INSIDER’S GUIDE

FDM APPROACH: FROZEN SHOULDER (ADHESIVE CAPSULITIS)

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The shoulder is a very complex joint that is crucial to many activities of daily living. Decreased shoulder mobility is a serious clinical finding. A global decrease in shoulder range of motion is called adhesive capsulitis, referring to the actual adherence of the shoulder capsule to the humeral head.

Adhesive capsulitis is a syndrome defined in its purest sense as idiopathic painful restriction of shoulder movement that results in global restriction of the glenohumeral joint. It is not associated with a specific underlying condition.

To avoid confusion, the term "adhesive capsulitis" should be used to refer to the primary idiopathic condition and the term "secondary adhesive capsulitis" should be applied to the condition that is associated with, or results from, other pathologic states.

Many terms are used to describe limitation of shoulder movement, and all of them imply a stiff shoulder with decreased range of motion. These terms are attempts to describe the probable underlying pathophysiologic process (i.e., bursal or capsular origins of inflammation).

In assessing a patient's shoulder pain, the physician must distinguish between true glenohumeral joint problems and extra-articular derangements.

Active range of motion will most likely be limited and painful in both cases, but decreased passive range of motion, which is often painful as well, most likely indicates true joint pathology.
If the patient is able to relax and the examiner can elicit full passive range of motion, the etiology of the pain is most likely to be extra-articular. Prolonged soft tissue problems, however, may eventually lead to decreased shoulder range of motion because of the patient's constant guarding of the shoulder.

It is imperative to determine the **precise source of shoulder pain** so that a program of therapeutic management can be initiated to prevent compromise of shoulder movement.

**Description**

Adhesive capsulitis, most commonly referred to as frozen shoulder (FS), is an idiopathic disease with 2 principal characteristics: **pain and contracture**.

This syndrome is characteristic of painful restriction of **active and passive** range of motion (ROM) in 1 or both shoulders.

**Synonym(s) include:**

- Pericapsulitis
- Adherent bursitis
- Obliterative bursitis
- Adhesive capsulitis

**Age**

FS most frequently occurs in the fifth and sixth decades of life. Patients who present with an idiopathic FS when they are younger than 40 years should definitely be examined to rule out occult diabetes, hyperthyroidism, hypertriglyceridemia, or concomitant neurologic or systemic rheumatologic disorder affecting the upper extremity.

**Sex**

FS affects women more frequently than men, with a female-to-male ratio of about 1.4:1.

**Signs and Symptoms**

Patients with FS typically describe a progressive onset of pain over several weeks and initially felt mostly at night or when the shoulder is moved close to the end of its range of motion (ROM). It can be caused by certain combined movements of the shoulder, such as **abduction and external rotation** (e.g., grooming one's hair, reaching for a seatbelt overhead) or **extension and internal rotation** (e.g., reaching for a back pocket or bra strap). These combined movements tend to **stretch the anterior and posterior glenohumeral capsule**, respectively.
The pain of FS then progresses to a constant pain at rest that is often aggravated by any movement of the shoulder, psychological stress, exposure to cold or vibration, and changes in the weather. Patients report worsening of the pain after they engage in activities that require repetitive movements of the affected shoulder.

In about 90% of patients, the pain associated with this condition usually lasts 1-2 years before subsiding. The pain is a prominent feature of the initial phase and of the second (frozen) phase of the disease.

The second principal characteristic of FS is progressive loss of passive ROM (PROM) and active ROM (AROM) of the glenohumeral joint in a capsular pattern. That is, the movements are usually restricted to a characteristic pattern, with proportionally greater passive loss of external rotation than of abduction and internal rotation.

During the thawing phase, the pain usually is less intense than it is in the other phases. It is usually felt only if the patient is moving at the end of his/her ROM (particularly in positions of subacromial impingement), if the patient performs repetitive movements of the shoulder, or if the patient is exposed to other important ergonomic stresses of the shoulder.

**Stages of Adhesive Capsulitis**

The natural history of adhesive capsulitis and its clinical course is divided into three stages: the painful stage, the adhesive stage and the recovery stage.

**Painful stage:** The painful stage involves gradually increasing generalized aching pain and stiffness that lasts between three and eight months. Patients commonly have difficulty pinpointing the exact location of the discomfort. Muscle spasms in the trapezius also generally occur during this phase. Pain frequently increases at night. It is not unusual for patients to complain that they have a hard time reaching behind the back when fastening a garment or removing a wallet from a back trouser pocket. The pain may radiate both proximally and distally and is frequently aggravated by movement and alleviated with rest. Sleep may be interrupted if the patient rolls on the involved shoulder.

**Passive and active range of motion in all planes of shoulder movement are lost. This global loss of motion is the primary factor distinguishing adhesive capsulitis from many of the conditions associated with secondary adhesive capsulitis.**

**Adhesive stage:** this phase is characteristic of less pain but stiffness and limitation of motion worsen has been found to last **four to six months**. Nocturnal pain, if present, lessens. Greatest discomfort is experienced at extreme ranges of movement with progressive limitation in a capsular pattern (that is, in all directions). Normal daily activities can be severely affected. **Hallmark** of this phase is an inability to move at great amplitude and an inability to move on the affected side.
**Recovery stage** (lasts one to three months): this phase is also referred to as the thawing or regressive phase. Pain will progressively decrease and although there is still marked restriction the ROM progressively increases over 12-24 months. Recovery can be spontaneous but frequently incomplete. The external rotation range of motion improves first, followed by abduction and internal rotation. Short recovery periods may have associated bouts of pain before each phase of improvement. Studies have shown that approximately 40% of patients have slight, persistent limitations in ROM with 10% having clinically significant long-term functional limitations.

**Pathophysiology**

Adhesive capsulitis is rare in patients younger than 40 and more common in sedentary workers than in laborers. The inferior portion of the capsule (axillary) has the largest portion of the synovial membrane, and the superior, anterior, and posterior portions of the capsule (rotator cuff) are more musculotendinous.

The axillary fold develops adhesions, preventing mostly **external (lateral) rotation, abduction, and medial rotation (capsular pattern)**. Adduction, flexion and extension in the sagittal plane are the last motions to be compromised.

It is clearly documented that limitation of external rotation is due to contracture of the **coracohumeral ligament** which prevents the greater tuberosity from further movement. Limitation of abduction is due to adhesion of the **subacromial bursa**. Subacromial fibrosis is a transformation of the connective tissue within the subacromial space above the shoulder joint.
capsule. This space develops a thin, dry, brittle subacromial bursa and becomes laced with tough adhesions associated with thickened accessory ligaments. Clinical studies have shown that the subacromial bursa was often thickened and obliterated by adhesions and surrounding soft tissues were friable and hypervascular.

When restricted abduction becomes chronic, secondary contracture occurs in the long rotators (pectoralis major, latissimus dorsi and teres major muscles).

Although there is some differing opinions on the pathophysiology of FS certain consistent neurologic and histologic soft tissue findings have been identified and appear to be specific to the pathology of FS.

It has also been found that increased irritability of the structures beneath the coracoacromial ligament appears to cause glenohumeral restriction and pain on motion.

Evaluation of anatomic and histologic specimens demonstrates that the glenohumeral joint synovial capsule is often involved in this disease process. However, most of the notable loss of ROM is caused by disease in structures outside the synovial capsule glenohumeral joint, such as the coracohumeral ligament, soft tissues in the rotator interval, the subscapularis muscle, and the subacromial bursae.

Most authors do not describe clinically significant capsular adhesions as a predominant finding in the chronic phase of this condition. Instead, pathologic data confirm an active process of hyperplastic fibroplasia and excessive type III collagen secretion that lead to soft-tissue contractures of the abovementioned structures (ie, the coracohumeral ligament, soft tissues of rotator interval, the subscapularis muscle, the subacromial bursae). In more clinical terms, resultant regional ischemia of the soft tissues of the shoulder can lead to the local release of free radicals and a platelet-derived growth factor that can initiate a cycle of fibroblastic hyperplasia and excessive deposition of collagen and glycosaminoglycans.

