An Approach to Diagnosis and Management of the Frozen Shoulder

Bob McCormack, MD, FRCSC, Dip Sport Med, Assistant Professor, Head of Division of Arthroscopy and Athletic Injuries, Department of Orthopaedic Surgery, University of British Columbia, Vancouver, BC.

Introduction

Frozen shoulder is a descriptive term for a clinical syndrome whereby soft tissue contractures cause a limitation of both active and passive range of motion of the glenohumeral joint. The primary role of the shoulder is to place the hand in space; to achieve this, it is necessary to maintain shoulder mobility.

Classification

As outlined in Figure 1, frozen shoulder can be divided into primary and secondary types. The primary, or idiopathic, form is commonly referred to as adhesive capsulitis. Secondary forms are important to identify as they often require a different treatment approach. For example, in the metabolic group, patients with diabetes mellitus not only have a much higher incidence of developing a frozen shoulder, but the syndrome is more resistant to conventional therapy. Several secondary causes, such as cervical disc disease and underlying neurologic or cardiovascular problems, require a treatment focus on the primary pathology. Frozen shoulder frequently co-exists with other shoulder problems, including rotator cuff tendinitis or tears.

Pathology

In the normal shoulder the ligaments that comprise the joint capsule are lax in the “at rest” position. This allows for normal joint translation during range of motion. In a frozen shoulder there is thickening and contracture of the capsule, which decreases the joint volume (Figure 2). The pathogenesis of a primary frozen shoulder is not well understood, but there does seem to be three stages to the clinical course of the syndrome. Usually patients report an initial “painful” phase that lasts anywhere between two and nine months. This is followed by a “stiffening” phase, during which the loss of shoulder motion becomes the dominant feature. This can last from four to 12 months. The final phase is described as the “thawing” phase, whereby motion and function gradually improve over the period of many months.

Epidemiology

Due to its varying definitions, it is difficult to measure the incidence of frozen shoulder, but cross-sectional studies indicate that it affects 2–4% of the general population. In almost all studies, however, the incidence is four to five times higher in people with diabetes. Most patients are middle-aged, and primary frozen shoulder is uncommon in patients older than 70 years. Therefore, in the older patient one has to look carefully to rule out other causes of shoulder stiffness. There is also a tendency, often not well recognized, to lose glenohumeral motion with advancing years; the functional demands on the shoulder in a person in their 80s is 65–85% of that in a 30-year-old.
While there are a variety of metabolic conditions that are associated with a frozen shoulder, the most common is diabetes mellitus. Frozen shoulder in people with diabetes is frequently bilateral and is more resistant to treatment. Some authors have suggested using an arthrogram to assess the joint volume, whether there is an underlying pain syndrome (reflex sympathetic dystrophy), whether this a true mechanical block. Some investigations have found that there is some other underlying endocrine disorder. Laboratory investigations are usually within normal limits, unless there is some other underlying endocrine disorder. Laboratory investigations are usually within normal limits, unless there is some other underlying endocrine disorder.

<table>
<thead>
<tr>
<th>Systemic</th>
<th>Extrinsic</th>
<th>Intrinsic</th>
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<tbody>
<tr>
<td>Diabetes mellitus</td>
<td>Cardiac dysfunction</td>
<td>Rotator cuff tendonosis</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>Cervical disc disease</td>
<td>Rotator cuff tears</td>
</tr>
<tr>
<td>Hyperthyroidism</td>
<td>Cerebrovascular accident</td>
<td>Biceps tendonosis</td>
</tr>
<tr>
<td>Hypoadrenalism</td>
<td>Parkinson’s disease</td>
<td>Calcific tendonosis</td>
</tr>
<tr>
<td></td>
<td>Humerus fract</td>
<td>Acromioclavicular arthritis</td>
</tr>
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</table>

The key to making the diagnosis of frozen shoulder is a deficit in passive motion, as active motion may be limited by pain of muscle dysfunction. One must be aware that trunk lean and scapular motion can compensate for a stiff glenohumeral joint, so it is more accurate to assess the range of motion with the patient sitting or, ideally, supine. If there is significant pain, an injection into the subacromial space or glenohumeral joint with a repeat exam can determine whether this a true mechanical block.

**Investigations**

The most important investigation for a frozen shoulder is plain radiography. Three views should always be obtained: an anterior-posterior of the glenohumeral joint; a lateral scapular view; and an axillary view. These not only can rule out mechanical problems from bony deformity or degenerative joint disease, but also help assess the degree of osteoporosis and may give some indication of whether there is an underlying pain syndrome.

