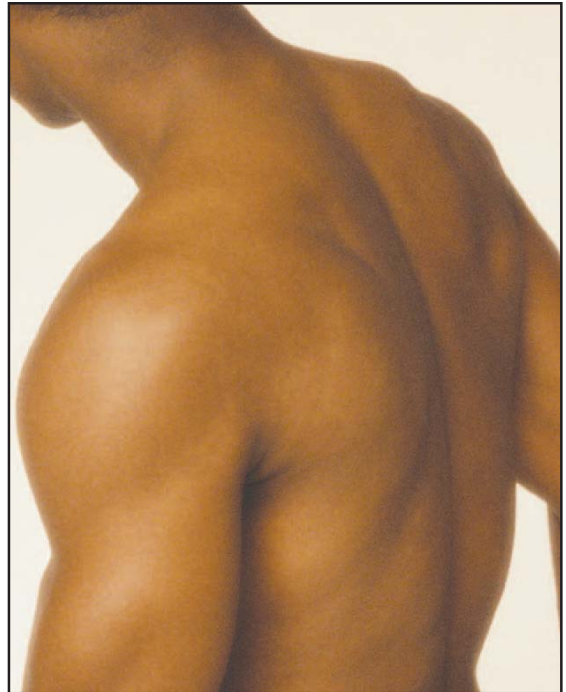




# Shouldering the Pain

## Practical tools for evaluating and treating a painful shoulder



By Pierre Frémont, MD, PhD, Dip Med Sport (CASM);  
and François Desmeules, BSc, PT

Shoulder pain is the most common musculoskeletal complaint after neck and low back pain and can be associated with impairments and marked disabilities.<sup>1</sup> The successful evaluation and treatment of shoulder pain by the primary care physician is a complex issue that relies on the systematic consideration of many disorders (Figure 1).

### Is it shoulder pain or referred pain?

The first step is to determine whether shoulder pain originates from the shoulder region, or from the cervical region. Several aspects of the patient's history can suggest a cervical pathology:

- coexistent neck pain;
- pain that radiates distally below the elbow;
- paresthasias;
- bilateral shoulder pain.

Physical examination should include a neurological and cervical assessment, including active range of motion (ROM). Gently applied surpressions can be added if the ROM is complete and painless.<sup>2</sup> Combined cervical movements (flexion combined

### In this article:

1. What are the most common shoulder disorders?
2. What are the clinical implications of recent progress in research?
3. Useful elements for physical evaluation

with lateral flexions, and extension combined with lateral flexions) may be evaluated if the active ROM and surpressions do not reproduce the patient's pain (Figure 2). The combined extension and lateral flexion movement can be especially helpful since the resulting reduction of the intervertebral foramen caliber can help reproduce the patient's symptoms, and differentiate cervical radiculitis from a shoulder pathology.<sup>3</sup>

Pathology of the acromio-clavicular (A/C) joint should also be considered in the presence of a traumatic history to the shoulder region, such as a hockey check into the boards. A/C joint injury typically