Neurologic factors seem to be the principle mediators of the pain, whereas a process resembling fibromatosis causes the contracture. Why the pain precedes the contracture and why it resolves before the contracture does in most subjects remain unclear. The fact that the pain of FS often precedes stiffening of the joint tends to support the notion that the initial pain probably does not stem from altered mechanics of the glenohumeral joint.

The whole process ends with the active development of a tough, thick, fibrous contracture of the connective tissues of the shoulder.
Risk factors for Idiopathic frozen shoulder.

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BACKGROUND: Idiopathic frozen shoulder is a self-limiting regional skeletal problem of unknown etiology. Clinically, patients first experience a phase of pain, progressing to a freezing stage when glenohumeral motion is lost, followed by a thawing phase when pain gradually subsides and most of the lost motion returns. OBJECTIVES: To identify possible specific and non-specific risk factors for idiopathic frozen shoulder. METHODS: We compared the medical histories, drug treatment, previous hospital as well as health management organization blood tests of 126 new consecutive frozen shoulder patients from a shoulder clinic to those of an age-matched control group of 98 consecutive patients from an orthopedic foot and ankle clinic and to the regional population disease prevalence registry. Frozen shoulder was classified as idiopathic only if there was no history of trauma and no evidence of a rotator cuff tear. RESULTS: Among the frozen shoulder patients 29.4% had diabetes and 13.6% had thyroid disorders. The risk ratio for diabetes in the frozen shoulder group was 5.9 for males (95% confidence interval 1.4-8.4, P< 0.001) and 5.0 for females (95% CI 3.3-7.5, P< 0.001). The risk ratio for thyroid disorders among females with frozen shoulder was 7.3 (95% CI 4.9-11.1, P= 0.001). No significant difference was found in the prevalence of thyroid disorders between frozen shoulder and the control group, but there was a significantly higher prevalence of diabetes in males and a trend for higher prevalence in females in the frozen shoulder group. CONCLUSIONS: Physicians should be aware that diabetes is a specific risk factor for idiopathic frozen shoulder in both males and females and thyroid disorders are a non-specific risk factor in females only.

PMID: 18635800 [PubMed - indexed for MEDLINE]

Clinical and laboratory parameters in adult diabetics with and without calcific shoulder periarthritis.

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The clinical and laboratory parameters of calcific shoulder periarthritis (CSP) were examined in 900 patients with type II diabetes mellitus as well as in 250 age- and sex-matched control subjects. A threefold increased prevalence of CSP in diabetics compared with the control group was associated with the presence of longstanding and poorly controlled diabetes, hypercholesterolemia, and hyperglycemia suggesting pronounced diabetic angiopathy, as well as with minor trauma and hypomagnesemia. Aging and serum calcium concentrations were not related to the presence of CSP. Thirty-two percent of diabetics with CSP were symptomatic, 15% of them presented with severe pain and restriction of shoulder movement. These findings confirm a close pathogenetic interrelation between CSP and diabetes mellitus.

PMID: 1780773 [PubMed - indexed for MEDLINE]
Prevalence of symptoms and signs of shoulder problems in people with diabetes mellitus.


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Diabetes mellitus is a known risk factor for frozen shoulder. This study was performed to quantify this association and test any relationship with other risk factors for diabetic complications. Patients attending diabetic (n = 865) and general medical (n = 202) clinics were interviewed and examined. External rotation was measured in both shoulders. Glycated hemoglobin A(1c) was measured in all diabetic patients. Frozen shoulder was defined as pain for more than 3 months and external rotation of less than 50% of the unaffected shoulder. Bilateral frozen shoulder was defined as external rotation of less than 50 degrees in both shoulders. Shoulder pain was present in 25.7% of diabetic patients compared with 5.0% of general medical patients. The criteria for frozen shoulder were fulfilled in 4.3% of diabetic patients and in 0.5% of the general medical patients. Only duration of diabetes had a positive association. The prevalence of painful or stiff shoulder was greater in diabetic patients than general medical patients. The prevalence of frozen shoulder is less than previously reported but still greater in diabetic patients.

Influence of comorbidity on self-assessment instrument scores of patients with idiopathic adhesive capsulitis.

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BACKGROUND: The purpose of this study was to determine whether comorbid factors influence the results of self-assessment instruments completed by patients with idiopathic adhesive capsulitis of the shoulder. We hypothesized that an increased number of comorbidities would be correlated with greater pain and worse function as measured by general and shoulder-specific outcome tools. METHODS: One hundred consecutive patients with phase II adhesive capsulitis were prospectively evaluated with use of a general health questionnaire, a visual analog pain scale, the Simple Shoulder Test, the Disabilities of the Arm, Shoulder and Hand questionnaire, and the Short Form-36. There were seventy-one women and twenty-nine men, with a mean age of fifty-two years (range, thirty-six to eighty-two years). Comorbidities included medical factors (e.g., diabetes and heart disease) and social factors (e.g., tobacco use and pending litigation). Linear regression analysis was performed to determine correlations between the number of comorbidities and the results of the questionnaires. RESULTS: Patients with more comorbidities had significantly lower scores on the Disabilities of the Arm, Shoulder and Hand questionnaire (p = 0.0005) and the Short Form-36 subscales of physical function (p = 0.0009) as well as poorer scores on the Simple Shoulder Test and the Short Form-36 subscales of physical role, social function, emotional role, and mental health. Although there was no correlation between increased comorbidity and pain as measured on the visual analog scale, the comfort/pain subscale of the Short Form-36 showed a significant correlation with increased comorbidity (p = 0.004). CONCLUSIONS: Idiopathic adhesive capsulitis is a debilitating condition. Comorbid factors have a significant effect on the pain and dysfunction (as measured on shoulder-specific and general health instruments) experienced by patients with this disorder. These findings can be applied to the evaluation of these patients and may help to identify patients who potentially require a longer treatment course or those whose outcome will be less satisfactory.

PMD: 12107317 [PubMed - indexed for MEDLINE]
Muscloskeletal manifestations in patients with thyroid disease.

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OBJECTIVE: Thyroid dysfunction may cause musculoskeletal symptoms. We have evaluated the prevalence of adhesive capsulitis, Dupuytren's contracture, trigger finger, limited joint mobility and carpal tunnel syndrome in a series of patients with various thyroid diseases and differing levels of function. DESIGN AND PATIENTS: Patients with euthyroid (diffuse and/or nodular) goitre, Hashimoto's thyroiditis, Graves' disease, toxic nodular goitre, toxic diffuse goitre and patients with goitre who had partial thyroidectomy were included in the study (n = 137). Neurological and musculoskeletal examinations were performed after a standardized symptom questionnaire. The prevalence of musculoskeletal problems was analysed with respect to thyroid function and thyroid autoantibody status. MEASUREMENTS: Serum concentrations of free T3, free T4, TSH and thyroglobulin and thyroperoxidase antibodies were determined. Serum levels of creatine kinase, lactate dehydrogenase, calcium and phosphate along with erythrocyte sedimentation rate were measured to exclude other causes of musculoskeletal complaints. RESULTS: When the study group (n = 137) was divided according to thyroid status, 30.6% (n = 42) were thyrotoxic, 16.8% (n = 23) had subclinical thyrotoxicosis, 28.5% (n = 39) were euthyroid, 7.3% (n = 10) had subclinical hypothyroidism and 16.0% (n = 23) were hypothyroid. Overall, adhesive capsulitis was found in 11.5% (n = 15), Dupuytren's contracture in 8.8% (n = 12), limited joint mobility in 4.4% (n = 6), trigger finger in 2.9% (n = 4) and carpal tunnel syndrome in 3.5% (n = 13) of the patients. The prevalence of adhesive capsulitis was highest in patients with subclinical thyrotoxicosis (17.4%); Dupuytren's contracture, limited joint mobility and carpal tunnel syndrome were commonest in hypothyroid patients (21.7%, 3.7% and 30.4%, respectively). Trigger finger occurred in 1.0% of patients with subclinical hypothyroidism. When these prevalences were analysed with respect to thyroid status, carpal tunnel syndrome was significantly more prevalent in the hypothyroid group (P = 0.004). When thyroperoxidase antibody-positive and -negative patients were compared, adhesive capsulitis negatively (P = 0.03, r = 0.13) and trigger finger positively correlated with (P = 0.03, r = 0.21) thyroperoxidase antibody existence. CONCLUSIONS: These results demonstrate that musculoskeletal disorders often accompany thyroid dysfunction. In addition to the well-known observation that these disorders are common in patients with hypothyroidism, they are also observed in patients with thyrotoxicosis. Patients with thyroid dysfunction should be questioned for musculoskeletal complaints and referred to a specialist if necessary.

