

This highlights the difficulties associated with long term follow up of patients who have undergone anterior cruciate ligament reconstruction, or indeed those who have not had their anterior cruciate ligament injury treated surgically. Sports participation may not be a useful outcome variable in the longer term as reduced sports participation may simply reflect a change in priorities on the part of the individual, rather than be regarded by the individual as a significant functional loss.

An important methodological concern pertaining to the study under review is the potential for selection bias. As the authors correctly observe, it is possible that those subjects with knee symptoms would have been more likely to participate in the current follow up than those whose knee continued to function well. This could in turn have resulted in an overall poorer outcome than if all of the original 238 had been contactable, and had responded and undergone a radiographic assessment

of their affected knee. Clearly the logistic problems of such long term follow up are considerable, and the authors should be congratulated rather than criticised for their efforts.

Whatever its shortcomings, the message from the current paper is clear. Anterior cruciate ligament rupture, whether treated surgically or not, is clearly associated with an increase in osteoarthritis in former soccer players. It remains to be seen whether improved surgical techniques of anterior cruciate ligament reconstruction and the use of grafts other than the patellar tendon can offer greater protection, while at the same time allowing resumption of sporting activities.

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Frozen shoulder

Effect of arthrographic shoulder joint distension with saline and corticosteroid for adhesive capsulitis

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Distension of the glenohumeral joint with saline and steroid has considerable short term benefit in adhesive capsulitis

Painful stiffening of the shoulder, first described by Duplay in 1834,¹ and aptly labelled “frozen shoulder” by Codman,² is a common cause of shoulder pain and disability. It is estimated to affect 2–5% of the general population and 10–20% of people with diabetes, with subsequent involvement of the contralateral shoulder estimated to occur in 5–40% of affected people.^{3,4} The cumulative incidence in general practice is estimated to be 2.4/1000/year (95% confidence interval 1.9 to 2.9).⁵ The condition is most common in the 5th and 6th decades and it is slightly more common among women. Based on his arthrographic findings of synovial inflammation and adhesions, the term “adhesive capsulitis” was first coined by Neviasser.⁶ These observations led to the commonly held hypothesis that inflammation of the capsule, leading to subsequent fibrosis,

is responsible for the clinical features of this condition.

Patients typically present with a history of gradual onset of severe, disabling shoulder pain accompanied by progressive limitation of both active and passive glenohumeral movement.⁷ Three phases have been described: an early painful phase, usually lasting two to nine months; an intermediate stiff phase, lasting 4–12 months, during which the stiffness predominates and pain is less pronounced; and a final recovery phase lasting 5–24 months, characterised by gradual return of movement.⁷ The pain and stiffness result in severe disability, restricting activities of daily living, work, and leisure activities. Although early studies suggested a self limiting condition lasting two to three years,⁸ other studies have found that up to 40% of patients have persistent symptoms and restriction

of movement beyond three years,⁹ and 15% have persistent disability.¹⁰ Therefore effective treatment that shortens the duration of symptoms and disability has the potential to be of considerable value in terms of reduced morbidity and costs to both the patient and the community.

Intra-articular glucocorticosteroid injections aimed at improving movement at the glenohumeral joint are commonly used to treat adhesive capsulitis, although evidence of their short term benefit has only recently been established.^{11,12} A randomised placebo controlled trial involving 93 participants, performed by Carette and colleagues,¹² showed that a single intra-articular injection of corticosteroid administered under fluoroscopic guidance combined with a simple home exercise programme was significantly better than placebo in improving pain and disability at six weeks, and this benefit was maintained at three months. The same study also showed that the addition of supervised physiotherapy, aimed at mobilisation of the glenohumeral joint, provided faster improvement in shoulder range of motion. Over time, the between group differences diminished, and by 12 months all treatment groups had improved to a similar degree.

