AAOS Clinical Practice Guideline: Management of Glenohumeral Joint Osteoarthritis

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The American Academy of Orthopaedic Surgeons Management of Glenohumeral Joint Osteoarthritis Evidence-Based Clinical Practice Guideline helps guide surgeons and other healthcare providers in the nonsurgical and surgical management of this painful, functionally debilitating shoulder condition. The guidelines summary provides the best available evidence and identifies areas with strong literature support and areas in need of future investigation. The full document is available electronically at http://www.aaos.org/gjocpg and was published on March 23, 2020. The case presented demonstrates how these guidelines can be effective in clinical decision-making for the treatment of symptomatic glenohumeral joint osteoarthritis.

History and Physical Examination

A 67-year-old right-hand–dominant man presented to the outpatient orthopaedic specialty clinic with greater than 7-year history of left greater than right bilateral shoulder pain. His shoulder pain has increased in severity and intensity over the past 6 months. He did not experience any traumatic events involving either shoulder. His pain is deep in the shoulders which he described as constant and like a "tooth ache." His shoulder pain and loss of motion have progressively restricted his activities of daily living such as being unable to tuck in his shirt and wash his back. He has difficulty even just putting on a shirt or a coat and difficulty with overhead activities such as removing something from a shelf. The pain keeps him awake at night causing significant sleep disruption. He has undergone several years of conservative management including three intra-articular glenohumeral joint corticosteroid injections. He has taken multiple rounds of nonsteroidal anti-inflammatory medications. He attempted formal physical therapy, which he found difficult due to increased pain but did find some relief in his symptoms from scapular strengthening exercises.

The patient has no history of diabetes mellitus and no history of depression, and he does not smoke nor use any nicotine products. His body mass index is 26.6. His visual analog scale (VAS) pain score is 6/10, Single Assessment Numeric Evaluation (SANE) score is 60%, and American Shoulder and Elbow Surgeons (ASES) score is 48.

Physical examination of the left shoulder found that active forward elevation was 110° and passive forward elevation was 120°. External rotation with arm at side was 20°, and internal rotation was to the L4-5 level. With arm abducted 90°, external rotation was 70° and internal rotation was 30°. Manual muscle strength testing was 5-/5 for supraspinatus in the plane of the scapula, external rotation, and internal rotation. Belly press and bear hug maneuvers were negative, but painful. There was no obvious periscapular muscle atrophy. C5 through T1 motor and sensory were intact. True AP

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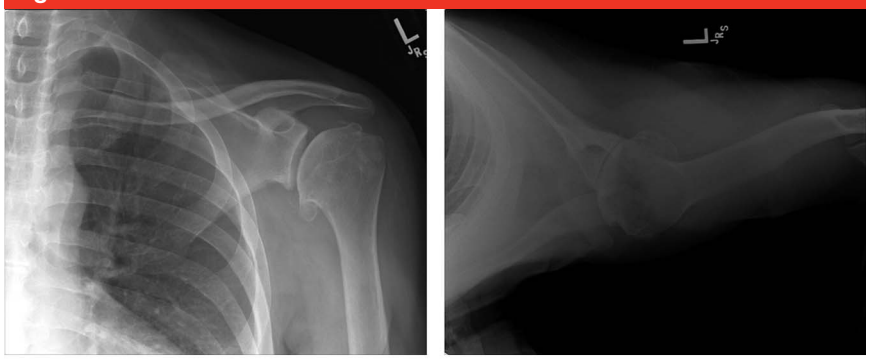
J Am Acad Orthop Surg 2020;28:790-794

DOI: 10.5435/JAAOS-D-20-00405

and axillary radiographs demonstrated significant glenohumeral joint osteoarthritis with characteristic inferior humeral head osteophyte and joint space narrowing (Figure 1, A and B). In addition, the glenoid wear pattern was classified as a Walch A1.[1,2]

