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Clinical Practice Guidelines

Physical Therapist Management of Glenohumeral Joint Osteoarthritis: A Clinical Practice Guideline from the American Physical Therapy Association

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A clinical practice guideline on glenohumeral joint osteoarthritis was developed by an American Physical Therapy Association volunteer guideline development group that consisted of physical therapists, an occupational therapist, and a physician. The guideline was based on systematic reviews of current scientific and clinical information and accepted approaches for physical therapist management of glenohumeral joint osteoarthritis.
This clinical practice guideline is available in Spanish and Chinese; see Supplementary Appendix 8 for Spanish Translation and Supplementary Appendix 9 for Chinese Translation.

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Introduction

Overview

This clinical practice guideline (CPG) is based on a systematic review of published studies involving the physical therapist management of patients with glenohumeral joint osteoarthritis (GHOA) and those undergoing total shoulder arthroplasty (TSA). In addition to providing practice recommendations (see Table 1 for a summary of recommendations and Table 2 for a summary of best practice statement recommendations), this guideline also highlights limitations in the literature, areas for future research, intentional vagueness, potential benefits, risks, harms, and costs to implementing each recommendation, and quality improvement activities.

This CPG is intended to be used by all qualified and appropriately trained physical therapists and physical therapist assistants involved in the management of individuals with GHOA and those undergoing TSA. It also is intended to be an information resource for decision makers, health care providers, and consumers.

Goals and Rationale

The purpose of this CPG is to help improve the physical therapist management of individuals with GHOA and those undergoing TSA. This CPG is based on the current best evidence and other elements of evidence-based practice, which is considered to be the integration of best available evidence, clinical expertise, and patient values and circumstances related to patient and client management, practice management, and health policy decision making.[1] To assist clinicians, this CPG contains a systematic review of the available literature regarding the management of individuals with GHOA and those undergoing TSA. This review included randomized controlled trials and diagnostic studies and identifies where there is evidence, where evidence is lacking, and topics that future research must target to improve the physical therapist management of individuals with GHOA and those undergoing TSA. Physical therapist postoperative management for reverse TSA has been described elsewhere.[2–5]

Physical therapist services are provided in diverse settings by many different providers. This CPG is an educational tool to guide qualified clinicians through a series of management decisions in an effort to improve quality and efficiency and reduce unwarranted variation of care. Recommendations guide evidence-based practice while considering the patient's wants and needs in the clinical decision-making process. This CPG should not be construed as including all proper methods of care or excluding methods of care reasonably directed at obtaining the same results. The ultimate judgment regarding the application of any specific procedure or treatment must be made by the physical therapist in light of all circumstances presented by the patient, including safety, preferences, and disease stage, as well as the needs and resources particular to the locality or institution.

Intended Users

This CPG is intended to be used by physical therapists, and by physical therapist assistants under the direction of physical therapists, for the management of patients who have GHOA, pre- and post-TSA, as well as those currently not planning to undergo a TSA. Physical therapists are health care professionals who help individuals maintain, restore, and improve movement, activity, and functioning to enable optimal performance and enhance health, well-being, and quality of life. Orthopedic surgeons, primary care clinicians, geriatricians, hospital-based adult medicine specialists, physiatrists, occupational therapists, nurse practitioners, physician assistants, emergency department clinicians, and other health care providers who routinely manage patients with GHOA, either operatively or nonoperatively, may benefit from this CPG. It should be used to guide the informed and shared decision making with the patient for management of GHOA.

Table 1. Summary of Recommendations[a]

Intervention	Quality of Evidence	Strength of Recommendation	Recommendation
Diagnosis: history, physical exam, radiograph	Moderate	♦♦♦◊	History, physical examination, and radiographs can be useful to differentially diagnose GHOA. Critical shoulder angle on radiographs and age are specifically predictive of the diagnosis.
Diagnosis: MRI	High	♦♦♦♦	Advanced imaging using MRI is beneficial in the differential diagnosis of GHOA. MRI is helpful to confirm the diagnosis but is less useful to rule out the diagnosis.
Postoperative management: sling and exercise	High	♦♦♦♦	Physical therapists should implement the use of a sling and progressive exercises for ROM and strengthening to improve patient-reported outcomes, and ROM in patients with GHOA who have undergone total shoulder arthroplasty (TSA).
Postoperative physical therapist–directed pain management	Moderate	♦♦♦◊	Physical therapists should implement the use of a sling with the shoulder in a neutral rotation position for pain management in patients with GHOA who have undergone TSA.
Postoperative physical therapy timing	Moderate	♦♦♦◊	The timing of the introduction of shoulder ROM exercises by physical therapists may be delayed up to 4 weeks without negatively impacting patient-reported outcomes in patients with GHOA who have undergone TSA.

[a]GHOA = glenohumeral joint osteoarthritis; ROM = range of motion; TSA = total shoulder arthroplasty.

Table 2. Summary of Best Practice Statement Recommendations[a,b]

Intervention	Quality of Evidence	Strength of Recommendation	Best Practice Statement Recommendation
Preoperative physical therapy for patients scheduled for TSA	Insufficient	♦◊◊◊	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services delivered preoperatively may benefit postoperative outcomes in patients with GHOA who are undergoing TSA.
Nonoperative physical therapy comparison to other management strategies	Insufficient	♦◊◊◊	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services may benefit patients with GHOA who have not undergone TSA.
Nonoperative physical therapist intervention options	Insufficient	♦◊◊◊	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that no one specific intervention performed by a physical therapist is superior to another for patients with GHOA.
Postoperative physical therapy outcomes	Insufficient	♦◊◊◊	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services delivered postoperatively may benefit patient-rated functional outcomes in the management of patients who have undergone TSA for GHOA.
Postoperative physical therapy edema management	Insufficient	♦◊◊◊	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist interventions for edema in patients with GHOA who have undergone TSA should be based on best available evidence, clinical expertise, and patient values.

[a]GDG = guideline development group; GHOA = glenohumeral joint osteoarthritis; TSA = total shoulder arthroplasty. [b]Best practice statement recommendations were crafted by the GDG based on discussion of theory, experience treating patients, and other evidence sources as noted in the rationale for each statement.

This guideline is not intended for use as an insurance benefit determination document.

Patient Population

This guideline addresses nonoperative, preoperative, and postoperative management of individuals with GHOA, who may or may not undergo TSA. This document is not intended to address management of TSA revision, partial or reverse shoulder arthroplasty, pediatric patients (under 18 years of age), or patients with primary rheumatoid arthritis.

Burden of Disease

Osteoarthritis (OA) is one of the leading causes of pain, disability, and health care resource use in the United States, with over 54 million (23%) older adults diagnosed with OA and 24 million limited in performing daily activities.[6] One in 4 people with OA report severe pain that limits their ability to do daily tasks at work and at home, costing over $300 billion in health care costs and lost wages annually.[6] With the aging population, the incidence of OA is increasing, resulting in higher costs to the health care system and to the individual in both dollars and impact on quality of life. As the aging population increases, this societal impact also will continue to increase.

