



## Review

## Frozen shoulder – A stiff problem that requires a flexible approach

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## ABSTRACT

Frozen shoulder is a specific, painful and debilitating condition effecting patients mainly in middle age. While it has been recognised for over 100 years, it is still mis-diagnosed, with a natural history that is poorly understood and with limited evidence for the efficacy for various treatments. This review considers what is known about this common painful condition and the treatments available.

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### Box 1: British Elbow and Shoulder Society (BESS) survey-definition of frozen shoulder [8]

Definition of Frozen Shoulder	
Symptoms	True (deltoid insertion) shoulder pain Night pain of insidious onset
Signs	Painful restriction of active and passive motion Passive elevation less than 100° Passive external rotation less than 30° Passive internal rotation less than L5 All other shoulder conditions excluded
Investigations	Plain radiographs normal Arthroscopy shows vascular granulation tissue in the rotator interval

## 1. Background

Frozen shoulder is an extremely painful and debilitating condition leading to stiffness and disability. The prevalence of shoulder complaints in the UK is estimated to be 14%, with 1–2% of adults consulting their general practitioner annually regarding new-onset shoulder pain [1]. Many of these patients may have apparent or true 'stiffness'. Apparent stiffness can occur either through muscle weakness (such as a rotator cuff tear) or through pain inhibition, whereas 'true' stiffness from frozen shoulder has characteristic features of pain and physical restriction of movements of the glenohumeral joint (ball and socket), in the presence of normal X-rays. This important difference is often not appreciated and frequently leads to an over and misdiagnosis of frozen shoulder [2,3]. Reasons for this range from education; variations in definition and clearly defined diagnostic criteria; common inaccurate terms used alongside frozen shoulder. Frozen shoulder has also been referred to as peri-arthritis, retractile capsulitis, adhesive capsulitis, and steroid-sensitive arthritis. These terms indicate a false pathology of the condition and are misleading. The pathology of this condition is a soft tissue fibrosis and inflammatory one. There are no 'adhesions' within the joint.

More recently, there has been an acknowledgement of the absence of a specific definition [5,6] and of diagnostic criteria for this condition [6] which both the British Elbow and Shoulder Society (BESS) and American Shoulder and Elbow Surgeons (ASES) have endeavoured to rectify. These societies tried to improve on the long established definition of Codman [7] who described the common features of a slow onset of pain felt near the insertion of the deltoid muscle, inability to sleep on the affected side with restriction in both active and passive elevation and external rotation, yet with normal radiographic appearance. A survey of the members of BESS overwhelmingly agreed with the definition of frozen shoulder as seen in Box 1 [8].

Frozen shoulder can be either primary (idiopathic – as in there are no detectable underlying cause) or secondary. Secondary frozen shoulder is defined as that associated with trauma, cardiovascular disease, hemiparesis or diabetes. The ASES and Robinson et al. [2,6] collectively agreed that frozen shoulder should be classified into primary and secondary types with secondary diabetic frozen shoulder being considered as a separate type since their disease course is usually more severe and protracted.

Clinical presentation is classically in three overlapping phases [9]:

- Phase 1: *Lasting 2–9 months*; Painful phase or pain predominant phase, with progressive stiffening and increasing pain on movement.
- Phase 2: *Lasting 4–12 months*; Stiffening, freezing or stiffness predominant phase, where there is gradual reduction of pain but stiffness persists with considerable restriction in range of motion.
- Phase 3: *Lasting 12–42 months*; Resolution or thawing phase, where there is improvement in range of motion with resolution of stiffness.

While frozen shoulder has been recognised for over 100 years, there still remains a lack of reliable evidence on the natural and variable history of this condition. In addition there is a lack of up to date high quality studies dealing with the variety of treatment options available. As such, it is sensible to involve patients in shared decision making about their treatment. We recommend a 'flexible' approach to frozen shoulder management, tailoring treatment choices to the needs of each individual patients dependent on factors such as symptom severity, age, occupation, patient requirements and longevity of symptoms.

### 1.1. Epidemiology

Frozen shoulder is estimated to affect 2–2.4% of the general population [10,11], with a cumulative incidence of 11.2 per 1000 person-years [12]. It typically occurs in the 5th and 6th decades of life, thus affecting individuals of working age. It is rare before the age of 40 years and is unusual in patients over 70 years. Women are marginally more affected than men [13–15]. 20% of contralateral shoulders can develop similar problems but bilateral simultaneous frozen shoulder is rare. Recurrence in the same shoulder is also very rare [14–16]. There is no current evidence to suggest a racial predisposition but there is some evidence of a genetic link with twins having up to a threefold increased risk [17].

The incidence of frozen shoulder in people with diabetes is higher and reported to be 10–36% with a combined prevalence of a diabetic predisposition and frozen shoulder estimated to be as high as 71.5%. Diabetics have a 2–4 times greater risk and a 10–20% lifetime risk of developing frozen shoulder compared to the general population and more importantly their disease course is usually more severe and protracted [9,11,18–20].

### 1.2. Natural history

The natural and apparent variable history of this condition is poorly understood. Many studies suggest that frozen shoulder is a self-limiting condition, with most cases recovering within 2–3 years [7,21], while others indicate a proportion of patients that do not regain full shoulder motion [9]. It has been suggested that up to 40% of patients may experience persistent symptoms with 7–15% having some degree of permanent loss of movement [22,23]. However the majority of these symptoms are usually mild and cause limited functional loss [22,24]. The two most comprehensive natural history studies are by Hand et al. [22] and Shaffer et al. [25]. Hand et al. [22] published the largest series of 223 patients with a mean follow up of 4.4 years showing that 59% made a full recovery

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