PMID: 12864792 [PubMed - indexed for MEDLINE]

The prevalence of a diabetic condition and adhesive capsulitis of the shoulder.

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OBJECTIVES: Adhesive capsulitis is characterized by a progressive and painful loss of shoulder motion of unknown etiology. Previous studies have found the prevalence of adhesive capsulitis to be slightly greater than 2% in the general population. However, the relationship between adhesive capsulitis and diabetes mellitus (DM) is well documented, with the incidence of adhesive capsulitis being two to four times higher in diabetics than in the general population. It affects about 20% of people with diabetes and has been described as the most disabling of the common musculoskeletal manifestations of diabetes. METHODS: Con secutively patients presenting with adhesive capsulitis reporting no history of DM had blood testing for diabetes and prediabetes. An anonymous database was analyzed for a diabetic condition. RESULTS: The prevalence of diabetes in patients with adhesive capsulitis was 30.6% (34 of 100). The prevalence of prediabetes was 32.95% (29 of 88). The total prevalence of a diabetic condition in patients with adhesive capsulitis was 71.5% (63 of 88). Previous literature fails to reveal the incidence of newly diagnosed diabetes, 2 of 80 (2%), and prediabetes, 25 of 92 (23.4%) in patients presenting with adhesive capsulitis. Early diagnosis and effective management of DM reduces the risk of microvascular complications. DM is believed to play a role in the development of musculoskeletal complications. CONCLUSIONS: Awareness of these findings alerts the practitioner to the risk of diabetes and prediabetes in patients presenting with adhesive capsulitis of the shoulder.

PMID: 16475240 [PubMed - indexed for MEDLINE]
Primary vs. Secondary Frozen Shoulder

Primary frozen shoulder is a condition of unknown etiology distinguished by painful restriction of all shoulder movement, both active and passive. It is characterized by prominent reduction in the glenohumeral range of movement.

Secondary frozen shoulder is an identical clinical syndrome but an identifiable disorder, such as diabetes mellitus, or readily recognizable precipitating event such as cardiac surgery, is discernible.

The correct diagnosis in a patient with restricted shoulder movement on physical examination and any of the following mentioned findings, such as bursitis or tendinitis, is secondary adhesive capsulitis. The underlying condition is documented as the primary problem leading to secondary adhesive capsulitis.

Possible Causes of Secondary Frozen Shoulder

The conditions most commonly associated with idiopathic FS are diabetes, hypothyroidism/hyperthyroidism, hypertriglyceridemia, CVA with upper-extremity paresis, brachial plexus injury, cervical spinal cord injury, and Parkinson disease. The performance of repetitive movements of the upper extremities also is associated with FS.

Some studies have shown patients developing FS after a coronary event or following open heart surgery.

Patients who have active glenohumeral synovitis in relation to a systemic inflammatory rheumatologic disorder may develop FS as a complication of this condition. Patients who have undergone surgery to the shoulder area, with postoperative immobilization or with clinically significant pain that causes them to immobilize their shoulder, also are predisposed to develop FS.

Clinical areas to consider include:

- **Endocrine and metabolic disease:** Diabetics have a higher incidence of frozen shoulder, probably because poor circulation leads to abnormal collagen repair and degenerative changes. The theory is that platelet derived growth factor is released from abnormal or ischemic blood vessels which will then act as a stimulus to local myofibroblast proliferation. What follows has been proposed that microvascular disease, abnormalities of collagen repair and predisposition to infection may link diabetes with frozen shoulder. Frozen shoulder in diabetics commonly occurs at a younger age and has been found to be less painful. It is more often bilateral and is associated with unsuspected diabetes, which may be present in approximately 25% of subjects presenting with FS.
• **Autoimmune illness:** Serum markers for inflammation are occasionally elevated with adhesive capsulitis. These markers may normalize when the shoulder condition resolves, indicating a possible autoimmune component. Furthermore, patients with concurrent autoimmune illness, such as rheumatoid arthritis, frequently develop frozen shoulder.

• **Disuse syndromes:** Post-mastectomy patients, stroke victims, and other individuals whose upper limb motion is restricted have a higher incidence of adhesive capsulitis.

• **Trauma:** FS can result from clinically significant trauma to the shoulder. Injury or chronic overuse can lead to joint inflammation and the formation of granulation tissue, with the subsequent development of capsular thickening and fibrous adhesions. Unfortunately, most patients with FS have no notable history of trauma. Although patients often try to recall minor trauma associated with the onset of their shoulder symptoms, careful history taking on the part of the examiner often reveals subtle symptoms, such as night pain or pain and stiffness at the end of ROM, that predated the episode of minor trauma. In most cases, the minor trauma simply makes the patient conscious of the insidious, underlying disease process.

**Other Causes of Secondary Adhesive Capsulitis**

Some systemic diseases are known to be associated with adhesive capsulitis and should be considered in patients with restricted shoulder movement.

Careful neurologic examination should be conducted in all patients presenting with signs and symptoms associated with FS. Patients who have a history of smoking should undergo chest radiography with apical views to rule out a Pancoast tumor irritating the brachial plexus, which can cause FS. All patients should receive a thorough neurologic examination of the upper extremities and neck to rule out cervical radiculopathy and brachial plexus dysfunction. Care also should be taken to look for signs of Parkinson disease, because the prevalence of shoulder pain in patients with this treatable condition is 4-5 times that of the healthy population. Furthermore, shoulder pain often is an early manifestation of Parkinson disease, and it sometimes precedes the tremor by many years.

Proper and complete musculoskeletal and integumentary examination should be performed to rule out concomitant systemic rheumatologic, inflammatory, metastatic, or infectious disorders.

All of these may be associated with secondary adhesive capsulitis and must be considered in a patient with limited range of motion of the shoulder.

Do not overlook visceral-somatic referred pain. Patients often have referred shoulder pain from the heart, neck, diaphragm, liver or spleen.

The following is quick reference list of possible direct or indirect causes of FS and should be ruled out in your medical detective work-up:

• **Trauma**
• Avascular Necrosis Of The Humeral Head
• Degenerative Osteoarthrosis
• Rheumatoid Arthritis
• Chronic Pulmonary Diseases
• Reflex Sympathetic Dystrophy
• History Of Cerebrovascular Accidents
• Diabetes Mellitus
• Pulmonary Tuberculosis
• Postmastectomy
• Lung Cancer
• Postinflammatory
• After Myocardial Infarction
• Hypothyroidism/Hyperthyroidism
• Tuberculosis
• Scleroderma
• Acromioclavicular Joint Irritation
• Entrapment Of The Suprascapular Nerve
• Prolonged Immobilization Of The Upper Extremity
• Cervical Radiculopathy
• Muscle Spasm
• Brachial Plexus Injury
• Brachial Neuritis
  Biceps Tendonitis
• Brachial Plexus Injury
• Neuropathic Shoulder
• Parsonage-Turner Syndrome
• Rotator Cuff Pathology
• Suprascapular Nerve Impingement
• Thoracic Outlet Syndrome

**Selective Tension-The Key to Successful Clinical Outcome of Primary Adhesive Capsulitis**

Clinical examination is the key.

A healthy structure will function painlessly while a damaged structure will not. Thus each tissue from which pain could arise is put through its paces in turn and as each structure has a known and separate function this presents few obstacles. The tissue that cannot operate without bringing on the pain is the guilty party.

