Frozen shoulder is a condition characterised by pain and global restriction of movement with loss of external rotation. It can be divided into primary and secondary forms. In the primary form there is no associated disease or a history of trauma, whilst the secondary form occurs after trauma or surgery. Its incidence in Caucasian populations is estimated to be between 2 and 5%. It occurs mainly in persons aged 40 to 60 years; women are more commonly affected than men.

Clinically it can be divided into a painful phase, a stiff phase, and a recovery phase. The painful phase lasts 2 to 9 months and usually begins insidiously. The pain interferes with sleep and is increased by movement, the patient becoming more aware of limitation of movement as time passes. In the stiff phase (typically lasting 3 to 12 months) restriction of movement becomes a major problem, which facilitates diagnosis. The recovery phase follows, during which the patient regains movement and function over a period of 5 to 26 months. The total duration of disability therefore lasts 12 to 42 months (30 months on average). Some patients may be left with some restriction of movement, but in most there is no residual impairment. Recurrence in the same shoulder has never been reported, though up to 20% of affected persons develop the condition on the opposite side.

The natural history of frozen shoulder is important not only for reassuring the patient that the condition will eventually improve, but also for assessing the results of various treatments. Although its aetiology is still unknown, frozen shoulder is associated with several diseases. For instance, diabetic patients have a higher incidence than the general population, as do those with hyperthyroidism, hypothyroidism, Parkinson’s disease and those who underwent cardiac surgery or had myocardial infarction. Some authors implicate genetic factors in its aetiology, but others could not confirm such assertions. An increased frequency of HLA-B27 in patients with frozen shoulder was reported, but such an association was not substantiated.

The pathophysiological process is believed to involve synovial inflammation and fibrosis of the joint capsule. Macroscopic examination shows thickening and contracture of the capsule. Fibroblasts account for the majority of cells, but mast cells are also present and act as the cellular intermediary giving rise to the characteristic fibroblast proliferation. The structure of the capsular collagen changes to involve a loss of fibril order and a twisting of collagen fibrils, and there is an increase in glycosaminoglycans and a decrease in glycoproteins. Furthermore, cytokines such as transforming growth factor β and platelet-derived growth factor may contribute to the inflammatory and fibrotic process. Abnormalities of matrix metalloproteinases and their inhibitors may prevent remodelling of the capsular fibrosis and prolong the disease. Patients treated with metalloproteinase inhibitors have been reported to develop frozen shoulder.

The diagnosis is made on the basis of the medical history, clinical and radiological examination, and exclusion of other shoulder pathologies. Impingement syndrome can be confused with the early stages of
frozen shoulder. Codman,\textsuperscript{13} who first used the term frozen shoulder, described 12 common features to diagnose the disorder. They are: pain coming on slowly, pain felt at the insertion of the deltoid, inability to sleep, painful and incomplete elevation and external rotation, with restriction of both the active and passive types, atrophy of infraspinatus, and little localised tenderness. Patients’ radiography, ultrasonography, and magnetic resonance imaging may reveal normalcy, but the pain is severe despite not affecting daily habits and routines. The intense pain could be attributed to an increased number of nerve endings in the capsular tissue or development of abnormal central pain processing. Functional magnetic resonance imaging may help examine the central pain sensitisation and assess the pain relief achieved by various therapies. Blood tests are not routinely required, but should be performed when other pathologies are suspected. Shoulder neoplasms also present with pain and stiffness despite their rarity. Thus, a high index of suspicion should be maintained especially in younger patients with persistent pain and discrete bony tenderness on light tapping.

There is no agreement on the standard management. Treatment options vary from benign neglect to clinical interventions. The latter include: supervised physical rehabilitation, non-steroidal anti-inflammatory medications, oral corticosteroid, intra-articular injections, suprascapular blocks, distension arthrography and closed manipulation, open surgical release, and arthroscopic capsular release. There is no conclusive evidence on the superiority of any of these interventions, as there are no robust data available comparing any specific treatment with the natural history of the disease. Successes of treatment could therefore be coinciding with the course of natural resolution.

The management of frozen shoulder depends on the phase of the disease and the patient’s preferences. In the painful phase, non-steroidal anti-inflammatory drugs are usually offered for mild pain. Physiotherapy is commonly used, often in conjunction with other treatment options. On its own its effectiveness is less clear. A study compared intensive physiotherapy with a programme of exercises performed within the limits of pain found better results in the gentler exercise group.\textsuperscript{14} Physiotherapy may be difficult for both the patient and physiotherapist when it is undertaken during the painful phase, because the pain prevents the exercises being carried out. Steroid injection is used to decrease the inflammatory process; it has better pain relief than physiotherapy, analgesics, or placebo. However, a meta-analysis concluded that it may be beneficial in the short term but the effect may be small and not well-maintained.\textsuperscript{15} Suprascapular blocks and acupuncture are other common treatment modalities.\textsuperscript{15} Manipulation under anaesthesia (MUA), recommended by Duplay\textsuperscript{16} in 1872 who first described the condition as periarthritis scapulo-humerale, is still used today but is increasingly performed together with surgical intervention. MUA carries the risks of humeral fracture, dislocation, cuff injuries, labial tears, or brachial plexus injury although the cumulative risk is small. Surgery is usually reserved for patients in whom conservative treatment has failed. The recommended duration of conservative treatment before surgery varies, and is usually 3 to 6 months.

Open or arthroscopic release of contracted tissue is typically combined with MUA. The anteroinferior capsular structures are divided as the rotator interval area is often affected. If this manoeuvre is not sufficient to restore internal rotation and flexion, posterior capsular release can be performed. Care should be taken to avoid injury to the axillary nerve in the inferior recess. Sectioning of the intra-articular portion of the subscapularis is controversial. Timing of MUA is a matter of preference; MUA before surgery allows easier entry of the arthroscope but increases the risk of severe fluid extravasation; MUA after arthroscopic access into a tight joint is more difficult, but identification of structures is easier and with less fluid extravasation. Also the manipulation is more controlled and the risk of complications decreased. Surgical interventions provide good to excellent results with few failures. The final outcome may depend on the initial degree of disability.\textsuperscript{17–19}

There are no randomised controlled trials of surgery for frozen shoulder. A recent trial of arthroscopic knee lavage has proved that inclusion of a placebo group can provide insights into the effects of current clinical practice.\textsuperscript{20} Future studies should focus on the aetiology and pathological process. The present situation of frozen shoulder is analogous to peptic ulcer disease before the discovery of Helicobacter pylori. Many patients appear to be offered treatments that are unnecessary or only partially effective.

REFERENCES