The incidence of GHOA is related to the high level of joint mobility and required use of the GH joint in daily tasks. In published large-scale population studies, GHOA-associated degenerative changes have been seen radiographically in 17% to 20% of adults over the age of 65 years.[7,8] Degenerative changes in the GH joint are found in up to 17% of patients with shoulder pain.[9] This condition occurs more frequently in women than in men and more frequently in those who have had previous shoulder injuries, have occupations that require heavy lifting, and are active in sports requiring overhead use of the upper extremity.[7,10]

GHOA can impact quality of life and arm function, especially related to overhead activities and those requiring shoulder external rotation.[10] Sleep issues have been reported related to difficulty falling asleep and to night pain that causes waking.[10] Psychological factors, such as anxiety and depression, have been shown to influence pain perception and impact outcomes of care.[11,12] Treatment for GHOA has included pain and anti-inflammatory medications (including injections), thermotherapy, strengthening and flexibility exercises, massage, and bracing. When these interventions are not effective, surgery of the joint may be indicated in the form of arthroscopy or TSA.[13] Although joint replacement surgery is most common in hips and knees, shoulder joint replacements are the third most commonly performed surgery to mitigate pain and disability.[14] Annually, 53,000 adults undergo GH joint replacement surgery, which accounts for 4% of all joint replacements and tends to increase in prevalence with aging.[15]

Preoperative health status related to physical strength and function has been associated with favorable postoperative outcomes of total joint replacements.[16] These studies related to total hip arthroplasty and total knee arthroplasty suggest that preoperative and postoperative care for patients with TSA will provide benefits in reducing pain and disability; however, research in this area for TSA is not available. For patients being managed postoperatively, a recent study[17] reported a high prevalence of outpatient falls following shoulder arthroplasty. In 198 patients who received shoulder arthroplasty,

10.6% had a fall after they went home that resulted in visits to the emergency department and hospital readmission due to injury to an anatomic site other than the shoulder and/or injury at the surgical site (eg, periprosthetic humeral fracture). This begs the question to be answered: What type(s) of postoperative management is needed to optimize the quality of life for people who have undergone a TSA?

Etiology

The etiology of GHOA is similar to that of OA in other large joints via classification into primary or degenerative for no known cause, or secondary OA related to prior injury or disease process. GHOA has been characterized by humeral head cartilage loss with subsequent adaptive changes to the subchondral bone and development of osteophytes that impact the biomechanical function of the shoulder.[18] In aging, the collagen content is unchanged but becomes less hydrated and more permeable. In contrast, with OA, there is an increase in activity of collagenase and matrix metalloproteinases that is associated with increased water content, disorganization of the collagen framework, and breakdown of protein proteoglycan content.[19] Multiple factors have been identified that increase risk of developing GHOA, defined in the risk factor section.

As GHOA progresses in severity of symptoms and limitations to arm function, a TSA may become an option. The goal of TSA is to relieve pain and improve function. This surgery can be indicated when arthritis has progressed to degeneration of the joint cartilage, impacting the articular surfaces between the humeral head and the glenoid fossa on the scapula. Rotator cuff tendon tears, severe fracture, and rheumatoid disease can also lead to TSA. The humeral head is held in the glenoid fossa of the scapula by the rotator cuff muscles and ligaments. During a TSA, prosthetic components replace the articular surfaces of the humerus and glenoid fossa. The humeral head and stem are fabricated primarily from metal, and the stem is fixed into the humeral shaft. Stemless humeral head implants are also used. The artificial glenoid socket can be made of polyethylene, metal, or a combination of both and is fixed into the glenoid socket. Both components can be press-fitted (pressed into the bone without cement) or cemented in place. The use of the prosthetic socket is dependent on the severity of the arthritis and whether the rotator cuff tendons are still intact.[20]

Risk Factors

There are multiple proposed risk factors for GHOA, including age, genetics, obesity, joint loading, occupation, exercise, GH joint stability and integrity, rotator cuff arthropathy, and scapular morphology.[21] Age is a known risk factor, similar to arthritis in other joints. Prevalence of GHOA has been reported in 17.4% to 20.3% of those 65 years of age and older in South Korean and Japanese cohorts.[7,8] Women have a higher prevalence of GHOA, but being female is not an independent risk factor.[7,10] Factors other than age that may lead to secondary OA–such as trauma, shoulder instability, joint infections, and fracture of the GH joint—are associated with the development of GHOA. Other anatomical factors associated with GHOA include rotator cuff tears (and, in particular, cuff arthropathy) and scapular morphological deficits that can increase the compressive forces at the GH joint. Environmental risk factors such as heavy construction jobs that involve loading to the shoulder and overhead sports may also play a role in the development of GHOA. Genetics have been identified as a factor in degenerative joint disease. Interplaying with genetics are associated risk factors of joint and systemic inflammation and obesity. Obesity has been associated more with lower extremity OA but has not been found to be an independent risk factor for GHOA.[7] Obesity can be associated with upper extremity OA but is more intertwined with inflammation and dyslipidemia.

Potential Benefits, Risks, Harms, and Costs

The potential benefits, risks, harms, and costs are provided for each recommendation within this document. TSA is a relatively new orthopedic surgery; thus, follow-up studies are just now emerging from the past 15 years or so, and overall global harm data are not available. Short- and long-term follow-up have shown that the radiographic findings of complications include periprosthetic lucency (thinning of the bone around the implant), subluxation (partial dislocation of the implant), and erosion (wearing away) of the bone underneath the implant.[22,23] Some of these complications required revisions due to loosening of the implant, polyethylene wear, and bone fracture of the humerus (upper arm bone). Most patient complaints focused on loss of motion, persistent pain, and need for revision.

Emotional and Physical Impact

Psychological factors can impact pain and functional outcomes.[21] Patients undergoing hip or knee joint arthroplasty who had high Medical Outcomes Study 36-Item Short-Form Survey (SF-36) mental health scores had lower functional outcomes both preoperatively and postoperatively than did those with lower psychological distress.[24] In patients with GHOA undergoing TSA, those with higher depression and anxiety scores preoperatively had fewer improvements postoperatively in self-report function and pain.[11] Assessment of psychological factors may be indicated to determine if the management of the mental health factors is indicated.[25] A comprehensive screening tool may be helpful to identify the presence of psychosocial factors that can impact recovery, such as the Optimal Screening for Prediction of Referral and Outcome for Yellow Flags (OSPRO-YF).[26]

The presence of GHOA and undergoing TSA can impact functional limitations of the shoulder complex that can reduce the ability to perform social and work-related tasks involving the upper extremity. Depending on the tasks (both at home and in the workplace), the demands on the muscular and joint structures of the shoulder complex may lead to awkward postures to perform a task resulting in fatigue and overuse syndromes. Additionally, psychosocial work issues may alter an individual's perception of pain and functional difficulties and thus impact recovery.[10] Patient-reported functional outcomes indicate that surgical (TSA) and nonsurgical management that includes physical therapist services can be beneficial.[27–29]

Future Research

Consideration for future research is provided for each recommendation within this document.

Methods

The methods used to develop this CPG were employed to minimize bias and enhance transparency in the selection,

appraisal, and analysis of the available evidence. These processes are vital to the development of reliable, transparent, and accurate clinical recommendations for physical therapist management of GHOA and TSA. Methods from the *APTA [American Physical Therapy Association] Clinical Practice Guideline Manual*[30] and *AAOS [American Academy of Orthopaedic Surgeons] Clinical Practice Guideline Methodology*[31] were used in development of this CPG.

