

<b>Department:</b>	Medical Management	<b>Original Approval:</b>	11/13/2024
<b>Policy No:</b>	MM201	<b>Last Approval:</b>	11/13/2024
<b>Policy Title:</b>	Shoulder Arthroscopy and Shoulder Arthroplasty Clinical Coverage Criteria		
<b>Approved By:</b>	UM Criteria Subcommittee		
<b>Applicable Line(s) of Business:</b>	<input type="checkbox"/> Washington Apple Health (Medicaid) <input type="checkbox"/> Behavioral Health Services Only <input type="checkbox"/> Apple Health Expansion <input checked="" type="checkbox"/> Medicare Advantage/Special Needs Plan <input checked="" type="checkbox"/> Medicare Advantage Only <input type="checkbox"/> Cascade Select		

### Required Clinical Documentation for Review

Requests for prior authorization for shoulder arthroscopy and arthroplasty must be submitted by an operating orthopedic surgeon and accompanied by clinical documentation that supports the medical necessity for the requested procedures.

Documentation of medical necessity must include all of the following:

1. The primary diagnosis name(s) and the ICD-CM code(s) for the condition requiring the procedure;
2. The secondary diagnosis name(s) and ICD-CM code(s) pertinent to any co-morbid conditions, if present;
3. A description of the procedure and appropriate CPT code(s) for the procedure being requested;
4. The most recent medical evaluation, including a summary of the medical history and the most recent physical exam, with emphasis on the orthopedic shoulder examination and testing specific to the patient's condition;
5. Results of any radiology studies (e.g. routine x-rays, MRI, CT, etc.) and other tests that may have been previously performed and are relevant to the condition for which the procedure is being requested;
6. An official report of all the imaging studies. If the operating surgeon disagrees with the official report, they must document the disagreement. The imaging must have been performed within the last year, or after the onset of the current symptoms or any relevant surgical procedures, whichever comes first;

Data contained in this document is considered confidential and proprietary information and its duplication, use, or disclosure is prohibited without prior approval of Community Health Plan of Washington.

7. A summary of appropriate, non-operative/conservative treatments that have been tried and have been unsuccessful in managing the patient's condition;
8. Any risk factors and/or co-morbid conditions;
9. Pertinent labs if abnormal

## **Background**

CHPW creates internal coverage criteria for Medicare when the coverage criteria are not fully established in CMS coverage guidelines; National Coverage Determinations (NCDs), or Local Coverage Determinations (LCDs). Criteria may be considered as not fully established when (1) there are no applicable Medicare statutes or regulations, NCD, or applicable LCD setting forth coverage criteria; (2) the NCD or applicable LCD explicitly allow for coverage in circumstances beyond the indications listed in the NCD or LCD; or (3) additional, unspecified criteria are needed to interpret or supplement general Medicare provisions in order to determine medical necessity consistently. The current CMS coverage guidelines can be found on [CMS Medicare Coverage Database](#) and in the [CMS Online Manual System \(IOMs\)](#). You can also find new or recently changed policies or procedures in [Transmittals](#). CHPW's internal clinical coverage criteria developed to assist in medical necessity determinations are based on the evidence-based guidelines and clinical studies in the peer-reviewed published medical literature as well as recommended practice guidelines. CHPW establishes internal guidelines to ensure timely decision-making for members and to assure that only services which are proven to be both safe and effective are provided. These services must demonstrate a clear benefit that outweighs any potential risks.

Per CMS, medical necessity is defined as services that are reasonable and necessary for diagnosis or treatment of an illness or injury, or to improve the functioning of a malformed body member and are not excluded under another provision of the Medicare Program. For information on services that are excluded, please review <https://med.noridianmedicare.com/web/ifb/topics/non-covered-services>.

Per Medicare guidelines, the services should be medically appropriate and necessary to be covered. Investigational and Experimental services will not be covered, as Medicare does not consider them to be medically necessary. Services should be FDA approved when appropriate.

CHPW follows CMS requirements to create Clinical Coverage Policies. All the policies are reviewed and voted on by the CHPW Utilization Management Criteria Committee. Policies are reviewed at least annually to reflect the changes in CMS guidance as well as the emergence of new technologies.