This methodology of diagnosis is commonly referred to as **selective tension**.
Basically, the clinician subjects each tissue about the incriminated joint to tension.

The diagnosis should describe the lesion as exactly as possible. Vague phrases such as rotator cuff syndrome, tennis elbow, low back pain, sciatica are unhelpful, in that they do not answer the important question – **which structure is affected?**

The clinician must therefore continue examining the patient to the point at which a precise description of the lesion is achieved: for example supraspinatus tendinitis at the superficial aspect of the tenoperiosteral junction, lateral epicondylitis at the anterior aspect of the lateral humeral epicondyle.

Such precise identification of the lesion is essential to determine the most effective treatment.

Functional testing is based on the recognition of two different groups of structures: **inert and contractile tissues.**

**Inert and Contractile Tissues**

Soft tissues are either inert or contractile. This distinction is one of the pillars on which the whole system of orthopedic medicine rests. The soft tissues of the locomotor system can be divided on the one hand into tissues that can contract (the **contractile structures**) and on the other hand, tissues that do not posses this capacity (the **non-contractile or inert structures**).

**Inert Structure**

And inert structure does not possess an inherent capacity to contract and relax and can thus be tested only by passive stretching or squeezing.

If a patient relaxes his/her limb and the physician moves it for her, the inert structures will be stretched; but no material strain is brought to bear on the contractile tissues. So if a passive movement hurts, an inert structure is considered at fault. The inert structures are stretched at the extreme of range of the joint and it is then that any pain would be apparent.

**Contractile structure:**

The complex of muscle origin, muscle belly, musculotendinous junction, body of tendon, tenoperiosteal junction and also the bone adjacent to the attachment are clinically considered contractile.

The main method of testing these structures is by maximal contraction against resistance.

For example, if the physician holds the joint still while the patient exerts his/her muscles against the resistance of the physician, no significant strain will be placed on the inert
structures. Instead it places resistive stress upon the specific muscle group responsible for the attempted movement.

For example, if the patient tries to adduct his/her arm against the resistance of the doctor, then tension is put on the pectoralis major, both teres muscles and latissimus dorsi. Therefore, if a resisted movement brings on the pain, the related contractile structure is the one to lay blame on.

<table>
<thead>
<tr>
<th>Inert Tissues</th>
<th>Contractile Tissues</th>
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<tbody>
<tr>
<td>Joint capsules</td>
<td>Muscle-bone attachment</td>
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<tr>
<td>Ligaments</td>
<td>Muscle belly</td>
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<tr>
<td>Bursae</td>
<td>Musculotendinous junction</td>
</tr>
<tr>
<td>Aponeuroses</td>
<td>Body of tendon</td>
</tr>
<tr>
<td>Dura Mater</td>
<td>Tenoperiosteal junction</td>
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<tr>
<td>Dural sleeve of nerve root</td>
<td>Bone adjacent to the attachment of tendon</td>
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<tr>
<td>Peripheral nerves</td>
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**Physical Exam**

In the early phase of FS, the only physical finding may be pain produced at the end of ROMs in the glenohumeral joint, particularly those that stretch the capsule, such as combined abduction and external rotation (such as combing one's hair) or combined extension and internal rotation (such as reaching to scratch one's midback).

<table>
<thead>
<tr>
<th>Functional Tests</th>
<th>Tissue/Structure Involved</th>
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<tbody>
<tr>
<td>Passive abduction</td>
<td>Joint capsule</td>
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<tr>
<td>Passive adduction</td>
<td>Joint capsule, AC sprain</td>
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<tr>
<td>Passive internal (medial) rotation</td>
<td>Joint capsule</td>
</tr>
<tr>
<td>Passive external (lateral) rotation</td>
<td>Joint capsule</td>
</tr>
<tr>
<td>Resisted abduction</td>
<td>Supraspinatus</td>
</tr>
<tr>
<td>Resisted adduction</td>
<td>Pectoralis major, latissimus dorsi</td>
</tr>
<tr>
<td>Resisted lateral (external) rotation</td>
<td>Infraspinatus</td>
</tr>
<tr>
<td>Resisted medial (internal) rotation</td>
<td>Subscapularis</td>
</tr>
<tr>
<td>Resisted elbow flexion</td>
<td>Bicep</td>
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<tr>
<td>Resisted elbow extension</td>
<td>Tricep</td>
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During the initial, painful stage, FS may not be distinguishable from an inflammatory synovitis affecting the glenohumeral joint or from a painful episode of rotator cuff tendinopathy. In the second, or freezing, stage of the disease, contracture of the glenohumeral joint becomes readily apparent. This stage may occur only several months after the onset of symptoms.

As the condition progresses, the clinician should observe progressive limitation of the passive range of motion (PROM), characterized by a painful capsular end-feel. The motion affected first and most severely is **external rotation**, followed by **abduction, internal rotation, and**
flexion. Extension and horizontal adduction tend to be least affected. PROM of the glenohumeral joint progressively worsens over several months and may result in a loss of up to 80% of the normal movement of glenohumeral joint.

**Combination of Glenohumeral Joint and Scapulothoracic Restriction**

As the disease progresses, evaluation of active range of motion (AROM) may show an inverted scapulothoracic motion (that is, motion of the scapula on the thorax). For example, the scapulothoracic joint initiates abduction (followed by the glenohumeral joint) to compensate for the loss of ROM in the glenohumeral joint.

In general, the scapular rotation occurs at 60 degrees with active abduction of the shoulder. In an unaffected person, the shoulder can be passively abducted to 90 degrees even when the physician holds the scapula. **Inability to achieve the 90-degree arc with scapular stabilization is the clue to the diagnosis in both primary and secondary adhesive capsulitis.** It is important to assure that the scapula is secured when assessing passive range of motion.

When examining a shoulder with restricted abduction, one of the first questions that needs to be answered is, “is there freedom of scapular mobility as distinguished from glenohumeral movement?”

Placing the hand on the scapula to note its movement as the arm is abducted answers the question.

Although some authors claim that any restriction of movement at the shoulder is diagnostic of a “frozen shoulder, with a primary decreased glenohumeral joint range, others claim that it is the restriction of **both scapular glide and glenohumeral movement** which should be given the clinical diagnosis of “frozen shoulder”.

Unfortunately, this decreased joint motion is compensated for by an increase in scapulothoracic motion during flexion and abduction leading to increased stress on other
structures around the shoulder. This in turn will commonly lead to global pain syndromes, guarding and decreased range of motion.

**The Subscapulis Syndrome- An Overlooked Cause of Primary FS**

The symptoms of progressive painful restriction of abduction and external rotation of the arm due to subscapularis trigger points are often diagnosed as a "frozen shoulder."

In the early stage of myofascial involvement of the subscapularis, patients can reach up and forward, but are unable to reach backward with the arm held at shoulder level, as when starting to throw a ball. With progression of TP hyperactivity, abduction at the shoulder becomes severely restricted to 45° or less. These patients complain of pain both at rest and on motion, and of inability to reach across to the opposite armpit.

Acting alone, the subscapularis internally rotates and adducts the arm, and helps to hold the head of the humerus in the glenoid fossa. Because the deltoid muscle attaches proximal to the midpoint of the humerus, during abduction it tends to pull the head of the humerus upward, out of the glenoid fossa and against the acromion. During abduction, the depressor action of the subscapularis contributes a major force to counteract this upward displacement caused by the deltoid.

When only the subscapularis muscle is shortened and taut, abduction and external rotation at the shoulder are reciprocally limited; one movement can trade for the other, which is easily demonstrated. If the patient has moderately active subscapularis TPs, abduction of the arm at the shoulder is limited to about 90° when the forearm hangs down, which fully internally rotates the arm. No external rotation of the arm at the shoulder is possible in this position. However, with the arm adducted by placing the elbow at the side and with the elbow bent at 90° to show shoulder joint rotation, close to 90° of external rotation is possible. The arm is internally rotated when the hand touches the abdomen and performs 90° of external rotation of the arm at the shoulder when the hand points forward. Involvement of the teres major, anterior deltoid and
lower fibers of the pectoralis major also can produce this same response, but not as severely or consistently as the subscapularis.