This CPG evaluates the effectiveness of approaches in the physical therapist management of GHOA. APTA sought out the expertise of the AAOS Evidence-Based Medicine Unit as paid consultants to assist in the methodology of this CPG. The multidisciplinary guideline development group (GDG) consisted of physical therapist members from APTA and its representative sections and academies, AAOS, the American Occupational Therapy Association, and the American Academy of Physical Medicine and Rehabilitation (Fig. 1). All GDG members, APTA staff, and methodologists were free of potential conflicts of interest relevant to the topic under study, as recommended by the National Academies of Sciences and Medicine's *Clinical Guidelines We Can Trust*.[15]

This CPG was prepared by the APTA Glenohumeral Joint Osteoarthritis Clinical Practice Guideline Development Group (clinical experts) with the assistance of the AAOS Clinical Quality and Value (CQV) Department (methodologists). To develop this guideline, the GDG held an introductory meeting on June 16, 2020, to establish the scope of the CPG. The GDG defined the scope of the CPG by creating PICOT questions (ie, population, intervention, comparison, outcome, and time) that directed the literature search. The AAOS medical librarian created and executed the search. (Suppl. Appendix 1 contains the search strategy.) AAOS chose the included studies and performed quality assessments based on the published guideline methodology. The GDG performed final reviews of the literature and recommendations, provided rationale in the context of physical therapist practice, and adjusted the strength of the recommendations depending on the magnitude of benefit, risk, harm, and cost.

Quality appraisals, diagnosis evidence tables, and intervention evidence tables are found in Supplementary Appendixes 2, 3, and 4, respectively.

Best Evidence Synthesis

This CPG includes only the best available evidence for any given outcome addressing a recommendation. Accordingly, the highest-quality evidence for any given outcome is included first if it was available. In the absence of 2 or more occurrences of an outcome based on the highest-quality (Level I) evidence, outcomes based on the next level of quality were considered until at least 2 or more occurrences of an outcome had been acquired (Tab. 3). For example, if there were 2 "moderate" quality (Level II) occurrences of an outcome that addressed a recommendation, the recommendation does not include "low" quality (Level III) occurrences of evidence for this outcome. For best practice statement recommendations for which high- or moderate-quality studies were not available, the other 2 elements of evidence-based practice (clinician experience and knowledge base, and patient values and preferences) were used to make the recommendation. A summary of included and excluded articles is included in Supplementary Appendixes 5 and 6. A flowchart of study attrition is found in Figure 2.

Literature Searches

The medical librarian conducted a comprehensive search of PubMed, Embase, and the Cochrane Central Register of Controlled Trials based on key terms and concepts from the PICOT questions. Bibliographies of relevant systematic reviews were hand searched for additional references. All databases were last searched on December 8, 2020, with limits for publication dates from 1990 through 2020 and English language. The PICOT questions used to define the literature search and inclusion criteria, and the literature search strategy used to develop this CPG, can be found in Supplementary Appendix 1.

Defining the Strength of the Recommendations

Judging the quality of evidence is only a steppingstone toward arriving at the strength of a CPG recommendation. The operational definitions for the quality of evidence are listed in Table 3, and rating of magnitude of benefits versus risk, harms, and cost is provided in Table 4. The strength of recommendation (Tab. 5) also takes into account the quality, quantity, and trade-off between the benefits and harms of a treatment, the magnitude of a treatment effect, and whether there are data on critical outcomes. Table 6 addresses how to link the assigned grade with the language of obligation of each recommendation.

Patient Involvement

Four individuals who had GHOA and/or a TSA participated in the development of this CPG through the peer-review process. These reviewers provided input on the final draft, which the GDG took into consideration in making any necessary edits to the CPG (Suppl. Appendix 7).

Voting on the Recommendations

GDG members agreed on the strength of every recommendation; recommendations were approved and adopted when a majority of 60% of the GDG voted to approve. All recommendations received 100% agreement among the quorum of the voting GDG. No disagreements were recorded during recommendation voting. When changes were made to the strength of a recommendation based on the magnitude of benefit or potential risk, harm, or cost, the GDG voted and provided an explanation in the rationale.

Structure of the Recommendations

Each recommendation contains information on the quality of the body of evidence and the strength of each recommendation. Additional categories are also provided for potential benefits, risks, harms, and costs of implementing each recommendation; future research; value judgments; intentional vagueness; exclusions; quality improvement; and implementation and audit. The rationales for each recommendation are intended to provide the reader with an overview of the included studies, highlighting consistencies or discrepancies in results where applicable, and are *not* intended to provide specific details of each study. References of the included studies for each recommendation are provided in the action statement profiles, and readers are encouraged to search individual studies for details. Additionally, information on quality improvement (what aspect of practice will improve as a result of following the recommendation) and implementation and

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Figure 1. Guideline Development Group roster.

Table 3. Rating Quality of Evidence

Rating Of Overall Quality Of Evidence	Definition
High	Preponderance of Level I or II evidence with at least 1 Level I study. Indicates a high level of certainty that further research is not likely to change outcomes of the combined evidence.
Moderate	Preponderance of Level II evidence. Indicates a moderate level of certainty that further research is not likely to change the outcomes direction of the combined evidence; however, further evidence may impact the magnitude of the outcome.
Low	A moderate level of certainty of slight benefit, harm, or cost, or a low level of certainty for moderate-to-substantial benefit, harm, or cost. Based on Level II through V evidence. Indicates that there is some but not enough evidence to be confident of the true outcomes of the study and that future research may change the direction of the outcome and/or impact magnitude of the outcome.
Insufficient	Based on Level II through V evidence. Indicates that there is minimal or conflicting evidence to support the true direction and/or magnitude of the outcome. Future research may inform the recommendation.

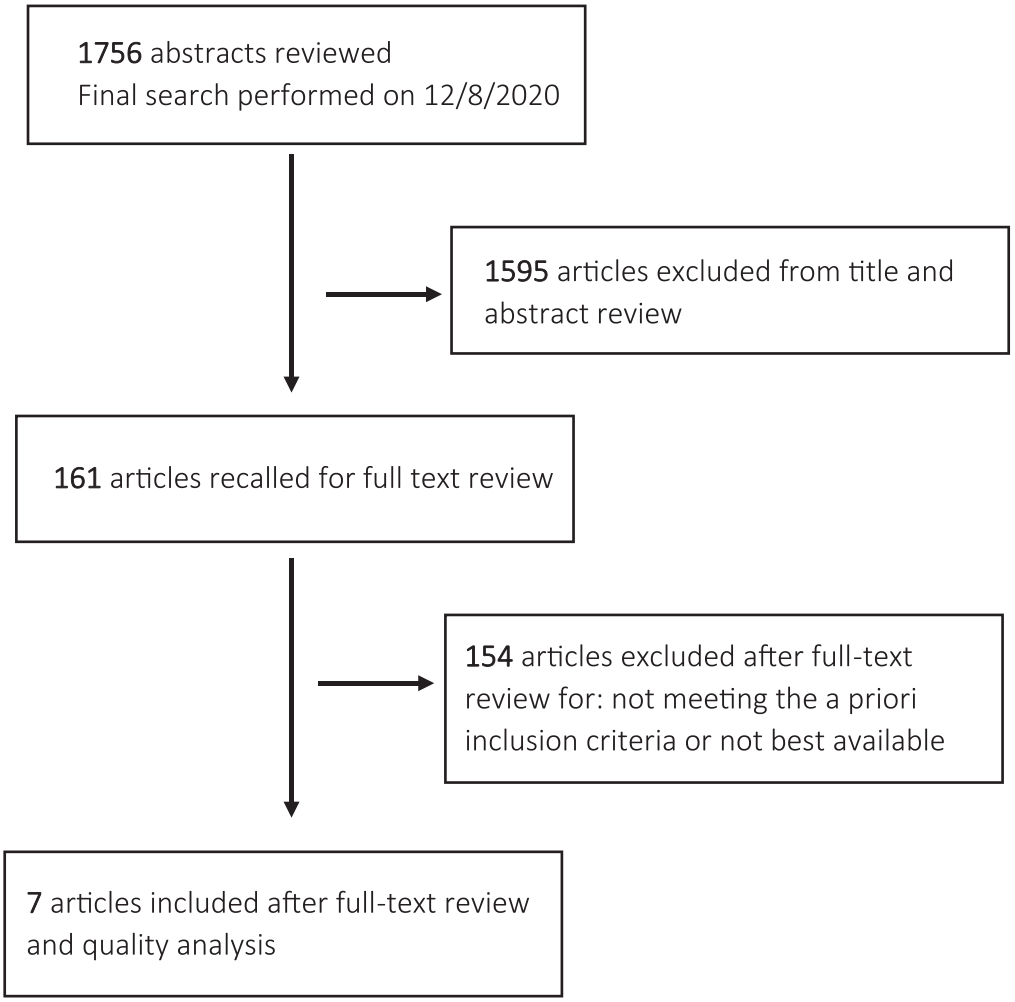

Figure 2. Study attrition flowchart.