Data contained in this document is considered confidential and proprietary information and its duplication, use, or disclosure is prohibited without prior approval of Community Health Plan of Washington.

## Definitions

**Shoulder Arthroscopy** is a minimally invasive surgical procedure that allows a surgeon to examine and treat a joint's interior. An arthroscope is a small tube that is inserted into the body. It contains a system of lenses, a small video camera, and a light for viewing. The camera is connected to a monitoring system, allowing the surgeon to look through the shoulder-cartilage, ligaments and the rotator cuff.

The surgeon makes small incisions around the joint area. In one portal, the arthroscope is inserted to view the shoulder joint. Along with the arthroscope, sterile solution is pumped to the joint which expands the shoulder joint, giving your surgeon a clear view and room to work. The other portal is used for the insertion of surgical instruments to probe various parts within the joint and repair the damaged shoulder.

Since it is a less invasive procedure compared to the open surgery, the post procedure pain, risk of infection, blood loss during the procedure, surrounding tissue damage, scarring, and the recovery time are significantly reduced. This procedure can be performed outpatient.

**Needle arthroscopy** is a minimally invasive diagnostic and therapeutic arthroscopy system that can be performed using local anesthesia. The patient stays awake during the procedure and can follow instructions during the procedure to better help with the diagnosis. The camera attached to the needle provides real-time images of the joint area, allowing the patient to be directly involved in their care. It can be performed in a physician's office, hospital bedside, surgical suite or treatment room. Needle arthroscopy is a less invasive alternative to traditional arthroscopy and magnetic resonance imaging (MRI). It is a good option when a patient is not able to tolerate MRI or has contraindications to MRI.

**Shoulder arthroplasty**, also known as shoulder replacement surgery, is a procedure that replaces damaged shoulder bones with artificial parts. An orthopedic surgeon removes the ball of the shoulder joint, inserts a metal stem into the upper arm bone, and places a metal or ceramic joint on the stem. The shoulder section is reshaped and lined with a metal or ceramic cup to create a new socket. A plastic liner may be added to the socket to help the joint move smoothly. Finally, the ball is placed into the socket to restore movement.

In a reverse total shoulder replacement, the socket and metal ball are switched. The metal ball is fixed to the socket, and the plastic cup is fixed to the upper end of the humerus.

Data contained in this document is considered confidential and proprietary information and its duplication, use, or disclosure is prohibited without prior approval of Community Health Plan of Washington.

## CPT codes and descriptions

Codes listed here are for informational purposes only.

Code	Description
<u>29805</u>	Arthroscopy, shoulder, diagnostic, with or without synovial biopsy (separate procedure)
<u>29806</u>	Arthroscopy, shoulder, surgical; capsulorrhaphy
<u>29807</u>	Arthroscopy, shoulder, surgical; repair of SLAP lesion
<u>29819</u>	Arthroscopy, shoulder, surgical; with removal of loose body or foreign body
<u>29820</u>	Arthroscopy, shoulder, surgical; synovectomy, partial
<u>29821</u>	Arthroscopy, shoulder, surgical; synovectomy, complete
<u>29822</u>	Arthroscopy, shoulder, surgical; debridement, limited, 1 or 2 discrete structures (eg, 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])
<u>29823</u>	Arthroscopy, shoulder, surgical; debridement, extensive, 3 or more discrete structures (eg, 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])
<u>29824</u>	Arthroscopy, shoulder, surgical; distal claviclectomy including distal articular surface (Mumford procedure)
<u>29825</u>	Arthroscopy, shoulder, surgical; with lysis and resection of adhesions, with or without manipulation
<u>29826</u>	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)
<u>29827</u>	Arthroscopy, shoulder, surgical; with rotator cuff repair
<u>29828</u>	Arthroscopy, shoulder, surgical; biceps tenodesis
23470	Partial shoulder arthroplasty/hemiarthroplasty
23472	Arthroplasty, glenohumeral joint; total shoulder (glenoid and proximal humeral replacement (eg, total shoulder))
23473	Revision of total shoulder arthroplasty, including allograft when performed; humeral or glenoid component
23474	Revision of total shoulder arthroplasty, including allograft when performed; humeral and glenoid component

Data contained in this document is considered confidential and proprietary information and its duplication, use, or disclosure is prohibited without prior approval of Community Health Plan of Washington.

