What can we expect from nonoperative treatment options for shoulder pain?

Thomas Trojian, MD
University of Connecticut Health Center/Saint Francis Hospital Department of Family Medicine, Hartford

J. Herbert Stevenson, MD
University of Massachusetts Medical School/Fitchburg Family Medicine Residency, North Worcerster

Nidhi Agrawal, MD
Family Medicine, Henry J. Austin Health Center, Trenton, NJ

Practice recommendations

- First-line treatment for shoulder pain and stage 1 impingement may include nonsteroidal anti-inflammatory drugs (NSAIDs) (**B**) or corticosteroid injection (**A**).
- Stage II or III Impingement (rotator cuff tears) are best treated initially with physical therapy (supervised or home exercise program) or corticosteroid injection.
- Steroid injections added to NSAID treatment probably confer no extra benefit.
- High pain levels during the day and associated neck pain may predict a longer recovery period.

Most shoulder pain responds best to NSAIDs or subacromial corticosteroid injections followed by a home exercise program or formal physical therapy exercises. Accumulating evidence is making it clearer what works and what doesn't for specific diagnoses.

Time to healing varies greatly among persons with shoulder pain, and specific prognostic indicators may help you and your patients know what to expect.

Corresponding author: Thomas H. Trojian, MD, 99 Woodland Street, Hartford, CT 06105. E-mail: ttrojian@stfrancsicare.org.

QUICK DIAGNOSTIC REVIEW

Consider the patient's age, history of trauma, details of injury, and previous shoulder problems. Observe the patient's general movements, assess range of motion, and use provocative testing to form a differential diagnosis (**Figure 1**).

If the diagnosis is unclear, arrange for imaging studies (**Table 1**). A more thorough review for diagnosing shoulder pain may be found in the article "Approach to the patient with shoulder pain" (*J Fam Pract* 2002; 7:605–611). The conditions causing shoulder pain (in order of frequency, as seen by primary care physicians) are subacromial impingement syndrome (SIS), adhesive capsulitis, acute bursitis, calcific tendinitis, glenohumeral arthrosis, biceps tendinitis, and labral tear.[1,2]

Subacromial impingement syndrome

This condition was first described by Neer, who estimated it leads to 95% of rotator cuff tears.[3]

Impingement occurs from repetitive overhead activities, acute trauma, or instability of the glenohumeral joint (subtle or overt). Current theory holds that degeneration of the rotator cuff tendons or inflammation of the subacromial bursa—caused by irritation against the coracoacromial arch—can

FIGURE 1

Evaluating shoulder pain for possible rotator cuff tear

A patient complains of shoulder pain

Rule out sources of referred pain: cervical spine disorder, cardiac disease, diaphragmatic irritation, thoracic outlet syndrome, and gall bladder disease

Is there a history of trauma, night pain, or pain on overhead activity?

No

Likelihood of complete rotator cuff tear <5%

Is the patient <45 years old?

Yes

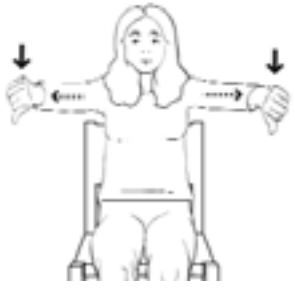
Consider joint instability, AC joint disease, labral tear

No

Consider AC joint disease, glenohumeral arthritis, or tendinitis

Yes

Perform Empty Can test



Have patient sit with arms extended and thumbs pointing down, as shown, then attempt to abduct arms as you apply resistance; a positive result is when the patient cannot abduct the arm against resistance

Negative

Likelihood of complete tear <5%

Consider partial tear or tendinopathy with or without bursitis

Positive

Likelihood of complete tear 50%

Perform **Drop Arm** test

Have patient abduct arm, as shown, then lower it slowly; a positive result is when the patient cannot keep the arm from falling quickly

Negative

Likelihood of complete tear 45%

Arrange for MRI: negative result indicates likelihood <10% for full tear; positive result indicates likelihood of 75%

Positive

Likelihood of complete tear >95%

progress to degeneration and a complete rotator cuff tear. So-called rotator cuff tendinitis is better described as a tendinopathy with mucoid degeneration of the tendon. SIS stage I involves edema and hemorrhage, as would be seen with rotator cuff tendinopathy or bursitis.