# Painful Shoulder

Figure 1

## Differential diagnosis of frequent painful shoulder problems

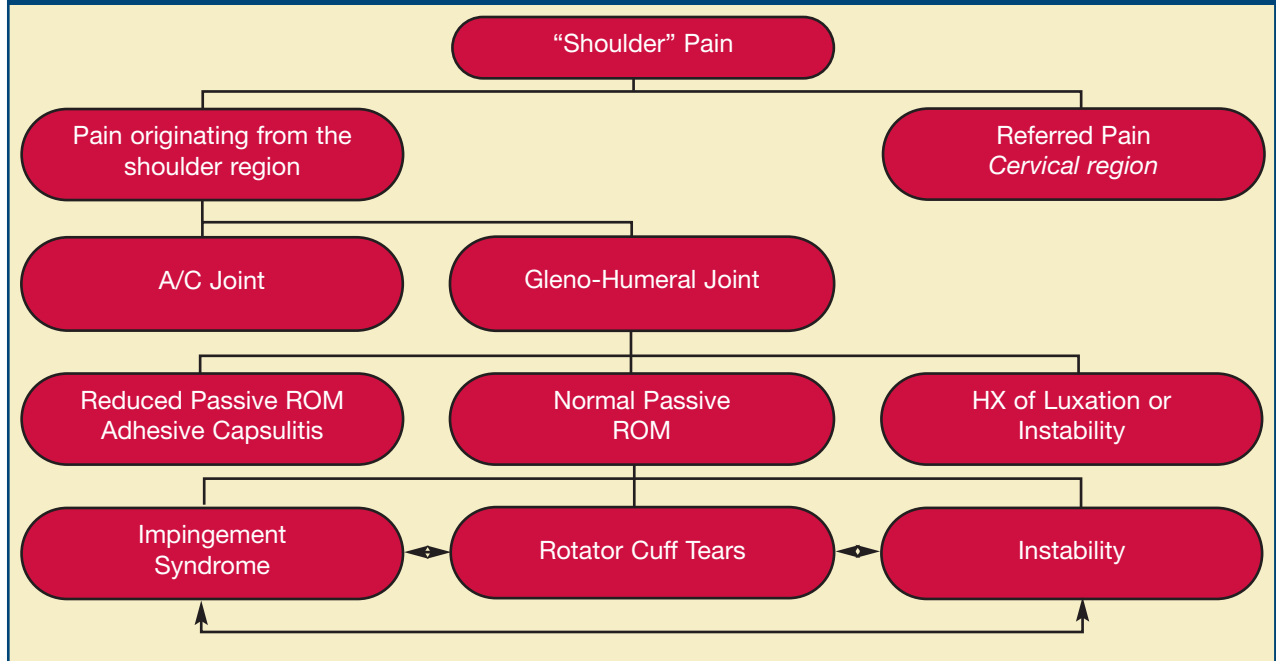


Figure 1. Differential diagnosis of frequent painful shoulder problems.

produces a distinct localized pain at the joint. Signs of subluxation or luxation of the A/C joint are suggestive of coracoclavicular ligament sprain or rupture. Palpation and mobilization of the A/C is typically painful. Horizontal adduction of the arm at 90° abduction results in a painful compression of the A/C joint. Even though an obvious A/C joint injury is present, the evaluator should consider the possibility that the gleno-humeral (GH) joint may have been stressed, and subluxation of the joint may have occurred (Figure 3).

## What is adhesive capsulitis?

Adhesive capsulitis (or frozen shoulder [FS]) is a common shoulder condition characterized by gradual loss of active and passive GH ROM. The etiology of FS is still controversial but factors, such as female gender, soft tissue injury, age over 40, and diabetes, have been associated with FS.<sup>4</sup> Figure 4 shows a four stage natural history of the condition. The first two stages that can last up to nine months can be described as acute or inflammatory. The last two stages are characterized by minimal pain at rest.



Mr. Desmeules is a candidate in the MSc program in rehabilitation, Université Laval, Quebec City, Quebec.



Dr. Frémont is associate professor, department of rehabilitation, faculty of medicine, Université Laval, Quebec City, Quebec.

# Painful Shoulder



Figure 2. Combined extension and right lateral flexion ROM evaluation of the cervical spine. The resulting reduction of the intervertebral foramen caliber can reproduce the patient's symptoms. Although the position may have to be maintained for 10 to 20 seconds before the irradiation is reproduced, care should be taken in executing combined cervical movements. These tests also constitute vertebro-basilar insufficiency tests that could be contraindicated depending on the patient's condition.



Figure 3. Evaluation of passive gleno-humeral joint movements. Stabilization of the scapula in the supine position with one hand helps to evaluate the pure range of motion in abduction (above left) or in external rotation (above right). When capsular limitation is present, the hand applied on the scapula can feel it being pulled by the retracted capsule when the maximal amplitude is reached. Comparison should be made with the contralateral side.

The natural history of FS is a gradual recovery of ROM over a period of up to two years after the onset of the first symptoms.

Clinical evaluation can be difficult especially in the first stages of the disease when pain is predominant and its anticipation may bring unintended resistance to mobilization.

Nevertheless, passive GH ROM limitation is the key element in the diagnosis of FS. Passive ROM is better evaluated with the patient supine since, in that position, stabilization of the scapula is achieved and pure GH motion can be assessed (Figure 3). During the first stage, the gradual appearance of a capsular pattern of limitation involving flexion, abduction, external rotation and internal rotation