## Indications/Criteria

### Shoulder Arthroscopy

Arthroscopy of the shoulder is indicated when patient's symptoms persist despite nonsurgical treatments. Nonsurgical treatments include rest, physical therapy, and medications or injections to reduce joint inflammation, as stated in Appendix A. This procedure will be considered medically reasonable and necessary when the following indications are met. Approval for coverage is on an individual, case-by-case basis.

Determination of medical necessity for shoulder arthroscopy is based on clinical data including, but not limited to, indicators that would affect the relative risks and benefits of the shoulder arthroscopy. These criteria include, but are not limited to, the following.

Diagnostic shoulder arthroscopy may be medically necessary when ALL of the following criteria (1 through 4) are met:

1. At least 12 weeks of shoulder pain accompanied by documented functional impairment, which may include painful movement, arm weakness, reduced range of motion, or joint instability. These issues must significantly affect the individual's ability to perform activities of daily living (ADLs), engage in recreational activities, or maintain employment due to injury or pain.
2. Failure of 12 weeks of nonsurgical treatments to improve symptoms.;
3. Clinical documentation detailing the signs and symptoms both prior to and following the nonsurgical treatments;
4. Indeterminate radiographic findings, including MRI.

Arthroscopy of the shoulder for acute full thickness rotator cuff tear is considered medically necessary and appropriate when the following criteria are met:

- a. Pain and functional impairment for less than 8 weeks; AND
- b. Radiological findings confirming the diagnosis

Arthroscopy of the shoulder for chronic rotator cuff tears is considered medically necessary and appropriate when following criteria are met:

- a. Pain and functional impairment; AND
- b. Radiological findings confirming the diagnosis; AND
- c. Failure of 12 weeks of all the nonsurgical treatments stated in Appendix A

Data contained in this document is considered confidential and proprietary information and its duplication, use, or disclosure is prohibited without prior approval of Community Health Plan of Washington.

Arthroscopy of the shoulder for adhesive capsulitis is considered medically necessary and appropriate when the following criteria are met:

- a. Pain or functional impairment of active and passive shoulder motion; AND
- b. Failure of 6 months of all the nonsurgical treatments stated in Appendix A

Arthroscopy of the shoulder for Superior labrum anterior to posterior (SLAP) tear is considered medically necessary and appropriate when the following criteria are met:

- a. Pain or functional impairment of active and passive shoulder motion; AND
- b. Failure of 12 weeks of all the nonsurgical treatments stated in Appendix A

Arthroscopy of the shoulder for subacromial impingement syndrome is considered medically necessary and appropriate when the following criteria are met:

- a. Pain or functional impairment of active and passive shoulder motion; AND
- b. Failure of 12 weeks of all the nonsurgical treatments stated in Appendix A

Arthroscopy of the shoulder for osteoarthritis of the acromial-clavicular joint is considered medically necessary and appropriate when the following criteria are met:

- a. Pain or functional impairment of active and passive shoulder motion; AND
- b. Failure of 12 weeks of all the nonsurgical treatments stated in Appendix A

Arthroscopy of the shoulder for calcific tendinosis of the acromial-clavicular joint is considered medically necessary and appropriate when the following criteria are met:

- a. Radiographic findings without any bony pathology; AND
- b. Pain or functional impairment of active and passive shoulder motion; AND
- c. Failure of 6 months of all the nonsurgical treatments stated in Appendix A

Arthroscopy of the shoulder for posterior or multidirectional glenohumeral instability of the acromial-clavicular joint is considered medically necessary and appropriate when the following criteria are met:

- a. Pain or functional impairment of active and passive shoulder motion; AND
- b. Failure of 6 weeks of all the nonsurgical treatments stated in Appendix A

Data contained in this document is considered confidential and proprietary information and its duplication, use, or disclosure is prohibited without prior approval of Community Health Plan of Washington.