Progressive feedback loop of subacromial impingement syndrome. Acute bursitis involves the subacromial bursa and typically is secondary to subacromial impingement. As underlying tendinopathy, instability, or heterotrophic bone irritates the bursa, it will become inflamed and irritated. Inflammation exacerbates the impingement and that in turn causes worsening of the bursitis.

Stage II and III impingement syndrome. SIS stage II is a progression to fibrosis and partial tear of the rotator cuff. Stage III is a full-thickness tear of the rotator cuff. These stages of SIS are seen predominantly in patients over the age of 40 years, and they become more common with increasing age. The tear—partial or complete—usually occurs in the supraspinatus tendon. Tears of other rotator cuff muscles are less common.

Magnetic resonance imaging (MRI), with or without arthrography, is used in clinical practice and in research to diagnose rotator cuff tears. Growing evidence indicates that ultrasound is a less expensive and equally effective way to diagnose stage II or III impingement. In the United States, however, the option of ultrasound is limited by scarce availability and inadequate operator skill.

The subacromial injection test is useful in clinical practice. Local anesthetic is injected into the subacromial space. Persisting loss of strength despite pain relief is a positive sign of impairment of the rotator cuff.

MRI or ultrasound must be done in conjunction with history taking and physical examination. As the age of a person increases, the amount of asymptomatic rotator cuff tendon injury will also increase. The incidence of rotator cuff tears has been found to be between 50% to 60% in cadavers of deceased elderly. Thirty percent were found to be stage III impingement; 20% to 30% were partial stage II impingement.[4]

Adhesive capsulitis

Also known as frozen shoulder, adhesive capsulitis may begin with any inflammatory condition, but it is most commonly idiopathic. It characteristically progresses through 3 stages.

The hallmark of adhesive capsulitis is a progressive lack of range of motion with both passive and active movement.

The first stage involves progressive pain and decreased range of motion as the capsule scars.

The second stage involves maturation of capsule scaring, resulting in decreased pain and increased restriction of movement.

The third stage is resolution of the condition, leading to a gradual increase in range of motion.

Full range of motion may or may not return, and the time to resolution is typically 1 to 2 years. Adhesive capsulitis is most common in older persons, especially women in the fourth and fifth decades.[5]

COMPARING NONOPERATIVE TREATMENTS

Nonoperative treatment modalities include protection, relative rest, and ice (PRI); anti-inflammatory medications; physical therapy (supervised or home exercise program); acupuncture; and steroid injection.

Operative treatments, depending on the particular disorder, include rotator cuff repair, subacromial decompression, capsular tightening, or manipulation under anesthesia.

The efficacy of nonoperative treatments for shoulder pain is not well known. Studies of treatment modalities have been numerous but generally of poor quality due to a lack of uniformity in how shoulder disorders are defined and in the variability of outcome measures used. Several recent systematic reviews have tried to identify which interventions are efficacious (**Table 2**).[6–11]

Overall, NSAIDs and subacromial steroid injections are effective in the short-term treatment of shoulder pain.[26–28] However, only nonselective NSAIDs have been studied. Evidence is insufficient to recommend use of cyclooxygenase-2 (COX-2) medications for shoulder pain.

TABLE 1

Value of imaging tests for shoulder injuries

Test	LOE	Sn	Sp	LR+	LR–	PV+	PV–
MRI							
Rotator cuff tears							
Partial[41]	2b	82	85	5.5	0.21	82	85
Complete[41]	1a	81	78	3.7	0.24	—	—
Overall[42–44]	2b	89–96	49–100	1.9– >25	0.08	58	94
Impingement[42]	2b	93	87	7.2	0.08	93	87
Labral tears*[45,46]	1b	75–89	97–100	>25	0.11–0.25	100	41
Plain arthrogram							
Rotator cuff tears							
Partial[47]	1b	70	—	—	—	—	—
Complete[41]	1b	50	96	13	0.52	—	—
CT arthrogram							
Rotator cuff tears							
Partial[47]	1b	70	—	—	—	—	—
Complete[47]	1b	95	—	—	—	—	—
Overall[47]	1b	86	98	>25	0.14	96	93
Ultrasound							
Rotator cuff tears							
Partial[47]	1b	80	—	—	—	—	—
Complete[47,48]	1b	90–100	85	6.7	>25	—	—
Overall[47]	1b	86	91–98	9.6– >25	0.14–0.15	96	73–93

*MRI arthrography.
LOE, level of evidence (SORT); Sn, sensitivity; Sp, specificity; LR, likelihood ratio; PV, predictive value; MRI, magnetic resonance imaging; CT, computed tomography.

