent with pathology in the subacromial space:
      - Subacromial spurs/osteophytes; **OR**
      - Type III (hooked) acromion; **OR**
      - Acromioclavicular osteoarthritis with inferior osteophyte formation; **OR**
- **Synovectomy (partial or complete)** is considered appropriate if **ALL** of the following are **TRUE**[19]:
  - Significant pain and/or functional impairment that impacts activities of daily living; **AND**

- Failure of conservative management (e.g., rest, analgesics, physical therapy, oral or injectable corticosteroids) must be documented for a period of greater than 3 months. Documentation should include detailed evidence of the measures taken, rather than solely a physician's statement; **AND**
- Advanced diagnostic imaging (e.g., MRI, CT) demonstrates findings consistent with pathologic synovial disease (e.g., synovial plica, synovial chondromatosis, pigmented villonodular synovitis, inflammatory/rheumatoid arthritis, crystalline arthropathy, infection).

### Non-Indications

➔ **Shoulder arthroscopy** is not considered appropriate if **ANY** of the following is **TRUE**:

- Capsulorrhaphy/labral repair for shoulder instability[20]; **OR**
- Arthroscopic debridement and/or removal of intra-articular loose body is not considered to be indicated in the presence of Kellgren-Lawrence grade 3 or 4 osteoarthritis[21]; **OR**
- Use of subacromial balloon spacer to treat irreparable rotator cuff tear[21]; **OR**
- Rotator cuff and/or labral repair in the presence of active infection (local or remote); **OR**
- Rotator cuff arthropathy.

## Level of Care Criteria

Outpatient.

## Procedure Codes (HCPCS/CPT)

| HCPCS Code | Code Description/Definition |
|---|---|
| 23929 | Unlisted procedure, shoulder |
| 29805 | Diagnostic examination of shoulder using an endoscope |
| 29806 | Arthroscopy, shoulder, surgical; capsulorrhaphy |
| 29807 | Surgical arthroscopy of shoulder with repair of SLAP lesion |
| 29819 | Removal of loose or foreign body of shoulder using an endoscope |

| | |
|---|---|
| 29820 | Arthroscopy, shoulder, surgical; synovectomy, partial |
| 29821 | Arthroscopy, shoulder, surgical; synovectomy, complete |
| 29822 | Surgical arthroscopy of shoulder with debridement<br>Surgical arthroscopy of shoulder with limited debridement |
| 29823 | Surgical arthroscopy of shoulder with debridement<br>Surgical arthroscopy of shoulder with extensive debridement |
| 29824 | Surgical arthroscopy of shoulder with distal claviculectomy |
| 29825 | Surgical arthroscopy of shoulder with lysis and resection of adhesions<br>Surgical arthroscopy of shoulder with lysis and resection of adhesions with manipulation |
| 29826 | Arthroscopy, shoulder, surgical; decompression of subacromial space with partial acromioplasty, with coracoacromial ligament (ie, arch) release, when performed (List separately in addition to code for primary procedure) |
| 29827 | Surgical arthroscopy of shoulder with repair of rotator cuff |
| 29828 | Surgical arthroscopy of shoulder with biceps tenodesis |
| 29999 | Unlisted procedure, arthroscopy |
| C9781 | Arthroscopy, shoulder, surgical; with implantation of subacromial spacer (e.g., balloon), includes debridement (e.g., limited or extensive), subacromial decompression, acromioplasty, and biceps tenodesis when performed |
| S2300 | Arthroscopy, shoulder, surgical; with thermally-induced<br>Not Covered capsulorrhaphy |

**Disclaimer:** S, I, and N Codes are non-covered per CMS guidelines due to their experimental or investigational nature.

# Medical Evidence

Kim et al. (2021) examined the predominance of arthroscopic distal clavicle excision procedures, specifically those using a fluoroscopic Kirchner wire guide. The technical aspects of the procedure were described, and the group concluded using the fluoroscopic wire leads to surgical success, particularly in new orthopedic surgeons as the distal clavicle excision is a technically demanding procedure due to visualization difficulties. They state that open distal clavicle excision remains the gold standard procedure for acromioclavicular joint arthritis.[13]