Arthroscopy of the shoulder for Suprascapular nerve entrapment with neuropathic pain or strength deficit is considered medically necessary and appropriate when the following criteria are met:

- a. Pain or functional impairment of active and passive shoulder motion; AND
- b. Failure of 6 weeks of all the nonsurgical treatments stated in Appendix A

Arthroscopy of the shoulder for bursitis or crepitus within scapulothoracic joint (snapping scapula) is considered medically necessary and appropriate when the following criteria are met:

- a. Pain or functional impairment of active and passive shoulder motion; AND
- b. Failure of 12 weeks of all the nonsurgical treatments stated in Appendix A

## Special Considerations

Failure of nonsurgical treatment is not required in the following situations:

- a. Documented contraindications to nonsurgical treatments are present
- b. Presence of Septic Shoulder
- c. Anterior glenohumeral instability resulting in subluxation or dislocation of the shoulder joint
- d. Fracture amenable to arthroscopic repair (eg, humeral head fracture, glenoid fracture)
- e. Intra-articular fracture reduction
- f. Loose intra-articular body
- g. Acromioclavicular joint separation with complete acromioclavicular or coracoclavicular ligament tear
- h. Tumor resection amenable to arthroscopic approach

## Limitations/Exclusions

Please see link to member coverage documents below:

Line of Business	Link to Member Coverage Documents
Medicare Advantage Plans (Including D-SNP)	<a href="https://medicare.chpw.org/">https://medicare.chpw.org/</a> Select the appropriate plan from the “Plans” drop down on the top navigation bar.
Apple Health	
Cascade Select	

Data contained in this document is considered confidential and proprietary information and its duplication, use, or disclosure is prohibited without prior approval of Community Health Plan of Washington.

## **Indications/Criteria**

### **Shoulder Arthroplasty**

#### **End stage joint disease as indicated by ALL of the following:**

1. The patient has shoulder pain accompanied by documented functional impairment, which may include painful movement, arm weakness, reduced range of motion, or joint instability. These issues must significantly affect the individual's ability to perform activities of daily living (ADLs), engage in recreational activities, or maintain employment due to injury or pain, AND
2. Radiological findings indicating shoulder joint destruction (such as severe joint space narrowing, osteophyte formation, cystic changes, complex fracture, or deformity)
3. Failure of 12 weeks of all the nonsurgical treatments stated in Appendix A

#### **Replacement (revision) of previous arthroplasty or hemiarthroplasty indicated for 1 or more of the following:**

1. Instability of glenoid or humeral components
2. Fracture or mechanical failure of implant
3. Glenoid erosion from humeral prosthetic component of hemiarthroplasty
4. Infection
5. Proximal migration of humeral head

#### **Reverse total shoulder arthroplasty indicated for 1 or more of the following:**

1. Massive rotator cuff tear
2. Failed rotator cuff repair
3. Rotator cuff deficient arthropathy
4. Failed shoulder arthroplasty or hemiarthroplasty
5. Proximal humerus fracture with rotator cuff deficiency or malunion
6. Complex fracture of proximal humerus
7. Reconstruction after tumor resection
8. Arthritis with posterior glenohumeral subluxation
9. Osteonecrosis of the humeral head
10. Rheumatoid arthritis of the shoulder and ALL of the following:
  - a. Positive radiographic findings (eg, shoulder joint destruction)

- b. Nonsurgical therapy has been tried and failed (eg, anti-inflammatory medications, disease-modifying antirheumatic drugs).
- c. Replacement needed because of **1 or more** of the following:
  - i. Disabling pain
  - ii. Functional disability

## List of Appendices

Appendix A: Nonsurgical/Conservative treatments

Appendix B: List of Sources

## Citations & References

<b>CFR</b>	42 CFR 422.101(b)(6)	
<b>WAC</b>		
<b>RCW</b>		
<b>LOB &amp; Contract Citation</b>	<input type="checkbox"/> <b>WAHIMC</b>	
	<input type="checkbox"/> <b>BHSO</b>	
	<input type="checkbox"/> <b>Wraparound</b>	
	<input type="checkbox"/> <b>SMAC</b>	
	<input type="checkbox"/> <b>HH</b>	
	<input type="checkbox"/> <b>AHE</b>	
<input checked="" type="checkbox"/> <b>MA/DSNP</b>	MMCM Ch 4, Sec. 10.16: Medical Necessity and Sec. 90: National and Local Coverage Determinations	
<input type="checkbox"/> <b>CS</b>		
<b>Other Requirements</b>		
<b>NCQA Elements</b>	UM2, UM5	

## Revision History

<b>Revision Date</b>	<b>Revision Description</b>	<b>Revision Made By</b>
11/08/2024	Policy drafted	Aparna Gadekar, MD
11/13/2024	Approval	UM Criteria Subcommittee

Data contained in this document is considered confidential and proprietary information and its duplication, use, or disclosure is prohibited without prior approval of Community Health Plan of Washington.