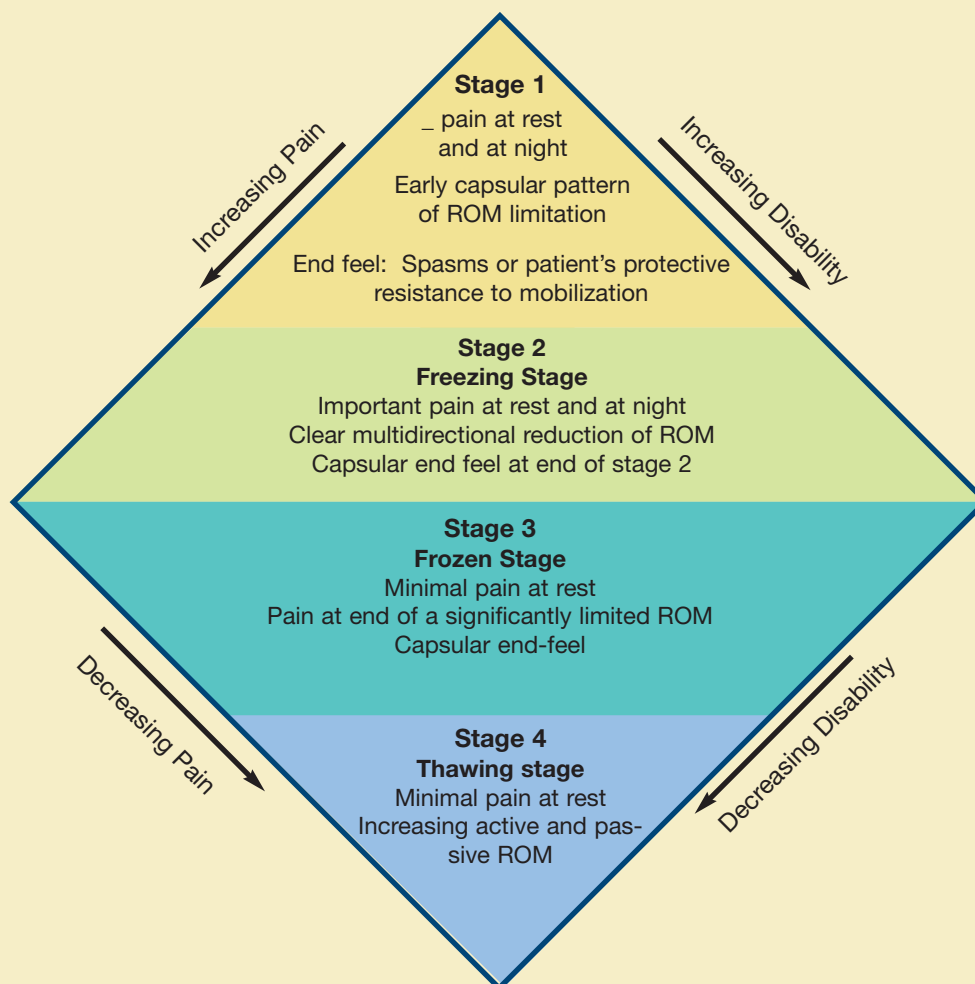
will be observed.<sup>4</sup> Capsular involvement can result in diffuse, non-specific pain upon isometric contraction of the rotator cuff muscles. In general, the clinical evaluation should properly identify the presence of FS; medical imaging modalities should only be used when a secondary cause is suspected, such as



# Painful Shoulder

Figure 4

## Clinical course of adhesive capsulitis\*



\*Based on the 4 stages described by Hanafin & Chiaia (2000).

Figure 3. Clinical course of adhesive capsulitis\*

osteoarthritis or rotator cuff disease.

## What are the treatment options?

Treatment should correspond to the stage of the disease. In the first two stages of the disease, the intervention should be aimed at reducing pain and inflammation. Increasing evidence, including a

recent randomized controlled trial on the effect of an intra-articular injection of corticosteroid administered under fluoroscopy with a simple home exercise program, supports the notion that corticosteroid injections are efficient in reducing pain and disability.<sup>5,6</sup> Although injection under fluoroscopic guidance is optimal when it can be obtained rapidly, an injection should be performed at the office if any significant delay is expected.



# Painful Shoulder

Nonsteroidal anti-inflammatory drugs (NSAIDs) and analgesics may also be used to help control pain and allow for adequate execution of exercises, especially in the first two phases.<sup>4</sup> Many exercise programs have been advocated and typically include auto-assisted flexion, abduction, external rotation, and hand behind back.<sup>4,7</sup> The use of manual therapy in the form of passive glide of the GH joint may provide faster gain in ROM.<sup>6</sup>

Suprascapular nerve block may be promising in reducing pain, but further studies are needed to evaluate long-term outcomes of this treatment.<sup>5</sup> Arthrographic capsular distension with corticosteroid has also been advocated in the treatment of FS. This treatment could be better at improving ROM compared to intra-articular corticosteroid injection alone.<sup>5</sup> However, comparison of the two techniques using functional outcomes is lacking.