The humeral attachment of the subscapularis is usually very tender to palpation when there is chronic TP involvement of the muscle. To examine this attachment, the arm is placed by the side and externally rotated as the patient extends the arm by trying to bring the elbow behind the plane of the back. This rotates the humeral attachment from the cover of the coracoid process to the front of the shoulder, where it can be palpated.

The trigger point examination needs to be precise to provide the necessary information to consider the subscapularis syndrome

**Abduction of the scapula** is necessary to reach many of the TPs in this muscle.

When viewed in terms of myofascial TP phenomena, the etiology and natural history of most "frozen shoulders" is clear. The patient activates TPs in the subscapularis muscle which, in turn, causes associated TPs to develop in most of the remaining shoulder muscles. Also, the initiating trauma, in some cases, may activate primary TPs in several shoulder-girdle muscles.

The idiopathic "frozen shoulder," in our experience, usually starts with the activation of TPs in the subscapularis muscle. This restricts abduction at the shoulder, which sensitizes the pectoralis major and minor, latissimus dorsi, and triceps muscles to the development of TPs.

The restriction of external rotation similarly sensitizes the anterior deltoid and teres major muscles. Referred pain from the subscapularis to the posterior deltoid region makes the latter muscle liable to satellite TPs. Involvement may continue to spread to other muscles causing an overload of antagonists and restriction of their range of motion. Eventually all of the shoulder-girdle muscles may become involved. Regardless of the name used, the important contribution by the muscles to this common condition remains the same. The peak age incidence of idiopathic "frozen shoulder" corresponds to that of the fibrositis syndrome.

Diagnostically, the distribution of the referred pain and tenderness depends on which TPs are active in which muscles.

The severely restricted range of motion is seldom missed, but the fact that the muscles are primarily responsible is only occasionally noted. **That the subscapularis muscle is critically involved is usually overlooked.**

Tenderness and calcification at the tendinous attachment of the supraspinatus muscle may develop as part of the "frozen shoulder" syndrome during prolonged TP activity and tension in that muscle.

**How does adhesive capsulitis relate to myofascial TPs in the "frozen shoulder?**

To understand how subscapularis TPs could lead to capsulitis, it helps to remember that several muscles, including the subscapularis, trapezius, sternocleidomastoid, and infraspinatus are known to produce dramatic referred autonomic phenomena including vasoconstriction leading to hypoxia. In turn this may induce fibrotic changes in the adjacent glenohumeral joint capsule that lead to adhesive capsulitis.
Diagnostically, it is not clear whether some of the arthrographic distortions of the lower bursal fold may not be caused by pressure from the taut, involved subscapularis fibers. The bursal fold lies between the subscapularis and the neck of the scapula.

**Laboratory Testing**

Although there are no specific lab tests to diagnose adhesive capsulitis, it is a prudent physician who does his/her due diligence to rule out systemic/autoimmune disease.

The scientific literature shows an elevated incidence of diabetes, hyper/hypo-thyroidism, and hypertriglyceridemia in patients with FS.

This association should prompt possible testing of thyroid-stimulating hormone (TSH), serum triglycerides, and fasting blood sugar levels in most patients, particularly those presenting with bilateral disease and patients presenting with FS who are younger than 45 years. In addition, inflammatory arthritis or polymyalgia rheumatica may present as FS requiring inflammatory markers such as ESR and CRP.

- Thyroid-stimulating hormone
- ESR
- Antinuclear antibody
- CBC
- Glucose level
- Triglycerides,
- CRP (quantitative)
Imaging Studies

In general, idiopathic FS is considered a clinical diagnosis that does not require confirmation with radiologic imaging, however diagnostic imaging may be of value in ruling out associated conditions that may influence the treatment of the patient. Basically, radiographs are important in assessing restricted range of motion in the diagnosis of secondary adhesive capsulitis.

All patients presenting with FS should undergo plain radiography of the shoulder, with the acquisition of soft-tissue views of the rotator cuff to rule out a septic or metastic process. Osteoarthritis, fracture, avascular necrosis, crystalline arthropathy, calcific tendinitis and neoplasm may be detected on plain radiographs. Radiographs of patients with early adhesive capsulitis are normal. Later changes sometimes show osteopenia, cyst-like changes in the humeral head and joint-space narrowing.

A plain radiograph may also show evidence of a large calcification of the rotator cuff in the painful resorptive phase, an avascular necrosis of the humeral head or a Charcot joint.
Plain radiograph shoulder include anteroposterior (AP), external AP, internal AP, axillary, and supraspinatus outlet views to rule out osteoarthritis, calcific tendinitis, avascular necrosis, osteomyelitis, fracture, dislocation, and tumor.

**AP View**

Check osteopenia, fractures, dislocations, and superior migration of humeral head.

**True Axillary View**

Done properly, this view allows of assessment of humeral wear in the anterior and posterior planes. And if aligned just right, it should show bone defects in the anterior glenoid lip.

This view is actually difficult to get just right, even by a skilled radiology tech. A true axillary view will have an "eye" just posterior to the glenoid (see image below). If this eye is not present, the anterior glenoid edge will be obliqued by the superior or inferior glenoid edge - which may mask severe defects that only a properly aligned axillary view will reveal. If the "eye" is not seen on the axillary view, this shot should be redone.

This view may also show decreased joint space, fractures, osteophytes, dislocations, Hill Sachs and reverse Hill Sachs Lesions.
Supraspinatus outlet views: Although a good view to rule out acromial impingement, the findings may be difficult to reproduce consistently because of thoracic kyphosis or superimposition of adjacent osseous structures, such as the clavicle, ribs or scapular body. Variations of the supraspinatus outlet angle and a high rate of interobserver error have been reported, suggesting inaccuracy of SOV.

Other studies

Arthrography, Bone Scans and MRI

Current research has found that both arthrography and bone scans of the glenohumeral joint are not useful in predicting the rate or extent of FS recovery. Some studies have suggested that arthrography of the glenohumeral joint is a poorly sensitive test for diagnosing FS, however when positive, the contrast medium shows that the normally rounded outline of the capsule is replaced by a squat, square contracted patch. The redundant fold at the inferior portion of the joint, which normally hangs down like a pleat, is obliterated. Look for lack of dye filling the bicipital sheath. Normal joint volume is reduced from 20-30 mL to 5-10 mL.
Remember, although this is a classic sign of FS and confirms the diagnosis it makes arthrography highly sensitive but not specific.

In the same light, bone scans are highly sensitive but not specific.

Although magnetic resonance imaging (MRI) are sensitive imaging modalities that depict specific signs for FS, it is not the common first choice of shoulder imaging because the decrease in joint fluid is not appreciated. However, MRI may be considered to evaluate rotator cuff, thickening of the shoulder capsule and to rule out other shoulder disorders.

**Treatment for Frozen Shoulder**

First and foremost, you need to have done your due diligence and determine if the patient has a primary or secondary adhesive capsulitis.

Pending an underlying systemic disease such as diabetes, treatment should be promptly initiated to manage the complicating factors associated with the named disease.

As functional medicine practitioners, we have a responsibility to the patient to view medical management from both the traditional and alternative position.

Frozen shoulder can be complicated requiring a thorough review of the patient’s past and present history.

Review of the list of possible causes listed above need to taken into consideration and ruled out or ruled in.

**DO NOT** make the assumption that your patient suffering with adhesive capsulitis simply has a primary or mechanical issue and can be treated with mechanical therapeutics.

It takes a wise and prudent healthcare provider to be privy of non-mechanical issues which lead to a secondary adhesive capsulitis.

Please understand that the mechanical dysfunction may have resulted from a systemic disorder and still needs to be treated mechanically, however, unless the underlying systemic disorder is not addressed your degree of clinical improvement is likely to be poor.

In the event you have ruled out an underlying systemic disorder, the following therapeutic protocol has been well documented to achieve a good level of clinical improvement.