Given the patient had minimal medical comorbidities, did not smoke, and had no signs of depression based on both strong and moderate American Academy of Orthopaedic Surgeons (AAOS) guidelines, he was at very low risk for postoperative complication and had a high likelihood of predictably having a successful postoperative outcome if he were to undergo anatomic total shoulder arthroplasty ("Strong evidence suggests that patients with glenohumeral joint osteoarthritis who have more comorbidities experience higher rates of early post-arthroplasty complications."; "Strong evidence supports that gender/sex is not associated with better or worse post-operative outcomes."; "Strong evidence suggests that obese patients with glenohumeral osteoarthritis do not experience an increase in the rate of early post-operative complications."; "Moderate evidence suggests that smoking is associated with inferior post-operative outcomes."; "Moderate evidence supports that older age at the time of surgery is associated with lower revision rates."; and "Moderate evidence suggests that depression is associated with inferior post-operative outcomes in patients with glenohumeral joint osteoarthritis undergoing arthroplasty.") After discussion with his orthopaedic surgeon, the patient felt he had exhausted the nonsurgical treatment options and an informed decision was made to proceed with surgical intervention. A preoperative CT scan was obtained before surgery for both a more detailed assessment of the glenoid and preoperative planning. CT scan of the shoulder confirmed this patient's glenoid morphology to be classified as type A1 glenoid. The surgeon discussed the surgical options with the patient, and based on the patient's glenoid morphology and functionally intact rotator cuff, the decision was made to proceed with an anatomic total shoulder arthroplasty. Based on the AAOS guidelines, the recommendation for anatomic total shoulder arthroplasty in this case is strongly supported as "anatomic total shoulder arthroplasty … provides more favorable function and pain relief at short- and mid-term follow-up as compared to hemiarthroplasty."

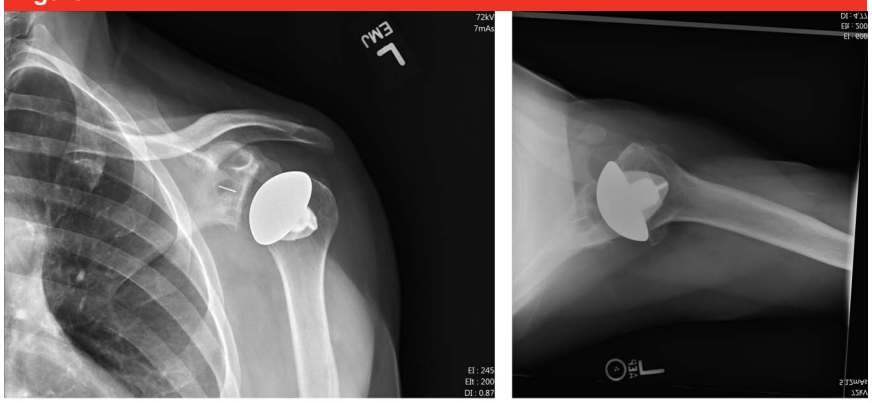
Figure 1



A B

A, True AP shoulder radiograph. **B**, Axillary shoulder radiograph.

Figure 2



A B

A, Three-year follow-up true AP shoulder radiograph. **B**, Three-year follow-up axillary radiograph.

Management

The patient underwent an anatomic total shoulder arthroplasty using a pegged all polyethylene glenoid component and a stemless humeral component. (Strong evidence indicates that all polyethylene pegged or keeled glenoid components can be used during anatomic total shoulder arthroplasty.) In addition, meta-analysis has demonstrated less postoperative radiolucent lines with pegged glenoid components and decreased revision rate postoperatively but no significant difference in patient-reported outcomes.[3,4] The pegged all polyethylene glenoid component fixation was

Table 1

American Academy of Orthopaedic Surgeons Clinical Practice Guidelines on the Management of Glenohumeral Joint Osteoarthritis: Clinical Decisions Made Based on Supporting Evidence From CPG in Order of Appearance