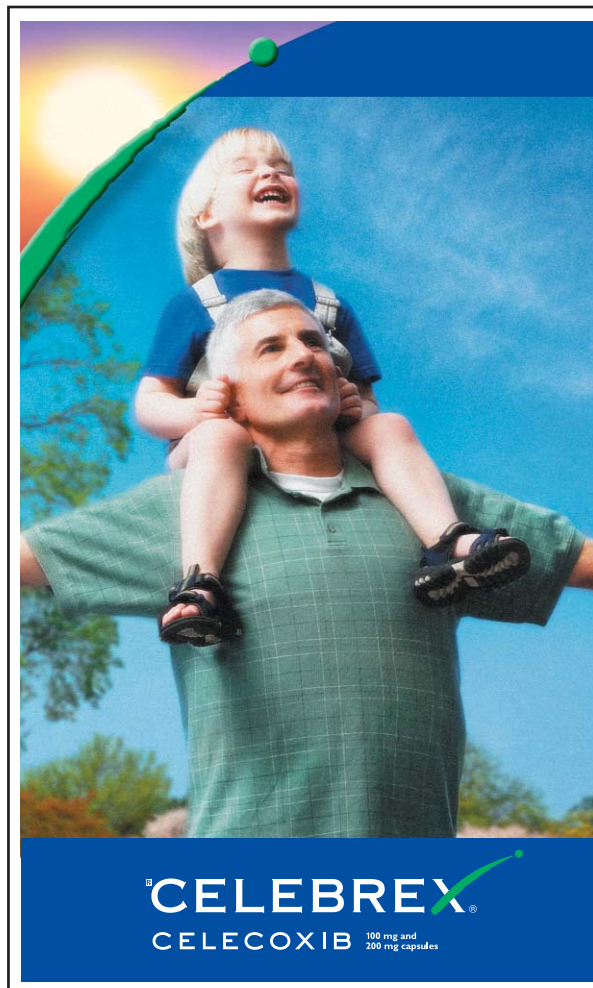
An orthopedic reference should only be considered in the presence of persistent or worsening severe pain, and functional limitation following the initiation of a conservative treatment, and a corticosteroid injection under fluoroscopic guidance. This attitude is justified by the scarce overall data regarding the efficacy of techniques, such as arthroscopic release of the capsule at its insertion near the glenoid cavity, or manipulation under anesthesia.<sup>5</sup> Furthermore, in the case of manipulation under anesthesia, many

authors have outlined the aggressiveness of this technique, and the risk of complications, such as fracture and luxation.<sup>4</sup>

## What is shoulder impingement syndrome?

Shoulder impingement syndrome (SIS) is the most common cause of shoulder pain encountered by the primary care physician.<sup>7</sup> The patient typically complains of pain felt in the shoulder region or arm that may be exacerbated by overhead activities. If a patient is younger than 35 years, and participates in regular overhead activities, the SIS could be secondary to instability.<sup>8</sup> Accordingly, in this population, the evaluation should include specific considerations for signs of instability. The evaluation should start with observation of any signs of atrophy in the shoulder region. Posture should be evaluated to look for protracted shoulders which may be associated with SIS.<sup>9</sup>

Contrary to adhesive capsulitis, the main clinical feature of SIS is the absence of obvious passive GH joint ROM limitation. The patient may present active limitation because of pain and, as a result, passive ROM can be difficult to evaluate due to the apprehension of pain and resistance to mobilization. Typically, the patient may also present with a painful arc in abduction



## Painful Shoulder



Figure 5. The apprehension-relocation test. For the apprehension manoeuvre (above left), the patient can be in a sitting or supine position. As the shoulder is moved passively in external rotation at 90° abduction, the examiner applies a forward pressure to the posterior aspect of the humeral head. The test is considered positive if the patient becomes apprehensive. The relocation manoeuvre (above right), is performed in the supine position when the apprehension test is positive. As the shoulder is passively moved in external rotation at 90° abduction, the examiner applies pressure on the anterior aspect of the proximal 1/3 of the humerus. The test is considered positive for anterior instability if apprehension is relieved by the anterior stabilization force. Warning: to avoid accidental iatrogenic luxation, the shoulder should be brought back to neutral position before releasing the stabilization pressure on the humerus. The diagnostic value of these two combined manoeuvres (when compared to surgical findings in 100 patients with a prevalence of 46% of anterior instability) was found to be 68% for sensitivity, and 100% for specificity. If the patient experienced only pain, the test is inconclusive. Source: Speer, K.P., et al: An evaluation of the shoulder relocation test. *Am J Sports Med*, 1994. 22(2): 177-83.