Table 4. Magnitude of Benefit, Risk, Harms, or Cost

Rating of Magnitude	Definition
Substantial	The balance of the benefits versus risk, harms, or cost overwhelmingly supports a specified direction.
Moderate	The balance of the benefits versus risk, harms, or cost supports a specified direction.
Slight	The balance of the benefits versus risk, harms, or cost demonstrates a small support of a specified direction.

audit (specific strategies for implementing a particular recommendation and how its implementation might be measured for adherence) is provided for each recommendation.

Outcome Measures

Assessment of ROM (passive and active), strength, pain, anthropometrics, and mechanics of the shoulder complex along with patient-reported outcome measures should be used to develop a patient-specific treatment plan and determine patient response to care. Valid and reliable patient-reported outcome measures are an important part of the initial assessments and reassessments to quantify the patient perspective of symptoms, activity limitations, and participation restrictions. A triangulation of patient-reported outcome measures may be useful when assessing the impact on activity limitations and participation restrictions. A condition-specific, upper extremity-specific, or shoulder-specific outcome measure may be included as 1 piece of outcome assessment. The Western Ontario Osteoarthritis Score (WOOS) Shoulder Index is a specifically designed outcome measure to assess symptoms, function/disability, and emotions in patients with shoulder osteoarthritis.[32] Examples of upper extremity measures include the Disability of the Arm, Shoulder and Hand (DASH) or its shortened version, the QuickDASH.[33,34] Many shoulder specific outcome measures would be appropriate to assess patients with GHOA and/or preoperative and postoperative TSA, such as the Shoulder Pain and Disability Index (SPADI),[35,36] Penn Shoulder Score (PENN),[37] Simple Shoulder Test (SST),[38–40] and American Shoulder and Elbow Surgeons score (ASES).[40,41] The ASES and WOOS have been demonstrated to be the most responsive of extremity-specific and condition-specific measures in patients undergoing TSA.[42] Patient-specific measures should also be used to guide individual patient care, such as the Patient-Specific Functional Scale (PSFS).[43,44] Finally, an

Table 5. Strength of Recommendations

Strength	Strength Visual	Definition
Strong	♦♦♦♦	A high level of certainty of moderate-to-substantial benefit, harms, or cost or a moderate level of certainty for substantial benefit, harms, or cost (based on a preponderance of Level I or II evidence with at least 1 Level I study).
Moderate	♦♦♦◊	A high level of certainty of slight-to-moderate benefit, harms, or cost or a moderate level of certainty for a moderate level of benefit, harms, or cost (based on a preponderance of Level II evidence or a single high-quality RCT).
Weak	♦♦◊◊	A moderate level of certainty of slight benefit, harms, or cost or a low level of certainty for moderate-to-substantial benefit, harms, or cost (based on Level II through V evidence).
Theoretical/ foundational	♦◊◊◊	A preponderance of evidence from animal or cadaver studies, from conceptual/theoretical models/principles, from basic science/bench research, or from published expert opinion in peer-reviewed journals that supports the recommendation.
Best practice	♦◊◊◊	Recommended practice based on current clinical practice norms; exceptional situations in which validating studies have not or cannot be performed yet there is a clear benefit, harm, or cost; or expert opinion.

Table 6. Linking the Strength of Recommendation, Quality of Evidence, Rating of Magnitude, and Preponderance of Risk vs Harm to the Language of Obligation[a]

Recommendation Strength	Quality Of Evidence and Rating of Magnitude	Preponderance of Benefit or Risk, Harms, or Cost	Level of Obligation to Follow the Recommendation
Strong	High-quality and moderate-to-substantial magnitude *or* Moderate-quality and substantial magnitude	Benefit Risk, harms, or cost	Must or should Must not or should not
Moderate	High-quality and slight-to-moderate magnitude *or* Moderate-quality and moderate magnitude	Benefit Risk, harms, or cost	Should Should not
Weak	Moderate-quality and slight magnitude *or* Low quality and moderate-to-substantial magnitude	Benefit Risk, harms, or cost	May May not
Theoretical/ foundational	N/A	Benefit Risk, harms, or cost	May May not
Best practice	Insufficient quality and insufficiently clear magnitude	Benefit Risk, harms, or cost	Should or may Should not or may not

[a]N/A = not applicable.

anchor may be helpful to interpret the patient-reported outcome scores, such as determining the Patient Acceptable Symptom State[45] or simply asking if the patient is satisfied with their current status. Patient-reported outcome measures can be found on the APTA webpage for tests and measures.[46]

Role of the Funding Source

APTA, which funded AAOS services and provided coordination, played no role in the design, conduct, and reporting of the recommendations.

Peer Review and Public Commentary

Following the formation of a final draft, the CPG draft was subjected to a 3-week peer review for additional input from external content experts and stakeholders. Eighty-four comments from 5 professional societies were collected via an electronic structured review form. All peer reviewers were required to disclose any potential conflicts of interest, which were recorded and, as necessary, addressed.

After modifying the draft in response to peer review, the CPG was subjected to a 2-week public comment period. Commenters consisted of the APTA Board of Directors (Board), the APTA Scientific and Practice Affairs Advisory Committee (SPAC), all relevant APTA sections and academies, stakeholder organizations, and the physical therapy community at large. Ten public comments were received. Revisions to the draft were made in response to relevant comments.

Recommendations

Diagnosis: History, Physical Examination, and Radiograph ♦♦♦◊

History, physical exam, and radiographs can be useful to differentially diagnose GHOA; specifically, critical shoulder angle on radiograph and age can be predictive of the diagnosis. *Evidence Quality: moderate; Recommendation Strength: moderate.*

Action Statement Profile

Aggregate Evidence Quality: 1 high-quality study[47] and 1 moderate-quality study.[48]

Rationale

One high-quality study found that age was useful to differentially diagnose GHOA from other similar conditions; older age was noted in those with cuff arthropathy, and younger

age was noted in those with rotator cuff tears.[48] One high-quality study[47] and 1 moderate-quality study[48] found that a decrease in the critical shoulder angle in true anterior–posterior radiographs was useful to diagnose GHOA. (*Critical shoulder angle* is defined as the angle between the line connecting the superior and inferior osseous margins of the glenoid cavity [parallel to glenoid surface] and a second line from the inferolateral border of the acromion to the inferior glenoid margin.[48]) Evidence and consensus-based patient care pathways developed with the National Health Service Evidence-Based Interventions program in the United Kingdom indicate that GHOA diagnosis should include symptoms of shoulder pain occurring for more than 3 months, no findings of instability or localized pain to the AC joint upon manual examination, a global reduction in range of motion (ROM) with the greatest loss in passive external rotation with the arm at the side, and radiographs to confirm the diagnosis.[49] Differential diagnosis should be performed for rotator cuff tendon pathology, adhesive capsulitis, and labral tears that may have a similar patient presentation.[49]