Redler et al. (2019) examined the literature related to treating adhesive capsulitis of the shoulder, with a discussion of the higher incidence of the diagnosis in diabetic patients, particularly those with long-standing, poorly controlled disease. Hyperthyroidism was determined in studies to be an independent risk factor for developing adhesive capsulitis. The authors preferred surgical technique post-nonsurgical interventions, including both anterior and posterior capsular release with rotator interval release and release of the coracohumeral ligament.[7]

Optimal management of glenohumeral osteoarthritis was reviewed by Ansok et al. (2018), concluding that initial conservative treatment includes the use of viscosupplementation or corticosteroid injections. The age and function of the affected patient should determine the necessity of operative treatment, and operative treatment of young individuals with glenohumeral osteoarthritis remains controversial. Younger, more active patients do benefit from non-arthroplasty techniques or procedures with minimal bone resection.[22]

Millett et al. (2018) examined the options for treating young, active patients with primary glenohumeral osteoarthritis, stating that arthroplasty may not be ideal in that population. They state that clinical studies report arthroscopic approaches for procedures such as synovectomy, chondroplasty, loose body removal, capsular release, and biceps tenodesis may improve clinical outcomes. It is concluded that arthroscopic management of glenohumeral osteoarthritis has numerous advantages over total shoulder arthroplasty; however, additional larger studies are needed.[24]

The American Academy of Orthopaedic Surgeons (AAOS) has published the following clinical guidelines related to shoulder arthroscopy:

- *Management of Glenohumeral Osteoarthritis* (2020): Arthroscopic debridement with capsular release is recommended for young patients with glenohumeral joint osteoarthritis.[1]
- *Management of Rotator Cuff Injuries* (2019): Moderate strength evidence does not support the routine use of acromioplasty as adjunct treatment compared to arthroscopic repair alone. Strong recommendation given for arthroscopic-only technique for better short-term improvement compared to open repair. For unrepairable tears without arthropathy, various arthroscopic treatments received a consensus recommendation.[5]

# References


1. American Academy of Orthopaedic Surgeons (AAOS). Management of glenohumeral osteoarthritis: Evidence-based clinical practice guidelines. Published March 23, 2020. Accessed December 20, 2023. https://www.aaos.org/gjocpg.
2. Saltzman BM, Leroux TS, Verma NN, et al. Glenohumeral osteoarthritis in the young patient. *J Am Acad Orthop Surg.* 2018; 26(17): e361-e370. doi: 10.5435/JAAOS-D-16-00657. PMID: 30095514.
3. Agrawal V. Healing rates for challenging rotator cuff tears utilizing an acellular human dermal reinforcement graft. *Int J Shoulder Surg*. 2012;6(2):36-44. doi: 10.4103/0973-6042.96992. PMID: 22787332; PMCID: PMC3391783.
4. Barber FA, Aziz-Jacobo J. Biomechanical testing of commercially available soft-tissue augmentation materials. *Arthroscopy*. 2009 Nov;25(11):1233-9. doi: 10.1016/j.arthro.2009.05.012. PMID: 19896044.
5. American Academy of Orthopaedic Surgeons (AAOS). Management of rotator cuff injuries: Evidence-based clinical practice guideline. Published March 11, 2019. Accessed December 20, 2023. https://www.aaos.org/rccpg.
6. Le HV, Lee SJ, Nazarian A, et al. Adhesive capsulitis of the shoulder: Review of pathophysiology and current clinical treatments. *Shoulder Elbow*. 2017 Apr;9(2):75-84. doi: 10.1177/1758573216676786. PMID: 28405218; PMCID: PMC5384535.
7. Redler LH, Dennis ER. Treatment of adhesive capsulitis of the shoulder. *J Am Acad Orthop Surg*. 2019;27(12):e544-e554. doi: 10.5435/JAAOS-D-17-00606. PMID: 30632986.
8. Patel R, Urits I, Wolf J, et al. A comprehensive update of adhesive capsulitis and minimally invasive treatment options. *Psychopharmacol Bull*. 2020 Oct 15;50(4 Suppl 1):91-107. PMID: 33633420.
9. Rolfes K. Arthroscopic treatment of shoulder instability: A systematic review of capsular plication versus thermal capsulorrhaphy. *J Athl Train*. 2015 Jan;50(1):105-9. doi: 10.4085/1062-6050-49.3.63. PMID: 25329347; PMCID: PMC4299727.
10. Jain NB, Luz J, Higgins LD, et al. The diagnostic accuracy of special tests for rotator cuff tear: The ROW cohort study. *Am J Phys Med Rehabil.* 2017;96(3):176–183. doi: 10.1097/PHM.0000000000000566. PMID: 27386812; PMCID: PMC5218987.
11. Keener JD, Patterson BM, Orvets N, et al. Degenerative rotator cuff tears: Refining surgical indications based on natural history data. *J Am Acad Orthop Surg*. 2019 Mar 1;27(5):156-165. doi: 10.5435/JAAOS-D-17-00480. PMID: 30335631; PMCID: PMC6389433.