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**Diagnosis**

**History**

Patients present with pain and limited range of motion, which interferes with their shoulder function. Symptoms usually begin insidiously and the pain is often worse at night. The main difficulties are with overhead and behind the back activities. These symptoms often suggest rotator cuff problems, but patients with isolated cuff pathology should have a good range of passive motion. There may be a history of some form of trauma, but the main contributing factor seems to be the period of immobilization following injury. Fractures of the proximal humerus require less than two weeks in a sling and then an exercise program should be initiated. While there are a variety of metabolic conditions that are associated with a frozen shoulder, the most common is diabetes mellitus. Frozen shoulder in people with diabetes is frequently bilateral and is more resistant to treatment. Some authors have suggested using an arthrogram to assess the joint volume, whether there is an underlying pain syndrome (reflex sympathetic dystrophy). Some investigations have found that there is some other underlying endocrine disorder. Laboratory investigations are usually within normal limits, unless there is some other underlying endocrine disorder.

**Pain Management**

The first objective in the treatment of patients with a frozen shoulder is pain relief. This will allow patients to more readily participate in an exercise program that is aimed at restoring motion. Nar-
Frozen Shoulder

Figure 2: The Frozen Shoulder and Recommended Assessment

Therapeutic Stretches
A simple yet effective series of stretches that can be quickly taught to patients includes (clockwise from top): resting in “siesta” position; arms up over head with palms facing up; and arms up over head with palms facing down.

Physical Examination
The key to making the diagnosis of frozen shoulder is a deficit in passive motion. Passive range of motion should be measured for total elevation (flexion), internal rotation, cross-body adduction, as well as external rotation.

<table>
<thead>
<tr>
<th>a. Total elevation</th>
<th>b. Internal rotation</th>
<th>c. Cross-body adduction</th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="a. Total elevation" /></td>
<td><img src="image" alt="b. Internal rotation" /></td>
<td><img src="image" alt="c. Cross-body adduction" /></td>
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cotics should be avoided because of side effects and the risk of dependency. Anti-inflammatories can be useful, but there is increased risk of gastrointestinal side effects in older patients, so the COX-II inhibitors are preferable in this patient group. Some authors have suggested oral corticosteroids, but there is little evidence to support their use. Local intra-articular (glenohumeral) and subacromial corticosteroid injections have been used to relieve pain and limit the inflammatory phase of the disease, and seem to be more beneficial in the early phase of the condition. Given the often long waiting list to obtain a specialist assessment, it would be a useful skill for primary care physicians to perform or arrange for these injections through their local radiologists. Other authors have suggested a suprascapular nerve block, which is easily done through the acromioclavicular joint. Any time an injection is done, it is important to document the improvement obtained following the injection, both in terms of range of motion and pain relief. This is very useful information to pass on to any specialists that become subsequently involved.

**Therapy**

All patients with frozen shoulder should be placed on an exercise program, with the aim of maintaining and regaining range of motion. Unfortunately, this is frequently not prescribed. Binder, et al. reported that, at the time of initial assessment, 50% of patients received no advice about the care of their painful shoulder from the primary care physician. Of those receiving some advice, 75% were told to rest the shoulder and 25% were told to exercise the shoulder gently.

An exercise program is all that is necessary for the majority of patients. These exercises should be performed several times per day, and are most readily performed with the patient in the supine position. I believe that all patients would benefit from seeing a physiotherapist who can teach them how to do the exercises correctly, and who can monitor their progress. However, there is considerable controversy around whether patients need to regularly attend a clinic, or if similar results can

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### Figure 3: Patient Self-Evaluation for Frozen Shoulder

**Are you having pain in your shoulder?**  
- Yes  
- No

Mark where your pain is:

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**Do you have pain in your shoulder at night?**  
- Yes  
- No

**Do you take pain medication (Aspirin, Advil, Tylenol, etc.)?**  
- Yes  
- No

**Do you take narcotic pain medication (codeine or stronger)?**  
- Yes  
- No

**How many pills do you take each day (average)?**  
- _ pills

**How bad is your pain today (mark line)?**

0 [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] 10

- No pain at all  
- Pain as bad as it can be

**Does your shoulder feel unstable (as if it is going to dislocate)?**  
- Yes  
- No

**How unstable is your shoulder (mark line)?**

0 [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] 10

- Very stable  
- Very unstable

Circle the number that indicates your ability to do the following activities:

(0 = Unable to do; 1 = Very difficult to do; 2 = Somewhat difficult; 3 = Not difficult)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Right Arm</th>
<th>Left Arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Put on a coat</td>
<td>0 1 2 3</td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>2. Sleep on your painful or affected side</td>
<td>0 1 2 3</td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>3. Wash back/do up bra in back</td>
<td>0 1 2 3</td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>4. Manage toileting</td>
<td>0 1 2 3</td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>5. Comb hair</td>
<td>0 1 2 3</td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>6. Reach a high shelf</td>
<td>0 1 2 3</td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>7. Lift 10lbs above shoulder</td>
<td>0 1 2 3</td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>8. Throw a ball overhand</td>
<td>0 1 2 3</td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>9. Do usual work—List:</td>
<td>0 1 2 3</td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>10. Do usual sport—List:</td>
<td>0 1 2 3</td>
<td>0 1 2 3</td>
</tr>
</tbody>
</table>
be obtained with a home exercise program. There is a delicate balance with an exercise program because up to one-quarter of patients can experience exacerbation of their pain with physiotherapy. The key to therapy is a gradually progressive stretching program, ideally supervised closely in the early phases (Figure 2). The pain management measures outlined above are important to help patients get a therapy program established. Therapy modalities (TENS or heat and ice before and after exercise sessions) can be beneficial, but it is important that the main focus of therapy sessions are not passive modalities.

Distension Arthrography, or Brisement
In this procedure, fluid is injected into the glenohumeral joint in sufficient volume to generate high pressures. The capsule expands, and eventually ruptures with a sudden decrease in the pressure necessary to inject. This is most commonly done as part of an arthrogram (to insure that the injection is, indeed, intra-articular). Although favourable results have been reported in the literature, they are difficult to interpret as it is commonly combined with other techniques. Although the injection may reduce pain, it is not clear if it has a specific effect on the range of motion, as it is usually a localized rupture of the joint capsule. While this technique is in fairly limited use in Canada, it may have a greater role in the older patient who has failed other treatment modalities, as the risks of manipulation are higher in this group (e.g., osteoporosis).

Manipulation
Manipulation under anesthetic (MUA) is considered for patients who have not improved despite compliance with a structured supervised rehabilitation program. Manipulation should not be performed during the acute painful stage of the injury, as the general consensus is that it may exacerbate the process. This technique is generally performed with an interscalene block that will give post-manipulation pain relief and allow the early initiation of a therapy program. Many authors have reported good results with this technique, with an earlier return to activity. The risks of a manipulation include a fracture of the proximal humerus, glenohumeral instability, neurovascular injury or tearing of the rotator cuff. While these are uncommon in most series, the risks are increased in older patients, and significant osteopenia is a contraindication to performing MUA.

Surgical Releases
Surgical release of the contracted tissues can be performed arthroscopically or as an open procedure. This is an evolving area, and depends on whether there are intra-articular or extra-articular causes for the limited range of motion. It is very uncommon for older patients to require surgery. However, older patients that fail with the usual nonoperative measures, and who are not coping, may benefit from an arthroscopic release to make manipulation of any remaining capsular tissue safer. Post-operatively, pain control is important and a long-acting interscalene nerve block can be used to facilitate the early initiation of a therapy program.

Results
The classic teaching has been that a frozen shoulder is a self-limiting condition lasting 12–24 months. However, more recent studies suggest that 40% of patients have a residual restriction in range of motion, even up to five years following the onset of pain. Fortunately, in most cases, patients believe their functional loss is minimal. The goals of the treatment options outlined above are to shorten the period of disability and to reduce the symptoms. The cornerstone of management is a consistent stretching program, intermittently monitored by physiotherapy. There is controversy about the cost-effectiveness of this approach given the long duration of symptoms and disability, and some advocate earlier manipulation or surgical release. In addition, an exercise program is less effective in secondary types of frozen shoulder (the classic example being frozen shoulder associated with diabetes). There is a need for ongoing study, and the Canadian Shoulder Study Group is embarking on a prospective trial to address these issues.

Summary
Shoulder stiffness is a common presenting complaint in older patients, but classic primary frozen shoulder (adhesive capsulitis) is less common. Therefore, in this age group it is important to look for other explanations, such as a mechanical block to motion (e.g., osteophytes), or underlying causes such as diabetes mellitus. While the duration of symptoms are frustrating for patients and physicians, the vast majority of patients regain acceptable function with nonoperative modalities. The higher incidence of osteopenia in older patients makes manipulation under anesthetic as an isolated procedure less attractive. Shoulder stiffness is often associated with other shoulder pathology (e.g., rotator cuff), but there must be significant improvement in the range of motion before this underlying pathology can be addressed.

No competing financial interests declared.

References

Recommended Reading