Diagnosis: Magnetic Resonance Imaging (MRI) ♦♦♦♦

Advanced imaging through MRI is beneficial in the differential diagnosis of GHOA. MRI is helpful to confirm the diagnosis but is less useful to rule out the diagnosis. *Evidence Quality: high; Recommendation Strength: strong.*

Action Statement Profile

Aggregate Evidence Quality: 2 high-quality studies.[50,51]

Rationale

Two high-quality studies found that MRI without contrast is helpful to confirm the diagnosis of GHOA but less useful to rule it out.[50,51] An MRI-based grading system for shoulder osteoarthritis severity is reliable and useful to detect early OA, classify severity, and track progression of shoulder OA. Consensus-based patient care pathway[49] indicates that the first step in diagnosis is the use of a clinical examination and radiographs to diagnose GHOA. Use of advanced imaging of MRI may be indicated if the diagnosis is unclear. Physical therapists can use the American College of Radiology Appropriateness Criteria for guidance.[52]

Potential Benefits, Risks, Harms, and Costs of Implementing these Recommendations

Benefits are as follows:

- Aids in clinical decision making and differential diagnosis

Risk, harms, and/or costs are as follows:

- There are no risks or harms with performing the history and physical examination.
- There are costs associated with performing unnecessary radiologic imaging; for example, use of advanced imaging such as MRI does increase the cost of care.

Benefit-harm Assessment.

History/Physical Exam/Radiographs: The balance of the benefits versus risk, harms, or cost supports this recommendation.

MRI: The balance of the benefits versus risk, harms, or cost overwhelmingly supports this recommendation.

Future Research

Future studies should continue to evaluate the ability of the history, physical examination, and imaging to diagnose GHOA. This would enable increased certainty in the diagnoses of GHOA and enable specific care pathways for the nonoperative management of GHOA.

Value Judgments

Physical therapists use clinical decision making and differential diagnosis skills during the physical examination to determine the plan of care, which may include the need for other health care provider involvement. Some states have granted physical therapists the legal ability to order radiographs,[53] which can be used for diagnosis of GHOA.

Intentional Vagueness

Differential diagnosis from other musculoskeletal conditions was not included in the search.

Exclusions

Diagnostic ultrasound was not included, as there was no available literature.

Quality Improvement

Organizations may use documentation of history, physical examination, and referral for and/or evidence of a radiograph or MRI as a performance indicator.

Implementation and Audit

Organizations may audit occurrence of history, physical exam, and referral for and/or evidence of radiograph or MRI.

Postoperative Management: Sling and Exercise ♦♦♦♦

Physical therapists should implement the use of a sling and progressive exercises for ROM and strengthening to improve patient-reported outcomes, and ROM in patients with GHOA who have undergone TSA. *Evidence Quality: high; Recommendation Strength: strong.*

Action Statement Profile

Aggregate Evidence Quality: 2 high-quality studies.[54,55]

Rationale

One high-quality study indicates improved patient-reported outcomes and ROM in patients with primary GHOA who have undergone TSA (with lesser tuberosity osteotomy) who were randomized to immediate motion versus delayed motion during the 4-week immobilization period.[54] Postoperative physical therapist services in the high-quality study consisted of sling use for 4 weeks, followed by 4 weeks of progressive assistive and active ROM and then strengthening exercises.[54] This randomized clinical trial (n = 60 patients), showed earlier improvements (at 4 and 8 weeks) in ROM and patient-reported functional outcomes (ASES scores) with immediate ROM exercises (flexion and external rotation to 30°) compared with delayed motion (4 weeks) during the

immobilization period, but no differences in ROM, pain, or patient-reported function (ASES, SST, SANE), at 1 year.[54]

One high-quality study of patients (n = 36) who received standard physical therapy, and randomized to either neutral or internal rotation sling position for 6 weeks following TSA. The internal rotation position was with the forearm positioned against the stomach. The neutral sling position was described by authors using "the Slingshot 3 sling (Arthrex, Naples, FL, USA) that maintained the glenohumeral joint in neutral rotation and attempted to maintain a neutral scapular position."[55] Results suggest both sling immobilization positions had significant improvements in pain, patient-reported function (DASH, WOOS, SANE), and ROM outcomes.[55] During 6 weeks of immobilization, patients who were randomized to use of a sling in a neutral shoulder position had less night pain at 2 weeks postoperative and greater ROM in external rotation at 1 year compared with patients immobilized in a traditional internal rotation sling.[55] Immobilization in a neutral position should be considered as a management option.

Potential Benefits, Risks, Harms, and Costs of Implementing this Recommendation

Benefits are as follows:

- Improved patient-reported arm function
- Decrease in postoperative day and night pain
- Improved ROM

Risks, harms, and/or costs are as follows:

- There is no harm in ROM and functional outcomes (ASES) with delayed ROM (4 weeks) compared with immediate active assistive ROM exercises with follow-up at 6 months and 1 year. While earlier gains in ROM can occur when ROM exercises are initiated immediately postoperative, there is a small risk for adverse healing of subscapularis with immediate ROM versus the delayed group following TSA.[54]
- Impaired subscapularis or osteotomy healing after TSA results in higher level of pain, instability, and reduced active internal rotation ROM.[54,56–58] Protection of subscapularis healing during the early postoperative healing stage of recovery with delayed ROM (4 weeks) and initiating ROM with limits in external rotation to 30 degrees should be considered.

Benefit-harm assessment: The balance of the benefits versus risk, harms, or cost overwhelmingly supports this recommendation.

Future Research

Since ROM exercises are the standard of care for physical therapist intervention of patients following TSA, randomized trials with control groups comparing physical therapist interventions without progressive ROM exercise is unlikely. Future research should evaluate which physical therapist interventions (passive ROM versus active assistive; formal strengthening versus ADLs) and dosing of interventions are the most effective to improve patient-reported outcomes. Comparative studies on the timing of initiating passive and active ROM and strengthening are also recommended. The impact of implant designs (eg, stemmed, stemless) and subscapularis fixation methods (eg, tenotomy, less tuberosity osteotomy, and peel to bone tunnels) and healing of the subscapularis should be considered in relationship to ROM guidelines after TSA.

Value Judgments

Sling use and delayed exercises are intended for management of the GHOA and may affect other regions in the upper extremity. Therefore, the function of the entire upper extremity should be assessed to determine if physical therapist management is appropriate.

Intentional Vagueness

The position of the shoulder in a sling would include a bolster with the shoulder in abduction and neutral glenohumeral rotation. Specific dose and type of exercises are not defined. Precautions about weight-bearing on the operated extremity during transfers or functional activities were not specifically described.

Exclusions

Studies of nonprimary OA (rotator cuff tear arthropathy or reverse TSA) were excluded.[2,59]

Quality Improvement

Organizations may use documentation of sling immobilization position and duration, exercise parameters to include ROM exercises as a performance indicator. Patient-rated outcomes of care should be assessed to determine effectiveness and areas for improvement.

Implementation and Audit

Organizations may audit occurrence of early exercise following TSA for management of GHOA.