## **Appendix A: Nonsurgical/Conservative treatments**

1. Modifications in activity including
  - a. Rest or activity modification or limitation
  - b. Avoiding pain inducing activities
2. Physical therapy modalities
  - a. Ice/heat
  - b. Exercises to strengthen and improve mobility in formal physical therapy sessions
  - c. Supervised home exercise to strengthen and improve mobility
3. Medications
  - a. Intra-articular steroid injection if medically appropriate and not contraindicated;  
AND
  - b. Nonsteroidal anti-inflammatory drugs (NSAIDs) if medically appropriate and not contraindicated

\*Physical therapy needs to be confirmed either by the actual PT notes, or by documentation in the medical records.

\*Conservative treatments must be within 1 year of requested procedure.

\*Intra-articular steroid injections should be avoided 1 month prior to planned interventions on the same joint.

## Appendix B: List of Sources

1. Phillips BB, Brolin TJ. Arthroscopy of the upper extremity. In: Azar FM, Beaty JH, editors. Campbell's Operative Orthopaedics. 14th ed. Philadelphia, PA: Elsevier; 2021:2663-2755.e10
1. Friedman LGM, Lafosse L, Garrigues GE. Global perspectives on management of shoulder instability: decision making and treatment. Orthopedic Clinics of North America 2020;51(2):241-258. DOI: 10.1016/j.ocl.2019.11.008.
2. American Academy of Orthopaedic Surgeons (AAOS). Guideline and Evidence Report. The diagnosis and treatment of glenohumeral joint osteoarthritis. <https://www.aaos.org>. Published March 23, 2020.
3. Hurley DJ, Hurley ET, Pauzenberger L, Lim Fat D, Mullett H. Open compared with arthroscopic biceps tenodesis: a systematic review. Journal of Bone and Joint Surgery Reviews 2019;7(5):e4. DOI: 10.2106/JBJS.RVW.18.00086.
4. American Academy of Orthopaedic Surgeons. Management of Rotator Cuff Injuries. Evidence-Based Clinical Practice Guidelines [Internet] American Academy of Orthopaedic Surgeons. 2019 Mar Accessed at: <https://www.orthoguidelines.org/>. [accessed 2023 Aug 10]
5. Carver DC, Brolin TJ. Arthroscopic management of glenohumeral arthritis. Orthopedic Clinics of North America 2019;50(4):521-528. DOI: 10.1016/j.ocl.2019.05.007.
6. Farrell G, Watson L, Devan H. Current evidence for nonpharmacological interventions and criteria for surgical management of persistent acromioclavicular joint osteoarthritis: A systematic review. Shoulder and Elbow 2019;11(6):395-410. DOI: 10.1177/1758573219840673.
7. Bechay J, Lawrence C, Namdari S. Calcific tendinopathy of the rotator cuff: a review of operative versus nonoperative management. Physician and Sportsmedicine 2020;1-6. DOI: 10.1080/00913847.2019.1710617.
8. Redler LH, Dennis ER. Treatment of adhesive capsulitis of the shoulder. Journal of the American Academy of Orthopedic Surgeons 2019;27(12):e544-e554. DOI: 10.5435/JAAOS-D-17-00606.
9. Forsythe B, et al. Efficacy of arthroscopic surgery in the management of adhesive capsulitis: a systematic review and network meta-analysis of randomized controlled trials. Arthroscopy 202;37(7):2281-2297. DOI: 10.1016/j.arthro.2020.09.041.
10. Alkhatib N, Abdullah ASA, AlNouri M, Ahmad Alzobi OZ, Alkaramany E, Ishibashi Y. Short- and long-term outcomes in Bankart repair vs. conservative treatment for first-time anterior shoulder dislocation: a systematic review and meta-analysis of randomized controlled trials. Journal of Shoulder and Elbow Surgery 2022;31(8):1751-1762. DOI: 10.1016/j.jse.2022.02.032.
11. Sheean AJ, Kibler WB, Conway J, Bradley JP. Posterior labral injury and glenohumeral instability in overhead athletes: current concepts for diagnosis and management. Journal of the American Academy of Orthopedic Surgeons 2020;28(15):628-637. DOI: 10.5435/JAAOS-D-19-00535.
12. Akgun D, et al. Diagnostic arthroscopy for detection of periprosthetic infection in painful shoulder arthroplasty. Arthroscopy 2019;35(9):2571-2577. DOI: 10.1016/j.arthro.2019.03.058.
13. Ge SM, Marwan Y, Abduljabbar FH, Morelli M, Turcotte RE. Arthroscopic management of intra- and juxta-articular osteoid osteoma of the upper extremity: a systematic review of the