12. Ferguson WJ, Field LD. Revision rotator cuff repair: A comprehensive approach and stepwise technique. *Arthrosc Tech*. 2021 Jun 20;10(7):e1737-e1742. doi: 10.1016/j.eats.2021.03.028. PMID: 34336572; PMCID: PMC8322629.
13. Kim JY, Bryant S, Gardner B, et al. Distal clavicle excision for acromioclavicular joint osteoarthritis using a fluoroscopic Kirschner wire guide. *Arthrosc Tech.* 2021;10(2):e359-e365. doi: 10.1016/j.eats.2020.10.010. PMID: 33680767; PMCID: PMC7917026.
14. Krupp RJ, Kevern MA, Gaines MD, et al. Long head of the biceps tendon pain: differential diagnosis and treatment. *J Orthop Sports Phys Ther*. 2009;39(2):55-70. doi: 10.2519/jospt.2009.2802. PMID: 19194019.
15. Christensen GV, Smith KM, Kawakami J, et al. Surgical management of superior labral tears in athletes: Focus on biceps tenodesis. *Open Access J Sports Med*. 2021 May 5:12:61-71. doi: 10.2147/OAJSM.S266226. PMID: 33981168; PMCID: PMC8107051.
16. Hanchard NCA, Lenza M, Handoll HHG, et al. Physical tests for shoulder impingements and local lesions of bursa, tendon or labrum that may accompany impingement. *Cochrane Database Syst Rev*. 2013 Apr 30;2013(4):CD007427. doi: 10.1002/14651858.CD007427.pub2. PMID: 23633343; PMCID: PMC6464770.
17. Harrison AK, Flatow EL. Subacromial impingement syndrome. *J Am Acad Orthop Surg*. 2011 Nov;19(11):701-8. doi: 10.5435/00124635-201111000-00006. PMID: 22052646.
18. Consigliere P, Haddo O, Levy O, et al. Subacromial impingement syndrome: Management challenges. *Orthop Res Rev*. 2018 Oct 23:10:83-91. doi: 10.2147/ORR.S157864. PMID: 30774463; PMCID: PMC6376459.
19. Winkler SL, Urbisci AE, Best TM. Sustained acoustic medicine for the treatment of musculoskeletal injuries: A systematic review and meta-analysis. *BMC Sports Sci Med Rehabil.* 2021 Dec 18;13(1):159. doi: 10.1186/s13102-021-00383-0. PMID: 34922606; PMCID: PMC8684070.
20. Centers for Medicare & Medicaid Services (CMS). Billing and Coding Article: Thermal Capsulorrhaphy (A53435). https://www.cms.gov/medicare-coverage-database/view/article.aspx?articleId=53435.
21. Beard D, Chokotho L. Subacromial balloon spacer for irreparable rotator cuff tears. *Lancet*. 2022 May 21;399(10339):1920-1921. doi: 10.1016/S0140-6736(22)00733-4. PMID: 35461616.
22. Ansok CB, Muh SJ. Optimal management of glenohumeral osteoarthritis. *Orthop Res Rev*. 2018;10:9-18. doi:10.2147/ORR.S134732. PMID: 30774456; PMCID: PMC6209346.
23. 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 Aug;104(2):207-214. doi: 10.1007/s12306-019-00614-1. Epub 2019 Jun 27. PMID: 31250379.

24. Millett PJ, Fritz EM, Frangiamore SJ, Mannava S. Arthroscopic Management of Glenohumeral Arthritis: A Joint Preservation Approach. J Am Acad Orthop Surg. 2018 Nov 1;26(21):745-752. doi: 10.5435/JAAOS-D-17-00214. PMID: 30273222.

# Clinical Guideline Revision History/Information

| Original Date: May 22, 2024 | | |
|---|---|---|
| **Review History** | | |
| Version 2 | 6/10/2024 | 422.101 Disclaimer added |
| | | |
| | | |