and/or flexion. The scapulo-humeral rhythm can be disturbed compared to the contralateral side, and winging or tipping of the scapula can be present.

The Neer's and Kennedy-Hawkins impingement signs are often present. Although not specific, these signs have a high sensitivity for SIS.<sup>10</sup> Pain on isometric movement of abduction and external rotation is another common finding. Other special tests, such as the Jobe's supraspinatus test, can also be positive when pain and weakness are present. It is important

***If a patient is younger than 35, and participates in regular overhead activities, the SIS could be secondary to instability.***

to realize that many of these tests are not specific to a particular tendon, and that generalized pain upon most of these manoeuvres may be suggestive of synovitis or capsular inflammation, such as in the early stages of FS.

In terms of imaging, plain radiographic assessment can be used to rule out pathologies, such as degenerative joint disease, tumours, and tendon calcifications. Although ultrasound (US) has a good diagnostic value for rotator cuff tears, its potential for the diag-

nosis of SIS is not clearly established. An interesting potential use of US would be to identify the subpopulation of SIS patients most likely to benefit from the rehabilitation programs commonly offered to these patients.<sup>11</sup>

The vast majority of SIS patients will eventually recover with a conservative approach.<sup>12</sup> The most common forms of intervention include rest, NSAID, subacromial injections of corticosteroids, and physical therapy interventions. A recent systematic review concluded there is sufficient evidence to demonstrate that NSAID and corticosteroid injections are useful treatments for subacromial pain.<sup>13</sup> However, because of possible adverse effects, such as tendon rupture, corticosteroid injections should be limited to conditions where rehabilitation is limited by pain.<sup>14</sup> In view of the increasing evidence supporting the use of exercise therapy and orthopedic manual therapy for impingement syndrome, a reference of SIS

patients for evaluation by a physiotherapist seems justified.<sup>15</sup> Anterior acromioplasty is the preferred treatment for SIS patients when non-operative treatment fails.<sup>12</sup>

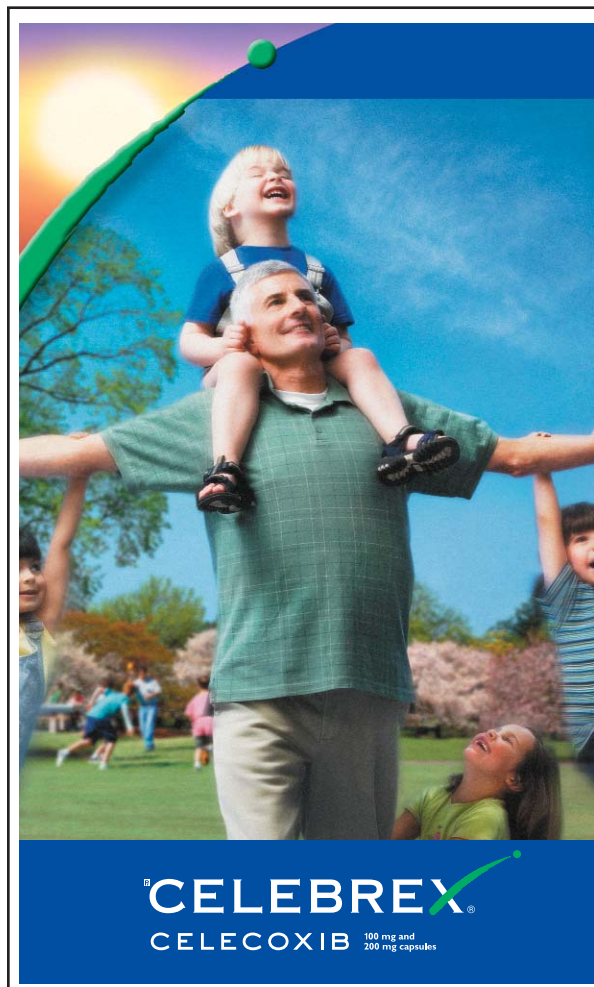
## Is it a rotator cuff tear?