Data contained in this document is considered confidential and proprietary information and its duplication, use, or disclosure is prohibited without prior approval of Community Health Plan of Washington.

- literature. *European Journal of Orthopaedic Surgery and Traumatology* 2020;30(8):1333-1344. DOI: 10.1007/s00590-020-02710-6.
14. Baldawi H, et al. Diagnosis and treatment of snapping scapula syndrome: a scoping review. *Sports Health* 2022;14(3):389-396. DOI: 10.1177/19417381211029211.
  15. Throckmorton TW. Shoulder and elbow arthroplasty. In: Azar FM, Beaty JH, editors. *Campbell's Operative Orthopaedics*. 14th ed. Philadelphia, PA: Elsevier; 2021:600-655.e8.
  16. Le Breton S, et al. A validated algorithm using current literature to judge the appropriateness of anatomic total shoulder arthroplasty utilizing the RAND/UCLA appropriateness method. *Journal of Shoulder and Elbow Surgery* 2022;31(7):e332-e345. DOI: 10.1016/j.jse.2021.12.025.
  17. American Academy of Orthopaedic Surgeons. Management of Glenohumeral Joint Osteoarthritis. Evidence-based Clinical Practice Guideline [Internet] American Academy of Orthopaedic Surgeons. 2020 Mar Accessed at: <https://www.aaos.org/>. [created 2009; accessed 2023 Sep 26]
  18. Getz CL, Ricchetti ET, Verborgt O, Brolin TJ. Normal and pathoanatomy of the arthritic shoulder: considerations for shoulder arthroplasty. *Journal of the American Academy of Orthopedic Surgeons* 2019;27(24):e1068-e1076. DOI: 10.5435/JAAOS-D-18-00414.
  19. Ayyash AM, Bui TM, O'Brien MJ, Mulcahey MK. Management of posttraumatic avascular necrosis of the proximal humerus. *Orthopedics* 2021;44(6):367-375. DOI: 10.3928/01477447-20211001-02.
  20. Alkhateeb JM, Arafah MA, Tashkandi M, Al Qahtani SM. Surgical treatment of humeral head avascular necrosis in patients with sickle cell disease: a systematic review. *JSES International* 2021;5(3):391-397. DOI: 10.1016/j.jseint.2021.01.011.
  21. Osmon DR, et al. Diagnosis and management of prosthetic joint infection: clinical practice guidelines by the Infectious Diseases Society of America. *Clinical Infectious Diseases* 2013;56(1):e1-e25. DOI: 10.1093/cid/cis803. (Reaffirmed 2022 Jun)
  22. Garrigues GE, Zmistowski B, Cooper AM, Green A, ICM Shoulder Group. Proceedings from the 2018 International Consensus Meeting on Orthopedic Infections: management of periprosthetic shoulder infection. *Journal of Shoulder and Elbow Surgery* 2019;28(6S):S67-S99. DOI: 10.1016/j.jse.2019.04.015.
  23. Gross CE, Della Valle CJ, Rex JC, Traven SA, Durante EC. Fungal periprosthetic joint infection: a review of demographics and management. *Journal of Arthroplasty* 2021;36(5):1758-1764. DOI: 10.1016/j.arth.2020.11.005.
  24. Ruditsky A, McBeth Z, Curry EJ, Cusano A, Galvin JW, Li X. One versus 2-stage revision for shoulder arthroplasty infections: a systematic review and analysis of treatment selection bias. *Journal of Bone and Joint Surgery Reviews* 2021;9(9):Online. DOI: 10.2106/JBJS.RVW.20.00219.
  25. Cvetanovich GL, Waterman BR, Verma NN, Romeo AA. Management of the irreparable rotator cuff tear. *Journal of the American Academy of Orthopedic Surgeons* 2019;27(24):909-917. DOI: 10.5435/JAAOS-D-18-00199.