Recommendations	Overall Strength of Evidence	Strength Visual
Strong evidence suggests that patients with glenohumeral joint osteoarthritis who have more comorbidities experience higher rates of early postarthroplasty complications.	Strong	★★★★
Strong evidence supports that gender/sex is not associated with better or worse post-operative outcomes.	Strong	★★★★
Strong evidence suggests that obese patients with glenohumeral osteoarthritis do not experience an increase in the rate of early postoperative complications.	Strong	★★★★
Moderate evidence suggests that smoking is associated with inferior postoperative outcomes.	Moderate	★★★☆
Moderate evidence supports that older age at the time of surgery is associated with lower revision rates.	Moderate	★★★☆
Moderate evidence suggests that depression is associated with inferior post-operative outcomes in patients with glenohumeral joint osteoarthritis undergoing arthroplasty.	Moderate	★★★☆
Strong evidence suggests anatomic total shoulder arthroplasty . . . provides more favorable function and pain relief at short- and mid-term follow-up as compared to hemiarthroplasty.	Strong	★★★★
Strong evidence indicates that all polyethylene pegged or keeled glenoid components can be used during anatomic total shoulder arthroplasty.	Strong	★★★★
Limited evidence supports that clinicians may utilize stemmed, stemless or resurfacing prosthesis for patients with glenohumeral joint osteoarthritis undergoing total or hemi-arthroplasty.	Limited	★★☆☆
Moderate evidence supports surgeons can utilize subscapularis peel, lesser tuberosity osteotomy, or tenotomy when performing shoulder arthroplasty.	Moderate	★★★☆
In the absence of reliable evidence, it is the opinion of the work group that clinicians may consider concomitant biceps tenodesis or tenotomy during shoulder arthroplasty.	Consensus	★☆☆☆
In the absence of reliable evidence, it is the opinion of the work group that utilization of tranexamic acid during shoulder arthroplasty may result in reduced blood loss and reduced risk of blood transfusion.	Consensus	★☆☆☆
In the absence of reliable evidence, it is the opinion of the work group that either continuous cryotherapy or cold packs can be used following shoulder arthroplasty.	Consensus	★☆☆☆

achieved with placement of bone graft from the resected humeral head in the flutes of the central peg and the three peripheral pegs cemented. The AAOS guidelines provide a limited recommendation related to humeral implant choice stating: "Limited evidence supports that clinicians may utilize stemmed, stemless or resurfacing prosthesis for patients with glenohumeral joint osteoarthritis undergoing total or hemiarthroplasty." Therefore, a stemless prosthesis was used for this patient as he had excellent bone quality.[5-8] Based on the AAOS guidelines, a stemmed or resurfacing implant could also have been used in this case, and decision for use of a stemless humerus prosthesis was based on surgeon preference. The subscapularis was addressed with a tenotomy at the level of the anatomic neck of the humerus and direct tendon to tendon repair. (Moderate evidence supports that surgeons can use subscapularis peel, lesser tuberosity osteotomy, or tenotomy when performing shoulder arthroplasty.) Multiple studies[9-11] have demonstrated no significant difference in healing rates or functional outcomes between any of these methods of handling the subscapularis. Biceps tenodesis was performed during exposure of the glenohumeral joint to avoid postoperative cosmetic deformity and cramping. (Consensus recommendations per workgroup guidelines state, "In the absence of reliable evidence, it is the opinion of the work group that clinicians may consider concomitant biceps tenodesis or tenotomy during shoulder arthroplasty.")

Multimodal anesthesia modalities were including long acting regional intrascalene nerve block in addition to general anesthetic. Tranexamic acid was placed topically before subscapularis repair to decrease postoperative bleeding and risk of hematoma formation.[12,13] (CPG guidelines in a consensus recommendation state, "In the absence of reliable evidence, it is the opinion of the work group that utilization of tranexamic acid during shoulder arthroplasty may result in reduced blood loss and reduced risk of blood transfusion.")

The patient was discharged home in less than 23 hours after surgery. Cryotherapy use was encouraged to aid in pain control during the early postoperative period. (CPG guidelines in a consensus recommendation state, "In the absence of reliable evidence, it is the opinion of the work group that either continuous cryotherapy or cold packs can be used following shoulder arthroplasty.")

Physical therapy was initiated immediately with home program instructions of passive supine forward elevation and scapular squeezes with avoidance of external rotation past 20° and extension past neutral. Formal physical therapy was initiated 1 week after surgery. The patient progressed to full shoulder range of motion and strengthen at 3 months and allowed to perform full weight-bearing activities 6 months after surgery. Subsequently, the patient underwent anatomic total shoulder arthroplasty on the contralateral shoulder at approximately 6 months postoperatively.

Outcome

A 3-year postoperative follow-up demonstrated ASES 100, VAS 0, and SANE 100. Physical examination demonstrated active forward elevation of 160°, external rotation with the arm at the side 40°, and internal rotation to L2-L3. Manual muscle strength testing of the supraspinatus in the plane of the scapula, external rotation, and internal rotation were graded as 5/5. Belly press and bear hug tests were negative. True AP and axillary radiographs demonstrated excellent fixation of the polyethylene glenoid component with no radiolucent lines, excellent alignment of the glenohumeral joint with centering of the humeral head on axillary radiograph, and no proximal humeral head migration (Figure 2, A and B). Table 1 is a summary of all the CPG recommendations used to support the clinical decision-making for this patient.

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