One common cause of shoulder pain is rotator cuff tears. Although rotator cuff tears can result from an acute traumatic event, the prevalence of tears increases with age and can reach 60% in people older than 60.<sup>16</sup> The clinical presentation of rotator cuff tears can be very similar to that of SIS; the presence of a direct relation between the onset of symptoms and a traumatic event should increase the suspicion of this diagnosis. A recent study suggested that the combined presence of three positive shoulder tests had a predictive value of 98% for rotator cuff tears. The three tests are:

1. impingement signs (Hawkins and/or Neer sign);
2. external rotation weakness;
3. supraspinatus weakness (Jobe's test).<sup>16</sup>

Since these combined limitations may have a predictive value comparable to magnetic resonance imaging (MRI) or ultrasound, they can be useful guidelines in the decision to obtain diagnostic

*The prevalence rate of tears increases with age, reaching 60% in patients over the age of 60.*



imaging for rotator cuff tears.

The choice to undergo surgical repair of the rotator cuff is a complex issue that should be individualized, taking into account the patient's pain, disabilities, and the risk of living with the condition. The pros and cons should be explained to the patient. Because of the absence of randomized controlled trials regarding treatment strategy, there is no evidence-based choice available.<sup>17</sup> However, as a general principle, some authors suggest that operative treatment has its best indication with young patients (less than 50 years old), with severe functional deficit following an acute trauma. Conservative treatment similar to rehabilitation for SIS patients should

first be considered in the presence of the following factors: age over 50, low upper limb activity level, and a longitudinal history of shoulder problems. Operative treatment may be considered if conservative treatment fails.<sup>18</sup>

When surgery is considered, MRI and ultra-



# Painful Shoulder

sound can be used to look for full thickness rotator cuff tears. A recent study comparing US and MRI evaluations to surgical findings of full thickness rotator cuff tears has shown a sensitivity of 92%, and a specificity of 100% for US.<sup>19</sup> For MRI, the corresponding values were 96% and 86%. Although US was found to be operator-dependent, the authors conclude that US can be considered the imaging modality of choice when an expert is available. MRI should be considered a secondary technique. It is important to note that both US and MRI have a poor diagnostic value for partial rotator cuff tears. Therefore, imaging reports with such an observation should not influence treatment.

## Shoulder instability

The GH joint has evolved to accommodate a very large ROM. As a consequence, the shoulder is the most commonly dislocated joint of the body. Here, GH instability will only be discussed as an underlying factor involved in painful shoulder problems. Tardif and Lirette have outlined in detail the importance of immobilization

and conservative treatment following a first episode of luxation.<sup>20</sup>

The diagnosis of instability in the absence of a traumatic episode of dislocation can be difficult to establish. Anterior instability is by far the most common type of instability. It has been shown that some patients do not feel the humeral head subluxating, and may only have pain as the main symptom. The patient may also complain of a “dead arm syndrome” following circumstances where the arm is stressed in a position of instability, such as combined abduction and external rotation.<sup>21</sup> When non-traumatic instability is suspected, shoulder evaluation should first be performed as described earlier for SIS patients. Care should be made in the evaluation of passive movements, especially in position of instability. Any pain or spasms should be regarded as possible signs of protection of the joint. Although active ROM can be complete, the presence of subtle signs, such as muscle spasm, co-contractions, or any change of plane during elevation of the arm may result from instability. Evaluation of active ROM in the supine position can also help, since the resulting stabilization of the scapula combined with the antero-posterior gravitational force can further emphasize the subtle signs of instability described previously. Another possible consequence of anterior GH instability is subscapular muscle overuse, which can result in pain upon isometric internal shoulder rotation. One of the most common tests for the evaluation of anterior instability is the apprehension-relocation test. When instability is suspected, the diagnostic value of this simple test makes it a useful component of the shoulder evaluation by the primary care physician (Figure 5). The treatment of shoulder pain associated with anterior instability is similar to the treatment of SIS. It is aimed at symptomatic control of pain and inflammation, which will also contribute to the successful rehabilitation of shoulder kinematics. [CME](#)

### What now?

The gradual increase of evidence-based information allows the primary care physician to better treat patients with painful shoulder problems. However, the successful integration of the available treatment options requires the development of adequate clinical and paraclinical evaluation skills. These skills have not always been properly covered by medical school curricula. Although more research is necessary, increasing evidence supports the important complementary roles of medicine and rehabilitation in the management of painful shoulder problems.