The present literature has shown that clinicians should be most conservative in designing a therapy program for patients with FS. An intermittently supervised, home-based articular stretching and strength-maintenance program can be combined with manual therapy, the appropriate prescriptive analgesic medications and/or natural analgesic agents, and the judicious use of electroanalgesia, ultrasound and warm packs. This approach generally suffices to provide adequate pain relief in most patients while the disease runs its usual, favorable course.
Treatment of the frozen shoulder can be frustrating and slow. Most cases will eventually improve, but it may be a process that takes months. Initial treatment is directed at decreasing inflammation and increasing the range of motion of the shoulder with a stretching program.

Constant encouragement is necessary for patients with adhesive capsulitis, since resolution may be slow.

Arguably, the most important aspect of treatment is maintaining shoulder motion. Physical therapy is prescribed for most patients. A series of simple exercises that can be performed twice daily at home include:

**“Climbing the wall”:** The patient faces a wall and places the hand flat against the wall. Using the fingers to crawl, spider-like, upward, the goal is to reach as high as possible, pausing every few inches to hold the position for 30 seconds. The same maneuver is then performed with the arm extended to the side. At each session, an effort is made to reach a little higher.

**Codman exercises:** Sitting sidewise on a chair, the affected arm is draped over the chair’s back, with the chair back in the armpit. The dangling arm is swung in increasingly large circles for 30 seconds, and then the circles are repeated in the opposite direction. This same exercise can be performed while leaning forward over a low counter and letting the affected arm hang straight downward.

**Rotation:** Alternatively reaching for the back of the head (as if combing the hair) and then reaching behind the back (as if reaching for a zipper or shirttail) takes the shoulder through internal and external rotation.

Research has shown the best way to lengthen connective tissue structures without promising their structural integrity is to use prolonged, low-intensity stretching at elevated tissue temperatures and subsequent cooling of the tissue before releasing the tension.

An effective procedure that the patient could do at home is first to warm up the shoulder with moist heat for 10 to 15 minutes then to lie supine with the shoulder in external rotation le holding a 1- to 2-lb weight and maintaining the stretched position for up to 45 minutes or more with the moist heat on the anterior shoulder. The patient may feel discomfort, but not pain.

Moist heat packs may have to be replaced every 10 minutes to maintain heat. During the last 10 to 15 minutes, ice should be applied. The patient should follow this procedure at 5 days per week.

Painless joint mobilization of the scapular and shoulder should also be used for breaking adhesions.

Long axis traction of the humeral head with the patient in a prone position.

Friction over the fibrous cuff may be beneficial.

Myofascial release techniques to the compromised muscles should be considered.

Rule out hypomobility or facilitation of the motor units of the cervical spine (C5).
Once adhesive capsulitis has resolved, it is important to continue range-of-motion exercises on a daily basis.

**Corrective Recommendations for a Subscapularis Syndrome Induced FS**

**Sleep Position**

When sleeping on the painful side or back, the patient should keep a small pillow between the elbow and side of the chest, thus maintaining some arm abduction and preventing prolonged positioning of the subscapularis muscle in the fully shortened position. When sleeping on the pain-free side, the pillow is moved to support the painful arm in front of the body. This prevents folding the arm across the chest.

**Posture Stress**

The patient should hook the thumb in the belt or on the hip when standing for a period of time to prevent the arm from remaining close to the side. Also, when sitting, the patient should move the arm to stretch the muscle frequently. When driving a car, this stretching is done by resting the right arm across the back of the passenger's front seat, or by opening the window in warm weather and holding on to the roof of the car with the left hand. In cold weather, the armrest on the door may be used for the left arm. When driving long distances, the subscapularis muscle generates much referred pain if it remains in the shortened position without movement; a non-dominant left subscapularis is the more vulnerable, since a dominant right arm is more active.
Long-term functional results after manipulation of the frozen shoulder.

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The use of shoulder manipulation in the treatment of frozen shoulder syndrome remains controversial. Opponents cite the risk of dislocation, fracture, nerve palsy, and rotator cuff tearing as limiting the usefulness of manipulation. A retrospective study of 38 shoulder manipulations in 32 patients was performed. These patients were followed for an average time of 26 months. The patients were examined in follow up for combined shoulder range of motion, external and internal rotation strength, and status of the long head of the biceps. Manipulation was performed in all patients by the senior author and supervised physical therapy was begun within 24 hours of the manipulation. The average recovery time was 13 weeks. In this series, 97% of patients had relief of pain and recovery of near complete range of motion, although 8% required a second manipulation to obtain a successful result. Mild weakness to manual muscle testing was present in 8.3% of patients in external rotation and 10.5% of patients in internal rotation. There was no deterioration of shoulder function with time. In fact, most patients improved with passage of time, even more. There was no evidence of biceps tendon rupture or rotator cuff insufficiency at the time of follow up in any of the patients. No fractures, dislocations or nerve palsies were observed, although one patient who had no premanipulation arthrogram was found to have a rotator cuff tear a few months after failed manipulation. Manipulation of the shoulder can therefore be offered to reduce the pain and period of disability in patients who fail conservative treatment of frozen shoulder syndrome.

PMID: 10046277 [PubMed - indexed for MEDLINE]
Musculoskeletal manifestations in patients with thyroid disease.

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OBJECTIVE: Thyroid dysfunction may cause musculoskeletal symptoms. We have evaluated the prevalence of adhesive capsulitis. Dupuytren's contracture, trigger finger, limited joint mobility and carpal tunnel syndrome in a series of patients with various thyroid diseases and differing levels of function. DESIGN AND PATIENTS: Patients with euthyroid (diffuse and/or nodular) goitre, Hashimoto's thyroiditis, Graves' disease, toxic nodular goitre, toxic diffuse goitre and patients with goitre who had partial thyroidec- tomy were included in the study (n = 137). Neurological and musculoskeletal examinations were performed after a standardized symptom questionnaire. The prevalence of musculoskeletal problems was analysed with respect to thyroid function and thyroid autoantibody status. MEASUREMENTS: Serum concentrations of free T3, free T4, TSH and thyroglobulin and thyroperoxidase antibodies were determined. Serum levels of creatine kinase, lactate dehydrogenase, calcium and phosphate along with erythrocyte sedimentation rate were measured to exclude other causes of musculoskeletal complaints. RESULTS: When the study group (n = 137) was divided according to thyroid status, 30.6% (n = 42) were thyrotoxic, 16.8% (n = 23) had subclinical thyrotoxicosis, 28.5% (n = 39) were euthyroid, 7.3% (n = 10) had subclinical hypothyroidism and 16.8% (n = 23) were hypothyroid. Overall, adhesive capsulitis was found in 10.9% (n = 15), Dupuytren's contracture in 8.0% (n = 12), limited joint mobility in 4.4% (n = 6), trigger finger in 2.9% (n = 4) and carpal tunnel syndrome in 9.5% (n = 13) of the patients. The prevalence of adhesive capsulitis was highest in patients with subclinical thyrotoxicosis (17.4%); Dupuytren's contracture, limited joint mobility and carpal tunnel syndrome were commonest in hypothyroid patients (21.7%, 8.7% and 30.4%, respectively). Trigger finger occurred in 10% of patients with subclinical hypothyroidism. When these prevalences were analysed with respect to thyroid status, carpal tunnel syndrome was significantly more prevalent in the hypothyroid group (P = 0.004). When thyroperoxidase antibody-positive and -negative patients were compared, adhesive capsulitis negatively (P = 0.03, r = -0.18) and trigger finger positively correlated with (P = 0.03, r = 0.21) thyroperoxidase antibody existence. CONCLUSIONS: These results demonstrate that musculoskeletal disorders often accompany thyroid dysfunction. In addition to the well-known observation that these disorders are common in patients with hypothyroidism, they are also observed in patients with thyrotoxicosis. Patients with thyroid dysfunction should be questioned for musculoskeletal complaints and referred to a specialist if necessary.
A prospective study of adhesive capsulitis of the shoulder ("frozen shoulder") in a high risk population.