Postoperative Physical Therapist–Directed Pain Management ♦♦♦◊

Physical therapists should implement the use of a sling with the shoulder in a neutral rotation position for pain management in patients with GHOA who have undergone TSA. *Evidence Quality: moderate; Recommendation Strength: moderate.*

Action Statement Profile

Aggregate Evidence Quality: 1 high-quality study.[55]

Rationale

One high-quality study assessed the effects of arm position (shoulder neutral glenohumeral rotation versus internal rotation) during 6-week sling immobilization on patient-reported outcomes. The neutral position was described by authors as using "the Slingshot 3 sling (Arthrex, Naples, FL, USA) that maintained the glenohumeral joint in neutral rotation and attempted to maintain a neutral scapular position."[55] The neutral rotation sling group demonstrated less night pain at 2 weeks but no differences at longer-term follow-up at 6, 12, 32, and 54 weeks. Positioning the arm in a sling in neutral rotation resulted in slightly better patient-reported pain outcomes (DASH, WOOS, SANE) compared with internal rotation, but the difference was not statistically significant. Improved pain ratings (overall and night) were seen in both groups who were immobilized in a sling for the first 6 weeks postoperatively in conjunction with a standardized program

supervised by physical therapists. Sling use in neutral arm position should begin postoperatively, with instructions from the surgeon if passive range-of-motion (PROM) exercises, such as pendulum, may be performed out of sling until the patient initiates physical therapy.

Potential Benefits, Risks, Harms, and Costs of Implementing this Recommendation

Benefits are as follows:

- Improved patient-reported arm function
- Decrease in postoperative daily and night pain
- Improved ROM

Risks, harms, and/or costs are as follows:

- Loss of ROM/shoulder joint contracture if protected ROM is not initiated or properly performed.

Benefit-harm assessment: The balance of the benefits versus risk, harms, or cost supports this recommendation.

Future Research

Studies are needed that characterize the effects of physical therapy modalities for pain, optimal duration of sling use on pain and functional outcomes. Importantly, studies are needed to define optimal multimodal pain management strategies for patients with TSA and GHOA. Large sample sizes could help to determine the optimal position of shoulder rotation during sling immobilization.

Value Judgments

As pain is an important aspect of quality of life, the need for pain control was determined to be an important consideration despite having only 1 quality study.

Intentional Vagueness

The position of the shoulder in a sling would include a bolster with the shoulder in abduction and neutral glenohumeral rotation.

Exclusions

No exclusions were identified. Other methods for pain management exist but were not included in the literature base for this recommendation. These include the use of cryotherapy or other physical modalities.

Quality Improvement

Organizations may use documentation of sling immobilization position, duration, and pain intensity as performance indicators. Patient-rated outcomes of care should be assessed to determine effectiveness and areas for improvement.

Implementation and Audit

Organizations may audit the occurrence of documentation of sling immobilization for management of pain control in patients with GHOA and management postoperative of TSA.

Postoperative Physical Therapy Timing ♦♦♦◊

The timing of the introduction of shoulder ROM exercises by physical therapists may be delayed up to 4 weeks without negatively impacting patient-reported outcomes in patients with GHOA who have undergone TSA. *Evidence Quality: moderate; Recommendation Strength: moderate.*

Action Statement Profile

Aggregate Evidence Quality: 1 high-quality study.[54]

Rationale

One high-quality study[54] of 60 individuals who had undergone a TSA using a lesser tuberosity osteotomy approach compared immediate with delayed (4 weeks) ROM exercises and found no difference between groups in outcomes. Treatment consisted of sling use for 4 weeks, followed by 4 weeks of progressive assistive and active ROM, and then strengthening exercises. Outcome measures included ROM measurements, visual analog scale (VAS), ASES, STT, and SANE scores. At 1 year postoperatively, there were no significant differences between groups in any of the outcomes. During the early phase of the study, the immediate group showed improved trends in external rotation and forward flexion ROM, VAS, SANE, and ASES scores. However, these differences narrowed over time, with no differences seen by 3 months. Of concern, nonhealing of the lesser tuberosity osteotomy was higher in the immediate ROM group (5/27 = 19%) than in the delayed group (1/28 = 4%). Other studies[60,61] have shown trends toward greater functional improvement with healing of the osteotomy or subscapularis tenotomy repair when ROM exercises were delayed. Although this study is related to shoulder exercises, this does not preclude the need for exercising the other upper quadrant muscles and joints, such as neck, elbow, and hand. The need for early PROM should be individualized to the patient's needs and type of surgery. Overall, the timing of initiation of physical therapist services related to ROM exercises does not affect patient-related outcomes.

- Initial limitation of external rotation to 30 degrees is recommended to avoid increased stress on the lesser tuberosity osteotomy site.
- Patient presentation/characteristics of overall health status can help determine timing.
- Protection of the subscapularis during the healing phase postoperatively must be a primary objective.

There was no evidence evaluating the intensity levels of ROM exercises with respect to timing of delivery. Physical therapists should be guided by the individual patient evaluation and their goals and should consider the need for adequate healing of the osteotomy in patients when determining the intensity and timing of treatment.

Potential Benefits, Risks, Harms, and Costs of Implementing this Recommendation

Benefits are as follows:

- No difference between immediate and delayed ROM exercises on patient-reported functional outcomes
- Relief from pain and swelling with ROM exercises

Risks, harms, and/or costs are as follows:

- Early stress on the subscapularis tenotomy or lesser tuberosity osteotomy may impair healing rates, which has been shown to compromise long-term functional outcomes.

- Early initiation of ROM exercises has been associated with delayed lesser tuberosity osteotomy healing.

Benefit-harm assessment: The balance of the benefits versus risk, harms, or costs supports this recommendation.

Future Research

Studies are needed to determine optimal timing for exercise for patient management after TSA and to determine factors of muscle integrity and surgical variables (including various implants and fixation methods) related to exercise implementation and healing. Determining the type and/or timing of exercise implementation can enable the optimization of postoperative healing, pain relief, and long-term functional outcomes. Comparative studies on the timing of initiating passive and active ROM and strengthening are also recommended. The impact of implant designs (eg, stemmed, stemless) and subscapularis fixation methods (eg, tenotomy, less tuberosity osteotomy, and peel-to-bone tunnels) and the impact of healing of the subscapularis should be considered in relationship to ROM guidelines after TSA.

Value Judgments

While outcomes at 1 year were similar for the shoulder, this recommendation does not speak to interventions for other joints of the upper extremity to maintain function.

Intentional Vagueness

Timing was left vague; intensity of ROM exercise was not defined.

Exclusions

No exclusions were identified.

Quality Improvement

Organizations may use information provided by the patient, care team documentation, and referral to help make decisions related to the timing of physical therapist services. Patient-rated outcomes of care should be assessed to determine effectiveness and areas for improvement.

Implementation and Audit

Organizations may audit occurrence of history, care team documentation, and referral for timing the physical therapist intervention(s).

Best Practice Statements

Best practice statement recommendations were crafted by the GDG based on discussion of theory, experience treating patients, patient values and preferences, and other evidence sources as noted in the rationale for each statement.

Preoperative Physical Therapy for Patients Scheduled for TSA ♦◊◊◊

In the absence of high or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services delivered preoperatively may benefit postoperative outcomes in patients with GHOA who are undergoing TSA. *Evidence Quality: insufficient; Recommendation Strength: best practice.*

Action Statement Profile

Aggregate Evidence Quality: 0 included studies.

Rationale

There are no studies investigating the effects of preoperative physical therapist services on patient-reported outcomes for those undergoing TSA for GHOA. The AAOS guidelines[62] and the United Kingdom's NICE Guidelines[63] for management of GHOA indicate that preoperative physical therapist services may decrease pain, restore function, and, in some cases, may eliminate the need for surgery.