We recently reported the positive results of a randomised, placebo controlled trial investigating the efficacy of intra-articular glucocorticosteroid injection combined with arthrographic distension of the glenohumeral joint with normal saline in this condition.¹³ We showed that shoulder joint distension

with a combination of saline and steroid for patients with a painful stiff shoulder of at least three months duration is of significant benefit over placebo in improving function, pain, and range of movement at three weeks, and this benefit appears to be maintained at six weeks. Consistent with the favourable natural history of this condition, we also found a statistically significant reduction in treatment group differences over time, and by 12 weeks, the sustained gain over placebo was only observed for function when measured by a patient preference questionnaire.

There are strong theoretical reasons to suggest that glenohumeral joint distension may be useful for shoulder stiffness. Andren and Lundberg¹⁴ first described arthrographic distension of the glenohumeral joint capsule leading to capsular rupture as a treatment for the painful stiff shoulder in 1965. They injected 20 ml contrast medium, and normal saline if a larger amount of fluid was required, into the joint, which was then allowed to flow back and forth between the syringe and joint several times or until capsular rupture. Subsequently, distension of the joint has been described using a variety of other substances such as local anaesthetic and air, with most including corticosteroid as part of the procedure.

Although numerous case series have reported favourable results of arthrographic shoulder joint distension, most have included corticosteroid; therefore it is not possible to directly attribute the benefit to the joint distension per se. Furthermore, two randomised controlled trials failed to find any benefit of distension combined with corticosteroid over corticosteroid alone,^{15, 16} although a third trial did report significant improvements in range of motion and analgesic use but not pain.¹⁷ It is important to note that all three trials injected small volumes of fluid (9–20 ml), which may not have been sufficient to adequately distend the shoulder capsule. The median volume injected in our trial was 43.3 ml (range 21–80) in the distension group and 6 ml (of contrast medium) in the placebo group. Joint distension proceeded until the subscapular bursa was filled, capsular rupture occurred, a total of 90 ml was injected, or the participant requested termination of the procedure.

The timing of joint distension in treating the painful stiff shoulder may also influence outcome. In the early painful phase of the disorder, patients may be unable to tolerate distension of the capsule, resulting in the injection of insufficient volume. We postulated that distension may be more effective in the later phases and therefore only included

patients in our trial who had had at least three months of symptoms and whose resting pain was less than seven out of 10 on a visual analogue scale.

With hindsight it is easy to be critical of our choice of comparator (placebo). However, at the start of our trial, clear evidence of efficacy of any treatment interventions, including corticosteroid injections, for adhesive capsulitis was lacking.¹⁸ Although we think it unlikely, we were unable to exclude the possibility that the observed improvements in the distension group of our trial were partially or entirely due to the injection of corticosteroid rather than capsular distension. Over 25% of participants had received one or more steroid injections before the trial without benefit, although other presently unresolved issues, such as the accuracy of needle placement, may have influenced outcome.

It is also easy to be critical of our choice of active treatment arm (glenohumeral joint distension with a combination of saline and corticosteroid). This intervention is already part of the established standard of care in our setting, despite a lack of evidence of its value from appropriately conducted trials. We therefore chose to address the more relevant issue to us—namely the efficacy of glenohumeral joint distension (with both saline and steroid) as performed in our setting. The fact that this treatment is widely available in our setting most likely accounted for slow patient recruitment, with both patients and referrers reluctant to accept the 50% chance of placebo when the active treatment was readily accessible and affordable. This highlights the problems inherent in introducing new treatments that become incorporated into standard care before their proper evaluation.

On the basis of the available data, we currently know that both intra-articular steroid injection alone and a combination of glenohumeral joint distension with saline and steroid provide important short term benefits in this condition.^{12, 13} The following remain to be determined: whether the combination of joint distension with saline and corticosteroid provides significantly more benefit than either distension with saline alone or corticosteroid injection alone; whether repeat distensions with or without steroid extend the benefit; whether the benefits of corticosteroid injection and glenohumeral joint distension vary depending on the phase of the disorder; and whether physiotherapy targeted to mobilisation and exercise after the procedure enhance the benefit of joint distension combined with steroid. We hope to obtain data to address some of these uncertainties

from further trials that are currently underway.

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