Bruckner FE, Nye CJ.

In order to evaluate risk factors for adhesive capsulitis of the shoulder ("frozen shoulder") a prospective study was carried out in neurosurgical patients, in whom there is a high incidence of capsulitis. Ninety-nine patients were admitted into the study, most of whom had surgical treatment for sub-arachnoid haemorrhage. Ninety-one patients (92 percent) were followed up at six months, and of these 23 (25.3 per cent) had developed adhesive capsulitis, which was bilateral in three. Three patients developed the shoulder-hand syndrome. By comparing the patients with capsulitis at six months with those in whom no capsulitis was found, we were able to evaluate 28 possible risk factors (Appendix I). The subsequent development of adhesive capsulitis in our patients was associated with, (1) impairment of consciousness, (2) hemiparesis, (3) duration of post-operative intravenous infusion, (4) age, and (5) depressive personality. These five associations were statistically significant. Associations with phenobarbitone therapy and hysterical personality were suggested, but these did not reach statistical significance. Routine treatment with corticosteroids post-operatively did not prevent capsulitis.

PMID: 7302118 [PubMed - indexed for MEDLINE]

Bilateral adhesive capsulitis, oligoarthritis and proximal myopathy as presentation of hypothyroidism.

Bowman CA, Jeffcoate WJ, Patrick M, Doherty M.

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A patient who presented with bilateral adhesive capsulitis of the shoulder, oligoarthropathy and rapidly progressive proximal myopathy is described. Although clinically euthyroid, autoimmune and biochemical hypothyroidism was the only predisposing factor found. Clinical deterioration after initiation of thyroxine replacement was followed by delayed improvement with reduction in initially elevated ESR and CRP.

PMID: 3337932 [PubMed - indexed for MEDLINE]
The painful diabetic shoulder.

Morén-Hybbinette I, Moritz U, Scherstén B.

Different types of shoulder affection were studied in 62 diabetic patients with shoulder pain. Three groups of shoulder joint disorder were found: painful shoulder with restricted mobility (62%), tendinitis without mobility restriction (27%), and a small group with mixed diagnoses. Sixty per cent had hand symptoms and 38% had restricted mobility of their hip joints. High frequencies of retinopathy and neuropathy were found. Affection of the shoulder joint was seen with almost the same frequency in insulin-dependent as in non-insulin-dependent patients, but after a shorter duration of diabetes in the latter. A group of patients with the triad shoulder pain, hand symptoms and restricted mobility of the hip joints had a significantly higher frequency of proliferative retinopathy than patients with shoulder pain only. The long duration of diabetes, the high frequency of insulin treatment and classical late complications indicate that diabetic patients with painful shoulder and restricted mobility are suffering from clinically advanced diabetes mellitus.

PMD: 3739754 [PubMed - indexed for MEDLINE]

Immunological studies in frozen shoulder.

Bulgen D, Hazleman B, Ward M, McCallum M.

Serum immunoglobulin levels were determined in 25 patients with frozen shoulder and in 25 age- and sex-matched controls. Serum IgA levels were significantly reduced (P less than 0.001) in the patients with frozen shoulder and remained so after clinical recovery. Lymphocyte transformation to phytohaemagglutinin in 21 patients also showed significant depression (P less than 0.01). These results support the suggested immunological pathogenesis of this condition.

PMD: 646464 [PubMed - indexed for MEDLINE]  PMCID: PMC1001178
HLA-B27 and frozen shoulder.

Bulgen DY, Hazleman BL, Voak D.

Histocompatibility antigens were determined in 38 patients with frozen shoulder and 216 normal blood-donors. **HLA-B27 was significantly more common in patients with frozen shoulder (42%) than in the controls (10%).** The distribution of the other 19 histocompatibility antigens was similar in the patient and control groups. This result may be associated with the suggested immunological pathogenesis of the condition.

PMD: 57430 [PubMed - indexed for MEDLINE]

Immunological studies in frozen shoulder.

Bulgen DY, Binder A, Hazleman BL, Park JR.

This immunological study of 40 patients with frozen shoulder showed a pretreatment increase in immune complex levels, C-reactive protein, and decreased lymphocyte transformation to phytohemagglutinin and concanavalin A compared to a control group. Repeat estimations after 6 months showed that values tended to approach control levels.

PMD: 7161781 [PubMed - indexed for MEDLINE]

Personality in frozen shoulder.

Fleming A, Dodman S, Beer TC, Crown S.

Fifty-six patients with frozen shoulder have had their personality profiles investigated by means of the Middlesex Hospital Questionnaire. **Females showed significantly increased somatic anxiety compared with controls.** It is suggested that this may be important both to aetiology and treatment. Males and females should be assessed separately in future studies of frozen shoulder.

PMD: 1234412 [PubMed - indexed for MEDLINE]  
PMCID: PMC1006580
Shoulder capsulitis in type I and II diabetic patients: association with diabetic complications and related diseases.

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OBJECTIVE: To examine the association between shoulder capsulitis and chronic diabetic complications and diseases closely related to diabetes. METHODS: A cross sectional study in 291 type I [mean (SD) age 33.2 (9.9) years] and 134 type II [61.1 (12.4) years] diabetic patients. The presence of shoulder capsulitis, Dupuytren disease, and limited joint mobility was sought. The patients were assessed for background and proliferative retinopathy, nephropathy, autonomic neuropathy, and peripheral symmetrical somatic polyneuropathy. Diseases closely related to diabetes (hypertension, history of myocardial infarction, coronary heart disease, and periperal vascular disease) were also recorded. RESULTS: Prevalence of shoulder capsulitis was 10.3% in type I and 22.4% in type II diabetic subjects. Shoulder capsulitis was associated with the age in types I (P < 0.01) and II (P < 0.05) diabetic patients, and with the duration of diabetes in type I patients (P < 0.01). Odds ratios for autonomic neuropathy in type I and type II diabetic subjects with shoulder capsulitis were 4.1 (95% confidence interval, 1.6 to 10.9) and 2.7 (95% CI, 1.1 to 7.0), respectively, after controlling for age and duration of diabetes. Odds ratio for history of myocardial infarction in type I diabetic subjects with shoulder capsulitis was 13.7 (95% CI, 1.3 to 130.5) after controlling for age, duration of diabetes, hypertension, and smoking habits. Other associations between shoulder capsulitis and diabetic complications, related diseases, and other hand abnormalities were fully explained by age and the duration of diabetes. CONCLUSIONS: Shoulder capsulitis is common in type I and type II diabetic patients. It is associated with age in type I and II diabetic patients and with the duration of diabetes in type I patients. It is associated with autonomic neuropathy in type I and II diabetic patients and with history of myocardial infarction in type I diabetic patients independently of time related variables.

PMID: 9014565 [PubMed - indexed for MEDLINE]  PMCID: PMC1010343

Contracture of the shoulder.

Nobuhara K, Sugiyama D, Ikeda H, Makiura M.

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A retrospective study involving 2272 patients with a limited range of motion of the shoulder in the period from 1970 to 1987 is described. Of these, 1210 patients (60%) were diagnosed as having frozen shoulder, with the highest incidence occurring in patients aged 50-60 years. The mechanism involved in the contracture is complicated. At first, the movement of the greater tuberosity at the subacromial level (also called the subacromial secondary joint) is limited due to bursitis. The external rotation of the upper arm then decreases, and the long rotator muscles contract. The relationship between the cause of contracture and the direction of the decreased mobility was analyzed. A ratio of the degree of external rotation with the arm beside the body to that achieved with the arm elevated to the horizontal plane showed values of almost one to one. Conservative treatment including physiotherapy, local anesthetic block, and joint distension must be attempted in all patients. If the conservative treatment remains ineffective, the surgical procedure should be considered. Satisfactory clinical results of arthroplasty of the subacromial joint were obtained in patients with frozen shoulder.

PMID: 2838126 [PubMed - indexed for MEDLINE]
Continuous passive motion provides good pain control in patients with adhesive capsulitis.