## References

- van der Heijden GJ: Shoulder disorders: a state of the art review. *Baillieres Clin Rheumatol*, 1999; 13(2):287-309.
- Manifold SG, McCann PD: Cervical radiculitis and shoulder disorders. *Clin Orthop* 1999; 368:105-13.
- Magee DJ: *Orthopedic physical assessment*. 3rd ed. 1997, Philadelphia: W.B. Saunders Company, 805.
- Hannafin JA, Chiaia TA: Adhesive capsulitis. A treatment approach. *Clin Orthop* 2000; 372:95-109.
- Alvado A, Pelissier J, Benaim C, et al: Physical therapy of frozen shoulder: Literature review. *Ann Readapt Med Phys* 2001; 44(2):59-71.
- Carette S, Moffet H, Tardif J, et al: Intraarticular corticosteroids, supervised physiotherapy, or a combination of the two in the treatment of adhesive capsulitis of the shoulder. *Arthritis and Rheum* 2003; 48(3):829-38.
- van der Windt DA, Koes BW, de Jong BA, et al: Shoulder disorders in general practice: incidence, patient characteristics, and management. *Ann Rheum Dis* 1995; 54(12):959-64.
- Jobe FW, Pink M: Classification and treatment of shoulder dysfunction in the overhead athlete. *J Orthop Sports Phys Ther* 1993; 18(2):427-32.
- Kamkar A, Irrgang JJ, Whitney SL: Nonoperative management of secondary shoulder impingement syndrome. *J Orthop Sports Phys Ther* 1993; 17(5):212-24.
- Tennent TD, Beach WR, Meyers JF: Clinical sports medicine update. A review of the special tests associated with shoulder examination Part I: the rotator cuff tests. *Am J Sports Med* 2003; 31(1):154-60.
- Desmeules F: Could ultrasonographic measurement of acromio-humeral distance predict the outcome of rehabilitation for shoulder impingement? *Clin J Sport Med* 2003; 13(abstract in press).
- Bigliani LU, Levine WN: Subacromial impingement syndrome. *J Bone Joint Surg Am*, 1997; 79(12):1854-68.
- Johansson K, Oberg B, Adolfsson L, et al: A combination of systematic review and clinicians' beliefs in interventions for subacromial pain. *Br J Gen Pract* 2002; 52(475):145-52.
- Speed CA: Fortnightly review: Corticosteroid injections in tendon lesions. *Bmj*, 2001. 323(7309): 382-6.
- Desmeules F, Côté HC, Frémont, P: Therapeutic Exercise and Orthopedic Manual Therapy for Impingement Syndrome: A Systematic Review. *Clin J Sports Med* 2003, 13:176-82.
- Murrell GA, Walton JR: Diagnosis of rotator cuff tears. *Lancet*, 2001; 357(9258):769-70.
- Brox JI: Shoulder pain. *Best Pract Res Clin Rheumatol* 2003; 17(1):33-56.
- Mantone JK, Burkhead Jr WZ, Noonan Jr J: Nonoperative treatment of rotator cuff tears. *Orthop Clin North Am* 2000; 31(2):295-311.
- Chang CY, Wang SF, Chiou HJ, et al: Comparison of shoulder ultrasound and MR imaging in diagnosing full-thickness rotator cuff tears. *Clin Imaging*, 2002; 26(1):50-4.
- Tardif J, Lirette R: Shoulder instability: Diagnosis and Treatment. *The Canadian Journal of CME* 1998; 10(7):59-70.
- Burkhart SS, Morgan CD, Kibler WB: Shoulder injuries in overhead athletes. The "dead arm" revisited. *Clin Sports Med* 2000; 19(1):125-58.



Anti-inflammatory analgesic agent. Product Monograph available upon request.  
**General warnings for NSAIDs should be borne in mind.**  
 CELEBREX® is a registered trademark of G.D. Searle & Co., used under permission by Pharmacia Canada Inc.

Copromoted with

**PHARMACIA** **Pfizer**  
 Pharmacia Canada Inc. Pfizer Canada Inc.  
 Mississauga, Ontario Kirkland, Quebec  
 L4S 4E3 H9J 2P5

Member  
 PAB R&D

**CELEBREX**  
 CELECOXIB 100 mg and 200 mg capsules