26. Kobayashi EF, Oak SR, Miller BS, Bedi A. Treatment of massive rotator cuff tears with reverse shoulder arthroplasty. *Clinics in Sports Medicine* 2023;42(1):157-173. DOI: 10.1016/j.csm.2022.08.007.
27. Wellington IJ, et al. Management of failed rotator cuff repairs: a review. *Orthopedic Clinics of North America* 2022;53(4):473-482. DOI: 10.1016/j.ocl.2022.05.002.
28. Harrison AK, Knudsen ML, Braman JP. Hemiarthroplasty and total shoulder arthroplasty conversion to reverse total shoulder arthroplasty. *Current Reviews in Musculoskeletal Medicine* 2020;13(4):501-508. DOI: 10.1007/s12178-020-09649-5.
29. Kelly BJ, Myeroff CM. Reverse shoulder arthroplasty for proximal humerus fracture. *Current Reviews in Musculoskeletal Medicine* 2020;13(2):186-199. DOI: 10.1007/s12178-020-09597-0.
30. Boin MA, Virk MS. CORR® Synthesis: what is the role of reverse shoulder arthroplasty for the treatment of proximal humerus fractures in patients older than 65 years? *Clinical Orthopaedics and Related Research* 2021;479(11):2421-2429. DOI: 10.1097/CORR.0000000000001910.
31. Davey MS, et al. Management options for proximal humerus fractures - A systematic review & network meta-analysis of randomized control trials. *Injury* 2022;53(2):244-249. DOI: 10.1016/j.injury.2021.12.022.
32. Larose G, Virk MS. The evolution of reverse total shoulder arthroplasty and its current use in the treatment of proximal humerus fractures in the older population. *Journal of Clinical Medicine* 2022;11(19):Online. DOI: 10.3390/jcm11195832.
33. Malik AT, Bishop JY, Neviasser AS, Beals CT, Jain N, Khan SN. Shoulder arthroplasty for a fracture is not the same as shoulder arthroplasty for osteoarthritis: implications for a bundled payment model. *Journal of the American Academy of Orthopedic Surgeons* 2019;27(24):927-932. DOI: 10.5435/JAAOS-D-18-00268.
34. Ferlauto HR, et al. Reverse total shoulder arthroplasty for oncologic reconstruction of the proximal humerus: a systematic review. *Journal of Shoulder and Elbow Surgery* 2021;30(11):Online. DOI: 10.1016/j.jse.2021.06.004.
35. McLaughlin R, et al. Reverse shoulder arthroplasty yields similar results to anatomic total shoulder arthroplasty for the treatment of humeral head avascular necrosis. *Journal of Shoulder and Elbow Surgery* 2022;31(6S):S94-S102. DOI: 10.1016/j.jse.2021.11.011.
36. Haleem A, Shanmugaraj A, Horner NS, Leroux T, Khan M, Alolabi B. Anatomic total shoulder arthroplasty in rheumatoid arthritis: A systematic review. *Shoulder and Elbow* 2022;14(2):142-149. DOI: 10.1177/1758573220954157.
37. Leroux TS, Basques BA, Saltzman BM, Nicholson GP, Romeo AA, Verma NN. Shoulder arthroplasty in patients with rheumatoid arthritis: a population-based study examining utilization, adverse events, length of stay, and cost. *American Journal of Orthopedics (Belle Mead, N.J.)* 2018;47(6):Online. DOI: 10.12788/ajo.2018.0046.