Systematic reviews report benefits of preoperative physical therapist services for lower extremity joint replacements. A systematic review[64] found preoperative patient education before total knee arthroplasty improved patient knowledge and expectations, knee motion, and postoperative exercise performance. A more recent systematic review and meta-analysis[65] reported that preoperative education and physical therapist services improved function and decreased length of stay for both total hip and knee arthroplasty. They also found decreased pain for those who had a total hip arthroplasty and improved quadriceps strength in those undergoing total knee arthroplasty.[65] A recent randomized trial not included in the prior systematic reviews[66] found that those undergoing total knee arthroplasty who received preoperative physical therapy took less pain medication and had improved physical activity both preoperatively and postoperatively compared with a control group that maintained activity as tolerated.

Based on these studies for other joint replacements, preoperative physical therapist services may be beneficial for those undergoing a TSA for GHOA. The preoperative treatment should include exercise, pain management, and education for expectations of function and lifestyle after surgery. This may improve physical activity and decrease pain and may reduce overall health care costs. Patients with GHOA should be offered preoperative physical therapy at least 6 weeks prior to surgery.

Potential Benefits, Risks, Harms, and Costs of Implementing this Recommendation

Benefits are as follows:

- Improved physical activity
- Decreased pain
- Improved postoperative patient-reported outcomes
- Improved expectations of outcomes following surgery
- Reduced length of stay

Risks, harms, and/or costs are as follows:

- A finite number of physical therapy visits may be available based on patient health care resources, and thus preoperative visits may reduce the available visits for postoperative care.
- There are no known harms related to physical therapist services with interventions that are appropriately designed to match the patient's irritability level.[67] Increased pain may result if intervention intensity and selection are not matched to the patient's level of irritability.

Future Research

Future research should focus on comparing the effects of preoperative physical therapist services with no preoperative

management on postoperative outcomes of pain, function, and length of stay in patients undergoing TSA for GHOA. Additionally, research should determine the optimal dose and components of preoperative management that may lead to the best postoperative outcomes.

Value Judgments

With no studies directly assessing the effects of preoperative physical therapy, the APTA CPG for total knee arthroplasty[68] indicates the benefit of preoperative physical therapy and education, which could be applied to TSA as well.

Intentional Vagueness

No specifics for preoperative TSA were found.

Exclusions

No exclusions were identified.

Quality Improvement

Organizations may use information provided by the patient, care team documentation, imaging, and physical examination to help develop preoperative goals for physical therapist services. Patient-rated outcomes of care should be assessed to determine effectiveness and areas for improvement.

Implementation and Audit

Organizations may audit occurrence of history, care team documentation, and prior imaging to help develop goals related to preoperative physical therapist intervention(s).

Nonoperative Physical Therapy Comparison to Other Management Strategies ♦◊◊◊

In the absence of high or moderate quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services may benefit patients with GHOA who have not undergone TSA. *Evidence Quality: insufficient; Recommendation Strength: best practice.*

Action Statement Profile

Aggregate Evidence Quality: 0 included studies.

Rationale

No high- or moderate-quality studies exist examining physical therapist services of multimodal treatment compared with placebo, wait and see/no treatment, or surgical management for patients with GHOA who are not seeking TSA. Surgical interventions for patients diagnosed with GHOA should be reserved for patients who fail nonoperative management to address pain, limitation in motion, and loss of function.[49,63] Nonoperative management for GHOA can include nonsteroidal anti-inflammatory drugs (NSAIDs), acupuncture, local injections, and rehabilitation management to include physical therapy. In a prospective cohort (n = 129) of older adults (65 years or older) with GHOA,[29] patients were treated nonoperatively with a combination of NSAIDs, corticosteroid and sodium hyaluronate injections, education, and physical therapist management including ROM and muscular strengthening exercises. Although this represents low-level evidence, the study participants demonstrated improvements in perceived function, pain, mental health, and health-related quality of life at 3 years' follow-up.[29]

Potential Benefits, Risks, Harms, and Costs of Implementing this Recommendation

Benefits are as follows:

Some patients with primary GHOA receiving physical therapist management have:

- Improved ROM
- Improved pain management
- Improved function

There is potential benefit of physical therapist intervention for some patients who are unable to undergo TSA or for patients who respond favorably to a trial of conservative treatment that includes physical therapy.

Risks, harms, and/or costs are as follows:

- There are no known harms related to physical therapist services with interventions that are appropriately designed to match the patient's irritability level.[67] Increased pain may result if intervention intensity and selection are not matched to the patient's level of irritability.
- There are expenses associated with the provision of physical therapist services.

Future Research

There is a need for high-quality research studies that examine the outcomes of physical therapist services for the management of patients with symptoms and functional deficits related to GHOA. Comparisons should be made to placebo treatment, to wait-and-see or no-treatment groups, and to surgical interventions. Studies should be designed to determine the optimal frequency and duration of physical therapist interventions. There is a need for prognostic cohort studies to identify characteristics of patients who would most benefit from nonoperative multimodal physical therapist-led interventions for management of pain and functional deficits associated with GHOA, including type and extent of glenoid OA deformity, duration of symptoms, patient expectations, and comorbidities.

Value Judgments

With the improvements noted in function, pain control, and quality of life in an observational study, the GDG agreed that the use of physical therapist services with interventions that are appropriately designed to match the patient's irritability level is advisable.

Intentional Vagueness

Specific exercises are identified based on the examination findings of the individual patient, including the associated impairments and tissue irritability levels.

Exclusions

This question did not address efficacy of preoperative physical therapist services; please refer to the preoperative physical therapy best practice statement.

Quality Improvement

Organizations may use information provided by the patient, care team documentation, imaging, and physical examination to help develop nonoperative goals for physical therapist services. Patient-rated outcomes of care should be assessed to determine effectiveness and areas for improvement.

Implementation and Audit

Organizations may audit occurrence of history, care team documentation, and prior imaging to help develop goals related to nonoperative physical therapist intervention(s).

Nonoperative Physical Therapist Intervention Options ♦◇◇◇

In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that no one specific intervention performed by a physical therapist is superior to another for patients with GHOA. *Evidence Quality: insufficient; Recommendation Strength: best practice.*

Action Statement Profile

Aggregate Evidence Quality: 0 included studies.

Rationale

No literature exists comparing physical therapist interventions for patients with GHOA. In the absence of evidence, intervention selection should be guided by best available evidence, clinical expertise, and patient values. In addition, intervention selection should be guided by the individual patient evaluation and their goals. Patient-reported outcomes should be used to assess function and disability and to aid in determining the effectiveness of treatment.

Nonoperative management for GHOA can include, but is not limited to, NSAIDs, local injections, and physical therapist management. A case series of 129 patients with GHOA investigated the effects of a multimodal management of physical therapy, NSAIDs, injections (cortisone and/or sodium hyaluronate), and education approach.[29] Physical therapist services consisted of ROM and strength-training exercises delivered by a physical therapist. Outcomes of pain, function, and overall quality of life improved at 6 and 12 months and remained at 3-year long-term follow-up. This study suggests that 12 months of conservative care before determining if shoulder arthroplasty is appropriate for a patient with GHOA. Expert opinion indicates that physical therapy for patients with GHOA is often effective in decreasing pain, restoring function, and obviating the need for surgical intervention.[63]

Potential Benefits, Risks, Harms, and Costs of Implementing this Recommendation

Benefits are as follows:

- Improved symptoms/pain, muscle performance, ROM, and functional patient-reported outcomes

Risk, harms, and/or costs are as follows:

- There are potential harms of ongoing use of NSAIDs and repeated injections.

Future Research

Future studies should determine the dose, parameters, effectiveness, and outcomes of physical therapist interventions for patients with GHOA. Studies should characterize parameters and dose of interventions delivered to determine the optimal physical therapist services to include interventions, length of treatment, and delivery of care. In addition, comorbidities, psychosocial status, and functional demands should be assessed to determine the impact on outcomes.