Steroid injections may not confer extra benefit when added to NSAIDs, but they appear superior to NSAIDs in improving shoulder abduction. This is particularly true for the painful stiff shoulder, as seen with impingement or rotator cuff disease.[26–28]

Two recent randomized control trials showed corticosteroid injections to be superior to physical therapy for treatment of shoulder complaints.[12,13]

Shoulder instability may be treated nonoperatively at first with PRI, NSAIDs, and strengthening and proprioceptive exercises for the rotator cuff. If 3 to 6 months of nonoperative treatment fails, the patient should be referred for surgical evaluation, especially in cases of full-thickness rotator cuff tears.[14]

TREATMENT OF SPECIFIC SHOULDER DISORDERS

Subacromial impingement syndrome stage I

A recommendation (SOR: **B**) can be made for the use of NSAIDs in the treatment of stage I impingement (**Table 3**). This is based on level 2 evidence that NSAIDs are beneficial for rotator cuff tendinopathy and bicipital tendinitis, compared with placebo in a 1 to 2 week follow-up.[15–17] No specific NSAID has proved better than another.[18,19]

Steroid injection (**Figure 2**) is beneficial for the acute treatment of SIS I reflected by improvement in pain (SOR: **A**).[20–23] This is particularly evident during the first 1 to 2 weeks following injections.[38]

TABLE 2

Nonoperative treatment options for shoulder pain

Treatment	Comment	SOR
NSAIDs	• Appear superior to placebo in short-term treatment of shoulder pain • Improve abduction in rotator cuff tendinitis • Inconclusive effect on pain reduction • No apparent difference between types of NSAIDs • Steroid injection to supplement NSAIDs appears to confer no benefit	C
Physical therapy	• Evidence is insufficient or absent to advocate use of low-level laser therapy, heat treatments, cold therapy, electrotherapy, and mobilization	B
Ultrasound	• Ineffective compared with placebo	A
Steroid injection	• Improves abduction in rotator cuff tendinitis • Superior to NSAIDs in improving abduction • Inconclusive data on efficacy in pain reduction	B
Acupuncture	• Majority of high-quality studies show no benefit for chronic neck pain • Weak evidence for short-term efficacy in patients with subacromial pain	C

SOR, strength of recommendation (SORT); NSAIDs, nonsteroidal anti-inflammatory drugs.

At 4 to 6 weeks, there appears to be no difference in the efficacy of steroid injection compared with NSAIDs,[24,25] but they are both better than placebo.[43]

Physical therapy, specifically rotator cuff strengthening and range of motion, is as beneficial as surgery for SIS I at 6 month and 2½-year follow-up, and both were better than placebo (SOR: **B**).[26,27]

SIS stages II and III

There is very good evidence (SOR: **B**) regarding the efficacy of nonoperative treatment of SIS II and III, based on level 2 cohort studies that suggest nonoperative care leads to improvements in patient satisfaction, pain, and daily activities.[28,29] Similar outcomes are reported for patients undergoing physical therapy alone.[30,31] Weiss reported that corticosteroid injections for stage III/full-thickness rotator cuff tears resulted in an 86% improvement as measured by return to previous activities and less or no pain with motion (**Table 4**).[32]

The most constant outcome measure was report of a reduction in pain. Younger patients or those with higher functional demands will likely consider surgical repair if nonoperative measures fail, particularly for full-thickness tears.

Adhesive capsulitis

There is no consistent evidence that treatment of any one form reduces the pain or improves range of motion in frozen shoulders. Various treatments that have been tried include, though are not limited to, steroid injection, NSAIDs, and physical therapy.[33–37] Studies on treatment efficacy are complicated by inherent discrepancy between patient and observer opinions of limitations in this condition, with objective range of motion findings often not being consistent with patient reported limitations.[38]

INDICATORS OF QUICKER OR SLOWER RECOVERY

Studies of prognosis following treatment have been difficult to assess due the heterogeneity of

TABLE 3

Treatments for SIS I impingement (rotator cuff tendinitis/tendinosis)