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Painful stiffening of the shoulder, 'frozen shoulder' is a common cause of shoulder pain and disability. Continuous passive motion (CPM) is an established method of preventing joint stiffness and of overcoming it. A randomized, comparative prospective clinical trial was planned to compare the early response with different rehabilitation methods [CPM vs. conventional physiotherapy treatment (CPT) protocol] for adhesive capsulitis taking into consideration the clinical efficacy. A total of 57 patients with frozen shoulder were included in this study. Patients were assigned randomly to receive daily CPM treatments or CPT protocol. Parameters were measured at baseline, and at weeks 4 and 12. All patients were evaluated with respect to pain (visual analogue scale) at rest, pain at movement, pain at night, measurement of range of motion (shoulder flexion, abduction, internal-external rotation were assessed), constant functional shoulder score and the shoulder pain and disability index. The first group (n=29) (CPM group) received CPM treatments for 1 h once a day for 20 days during a period of 4 weeks. The second group (n=28) (CPT group) had a daily physiotherapy treatment protocol including active stretching and pendulum exercises for 1 h once a day for 20 days during a period of 4 weeks. All patients in both groups were also instructed in a standardized home exercise programme consisting of passive range of motion and pendulum exercises to be performed every day. In both groups, statistically significant improvements were detected in all outcome measures compared with baseline. Pain reduction, however, evaluated with respect to pain at rest, at movement and at night was better in CPM group. In addition the CPM group showed better shoulder pain index scores than the CPT group. CPM treatment provides better response in pain reduction than the conventional physiotherapy treatment protocol in the early phase of treatment in adhesive capsulitis.

Comparison of the early response to two methods of rehabilitation in adhesive capsulitis.

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PRINCIPLE: A randomised, comparative prospective clinical trial was planned to compare the early response to different rehabilitation methods for adhesive capsulitis taking into consideration the clinical efficacy and the cost effectiveness of the methods. METHODS: Forty patients with adhesive capsulitis were randomised into two treatment groups. The first group (CYR) received the Cynax approach of deep friction massage and mobilisation exercises three times weekly. The second group (PT) had daily physiotherapy including hot pack and short wave diathermy application. Both groups concluded their treatments with stretching exercises and were also instructed to a daily home exercise program. The primary end point of the study was to reach 80% of the normal passive range of motion (ROM) of the shoulder in all planes within a period of two weeks. Secondary end points were the overall ROM and pain response (spontaneous pain, night pain and pain with motion) to each treatment. RESULTS: 15 patients in the CYR group (95%) and 13 patients in the PT group (55%) reached sufficient ROM at the end of the second week (p < 0.05). The improvement in shoulder flexion, inner and outer rotation values and the decrease in pain with motion were significantly better in the CYR group after the first week of treatment. CONCLUSION: The Cynax method of rehabilitation provides a faster and better response than the conventional physiotherapy methods in the early phase of treatment in adhesive capsulitis. The method is non-invasive, effective and requires fewer hospital visits for a sufficient early response.
The effect of anterior versus posterior glide joint mobilization on external rotation range of motion in patients with shoulder adhesive capsulitis.

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STUDY DESIGN: Randomized clinical trial. OBJECTIVE: To compare the effectiveness of anterior versus posterior glide mobilization techniques for improving shoulder external rotation range of motion (ROM) in patients with adhesive capsulitis. BACKGROUND: Physical therapists use joint mobilization techniques to treat motion impairments in patients with adhesive capsulitis. However, opinions of the value of anterior versus posterior mobilization procedures to improve external rotation ROM differ. METHODS AND MEASURES: Twenty consecutive subjects with a primary diagnosis of shoulder adhesive capsulitis and exhibiting a specific external rotation ROM deficit were randomly assigned to 1 of 2 treatment groups. All subjects received 6 therapy sessions consisting of application of therapeutic ultrasound, joint mobilization, and upper-body ergometer exercise. Treatment differed between groups in the direction of the mobilization technique performed. Shoulder external rotation ROM measured initially and after each treatment session was compared within and between groups and analyzed using a 2-way ANOVA, followed by paired and independent t tests. RESULTS: There was no significant difference in shoulder external rotation ROM between groups prior to initiating the treatment program. A significant difference between groups (P = .001) was present by the third treatment. The individuals in the anterior mobilization group had a mean improvement in external rotation ROM of 3.0 degrees (SD, 10.8 degrees; P = .40), whereas the individuals in the posterior mobilization group had a mean improvement of 13.3 degrees (SD, 7.4 degrees; P < .001). CONCLUSIONS: A posteriorly directed joint mobilization technique was more effective than an anteriorly directed mobilization technique for improving external rotation ROM in subjects with adhesive capsulitis. Both groups had a significant decrease in pain.

PMID: 17416123 [PubMed - Indexed for MEDLINE]

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BACKGROUND: Idiopathic adhesive capsulitis is a commonly recognized but poorly understood cause of a painful and stiff shoulder. Although most orthopedic literature supports treatment with physical therapy and stretching exercises, some studies have demonstrated late pain and functional deficits. The purpose of this study was to evaluate the outcome of patients with idiopathic adhesive capsulitis who were treated with a stretching-exercise program. METHODS: Seventy-five consecutive patients (seventy-seven shoulders) with phase-II idiopathic adhesive capsulitis were treated with use of a specific four-direction shoulder-stretching exercise program and evaluated prospectively. The initial evaluation included the recording of a detailed medical and orthopaedic history and assessment of pain, range of motion, and function. The outcome evaluation included assessment of pain, range of motion, and function; completion of the Disabilities of the Arm, Shoulder, and Hand (DASH) Questionnaire; and completion of the Short Form-36 (SF-36) Health Survey. The mean duration of follow-up was twenty-two months (range, twelve to forty-one months). One patient died prior to the final evaluation, and three patients were lost to follow-up. RESULTS: Sixty-four (90 percent) of the patients reported a satisfactory outcome. Seven (10 percent) were not satisfied with the outcome, and five (7 percent) underwent manipulation and/or arthroscopic capsular release. The outcomes of the patients who did not have manipulation or capsular release were evaluated. There were significant improvements in the scores for pain at rest (from a mean of 1.57 points before treatment to a mean of 1.16 points at the final evaluation; p < 0.001) and pain with activity (from a mean of 4.12 points before treatment to a mean of 1.33 points at the final evaluation; p < 0.0001). On the average, active forward elevation increased 43 degrees, active external rotation increased 25 degrees, passive internal rotation increased eight vertebral levels, and the glenohumeral rotation arc at 90 degrees of abduction increased 72 degrees (p < 0.00001). The number of 'yes' responses to the Simple Shoulder Test increased from a mean of 4.1 (of a possible twelve) to a mean of 10.75 (p < 0.00001). Despite the significant improvements and the high rate of patient satisfaction, there were still significant differences in the pain and motion of the affected shoulder when compared with those of the unaffected, contralateral shoulder (p < 0.00001). At the final outcome evaluation, the DASH scores demonstrated limitations when compared with known population norms, whereas the profiles of the SF-36 were comparable with those of age and gender-matched control populations. Prior treatment with physical therapy and a Workers’ Compensation claim or pending litigation were the only variables that were associated with the eventual need for manipulation or capsular release. Male gender and diabetes mellitus were associated with worse motion at the final evaluation. Patients with a greater severity of pain with activity at the initial evaluation had significantly lower DASH scores at the final evaluation, and patients with lower initial scores on the Simple Shoulder Test had comparatively lower scores on the Simple Shoulder Test at the outcome evaluation.

CONCLUSIONS: The vast majority of patients who have phase-II idiopathic adhesive capsulitis can be successfully treated with a specific four-direction shoulder-stretching exercise program. Although measurable limitations and deficiencies were noted at the outcome evaluation, these appeared to be acceptable to most of the patients and did not affect their general health status. Patients with more severe pain and functional limitations before treatment had relatively worse outcomes. More aggressive treatment such as manipulation or capsular release was rarely necessary, and the efficacy of early use of these treatments should be further studied.