Value Judgments

Reducing pain through nonpharmaceutical means may be more beneficial to the quality of life of individuals with GHOA and may reduce the need for costly surgery and or pharmaceuticals.

Intentional Vagueness

Physical therapist interventions should be based on individual patient needs and impairments.

Exclusions

Patients already scheduled for a TSA were excluded.

Quality Improvement

Organizations may use information provided by the patient, care team documentation, imaging, and physical examination to help develop a nonoperative plan of care for physical therapist services. Patient-rated outcomes of care should be assessed to determine effectiveness and areas for improvement.

Implementation and Audit

Organizations may track types of plans of care that achieve the most effective and efficient outcomes for the patients with GHOA.

Postoperative Physical Therapy Outcomes ♦◇◇◇

In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services delivered postoperatively may benefit patient-rated functional outcomes in the management of patients who have undergone TSA for GHOA. *Evidence Quality: insufficient; Recommendation Strength: best practice.*

Action Statement Profile

Aggregate Evidence Quality: 1 low-quality study.[59]

Rationale

One low-quality study examined outcomes of physical therapist services after TSA. Physical therapy services were compared with a physician-guided home exercise program, with no differences found in functional outcomes or patient satisfaction between groups.[59] This study was a low-quality retrospective study examining 2 cohorts treated during different time periods; it did not control for exercise volume or measure compliance to treatment. A recent systematic review of outcomes of TSA[5] provided no additional evidence. AAOS recommends that formal physical therapist management be considered for patients following TSA.[62]

Potential Benefits, Risks, Harms, and Costs of Implementing this Recommendation

Benefits are as follows:

- Earlier improvements and optimized outcomes of pain, ROM, and function.
- Earlier detection of postsurgical complications including infection.

Risks, harms, and/or costs are as follows:

- There was no difference in outcomes compared with self-directed or physician-directed management.
- There are expenses associated with the provision of physical therapist services.

Future Research

High-quality studies are needed to characterize the outcomes of postoperative physical therapist management following TSA for GHOA. Comparisons should be made for self-directed or physician-directed home exercise programs, controlling for the volume of exercise. Given the variety of protocols that guide postoperative management of TSA, studies should determine optimal timing to initiate ROM to preserve the integrity of healing structures such as the subscapularis, frequency and duration of physical therapist treatments, and which interventions best improve shoulder motion and function after TSA. Prognostic cohort studies are needed to identify characteristics of patients who would benefit from formal physical therapist intervention over a home exercise program following TSA for GHOA. Given the advances in telehealth technology, studies that examine differences in delivery methods of physical therapist services are also needed.

Value Judgments

Physical therapist supervision of patients may be appropriate after TSA for GHOA; however, additional research may help identify which individuals may succeed with a less-structured rehabilitation program.

Intentional Vagueness

Given the lack of published research, the GDG cannot recommend the amount or extent of physical therapist supervision for optimal outcomes following TSA for GHOA. Patient preferences, comorbidities, and specific functional needs likely impact individual patient needs for supervision.

Exclusions

This question did not address efficacy of physical therapist services for the nonoperative or conservative management of GHOA; please refer to the nonoperative and conservative physical therapist management best practice statements.

Quality Improvement

Organizations may use documentation of relevant outcomes to include ROM, functional status, and patient-reported outcomes of pain and disability with physical therapist supervised care and nonsupervised care provided in the postoperative management of patients with TSA for GHOA.

Implementation and Audit

Organizations may audit outcomes of care with physical therapist–supervised care versus nonsupervised care provided in the postoperative management of patients with TSA for GHOA.

Postoperative Physical Therapist Management of Edema ♦◊◊◊

In the absence of high or moderate quality evidence, the opinion of the GDG is that physical therapist interventions for edema in patients who have undergone TSA for GHOA should be based on best available evidence, clinical expertise, and patient values. *Evidence Quality: insufficient; Recommendation Strength: best practice.*

Action Statement Profile

Aggregate Evidence Quality: 0 included studies.

Rationale

Edema after injury or surgery is important to manage to optimize patient outcomes. Commonly used interventions such as ice, compression, and elevation may be effective to manage swelling. Prolonged edema can interfere with the healing process. A systematic review concluded various lymphatic therapies can be effective in those with prolonged or extensive edema, pain, and/olimitations.[69] The addition of manual lymphatic drainage may assist lymphatic system function by promoting variations in interstitial pressures and should be considered in reduction of prolonged edema.[70,71]

Potential Benefits, Risks, Harms, and Costs of Implementing this Recommendation

Benefits are as follows:

- A program for management of swelling and edema may assist in pain management and reduce secondary complications that can result from prolonged edema that delays the healing process.

Risks, harms, and/or costs are as follows:

- Using interventions that manage swelling and edema has shown no risk or harm to patients, and the overall cost to health care may be lowered by reducing the secondary complications that could occur with prolonged healing.

Future Research

Prior evidence[69–71] indicates swelling can negatively impact healing. Studies are needed to determine the effectiveness of treatment for edema management in patients after TSA. In addition, a focus on which interventions are most effective for patient outcomes is needed. Questions could consider if the conventional use of ice, compression, and elevation impact edema and patient outcomes, or if the use of manual lymphatic drainage techniques would be beneficial.

Value Judgments

With no studies available, and given the known impact of swelling on healing,[69–71] management of the swelling should be considered as part of the postoperative plan of care for patients who have undergone a TSA.

Intentional Vagueness

Type of edema control is not identified.

Exclusions

No exclusions were noted.

Quality Improvement

Organizations may use information provided by the patient, care team documentation, imaging, and physical examination to help determine the impact of edema management on patient-reported outcomes.

Implementation and Audit

Organizations may use the data of patient outcomes to determine future interventions for patients with GHOA after TSA.

Revision Plans

This CPG represents a cross-sectional view of current management strategies and may become outdated as new evidence becomes available. This CPG will be revised in accordance with new evidence, changing practice, rapidly emerging treatment options, and new technology; reaffirmed; or withdrawn in 5 years.

Dissemination Plans and Implementation Tools

The primary purpose of this CPG is to provide interested readers with full documentation of the best available evidence for various intervention strategies associated with the physical therapist management of GHOA and TSA. Publication of this CPG will be announced by press release and published in *PTJ: Physical Therapy & Rehabilitation Journal*, the journal of APTA. This CPG is available in Spanish; see Supplementary Appendix 8.

Education and implementation tools for this CPG will be disseminated via online resources, such as webinars, podcasts, pocket guides (https://www.guidelinecentral.com/aptamembers/), and continuing education courses, at professional annual meetings, and via social media. A CPG+, which includes an appraisal rating using the AGREE II tool, highlights, a check-your-practice section, and review comments, is available on apta.org for this CPG at: https://www.apta.org/patient-care/evidence-based-practice-resources/cpgs/physical-therapist-management-of-glenohumeral-joint-osteoarthritis. Additional implementation tools will be forthcoming.

Disclaimer

This clinical practice guideline was developed by an APTA volunteer guideline development group consisting of physical therapists, an occupational therapist, and a physician. It was based on systematic reviews of current scientific literature, clinical information, and accepted approaches to the physical therapist management of glenohumeral joint osteoarthritis. This clinical practice guideline is not intended to be a fixed protocol, as some patients may require more or less treatment. Clinical patients may not necessarily be the same as participants in a clinical trial. Patient care and treatment should always be based on a clinician's independent medical judgment, given the individual patient's clinical circumstances.

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Data Availability Statement

Supplementary files contain data used for this clinical practice guideline. Additional data elements are available upon request. Peer review comments are available, upon reasonable request, from practice@apta.org.

Disclosures

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