Treatment	Comment	LOE
NSAIDs	• Benefit seen with use for 1 to 2 weeks	1c
NSAIDs vs steroid injection	• Both better than placebo • NSAIDs and injections are equally effective over 4 to 6 weeks	1a
Subacromial steroid injection	• Most effective 1 to 2 weeks following injection	1b
Surgery	• No statistically significant difference compared with physical therapy	2a

TABLE 4

Nonoperative treatments for SIS III (full-thickness rotator cuff tears)

Treatment	Comment	SOR
Physical therapy	• Patient satisfaction is best correlated with improved pain • Functional abilities significantly improved • These improvements are seen over years	B
Subacromial injection	• Accurate delivery is key	B
Multiple nonoperative therapies	• Active abduction and strength significantly improve • Relief of discomfort more likely if pain has been present for less than 3 months	B

the underlying conditions and variability of treatments. A follow-up questionnaire in one instance found no difference between treatment groups. Complaints of pain or impaired mobility 2 to 3 years after treatment were similar among patients treated with steroid injection and physical therapy and with physical therapy alone.[30] Overall, 76% of respondents were symptom free at 2 to 3 years.

Two prospective studies confirm that speed of recovery is slow, with complete recovery 23% at 1 month, 21% to 51% at 6 months, 59% at 1 year, and 69% at 18 months.[39,40]

Prognostic indicators of quicker recovery were preceding overuse or slight trauma and early presentation to the physician.[58] Protracted recovery occurred more often with high pain levels during the day or associated neck pain.[58] These results suggest that patients with subacromial impingement stage I respond better to nonoperative treatment than those patients with underlying degenerative changes or referred pain from the neck.

Finally, specialty surgical referral may be necessary in cases of failed nonoperative therapy or persistent diagnostic and therapeutic challenges.

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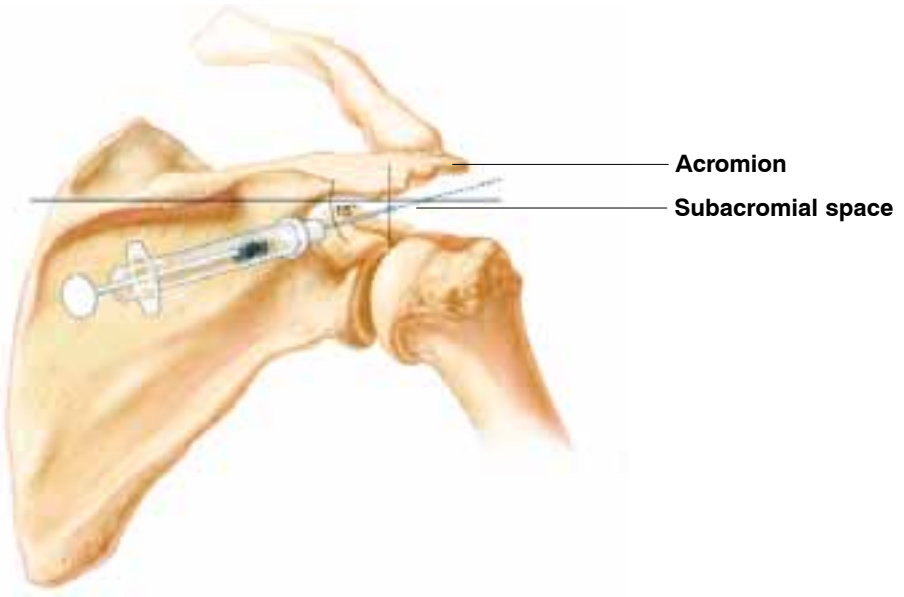
FIGURE 2

Steroid injection in the subacromial space



The subacromial space can be entered from a posterior approach using a 22- or 25-gauge 1 1/2-inch needle. 2 cc of an appropriate injectable steroid along with 6 cc of a local anesthetic (lidocaine or bupivacaine) are combined in the syringe. The lateral and posterior edges of the acromion are palpated. Using aseptic technique, a spot 1 to 2 cm inferior and 1 to 2 cm medial to the posterior-lateral edge of the acromion is marked and the area swabbed with betadine. The needle is inserted at the mark and directed 15° superior-laterally towards the acromioclavicular joint. If resistance is met, withdraw the syringe slightly and redirect. The area should be cleaned with alcohol and a bandage applied. Wait 5 minutes to test patient for pain-free range of motion to ensure proper injection and diagnosis.

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