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Original Article

Body mass index and active range of motion exercise treatment after intra-articular injection in adhesive capsulitis

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Abstract

Background: Adhesive capsulitis is commonly associated with medical diseases such as diabetes mellitus, hyperthyroidism, and obesity. Intra-articular injection has been used to speed recovery and relieve pain associated with frozen shoulder. In this study, we evaluated and compared the effects of an intra-articular injection of corticosteroid and lidocaine in the treatment of primary adhesive capsulitis in overweight and normal-weight patients.

Methods: This is a prospective clinical study of patients with adhesive capsulitis, in which the main treatment strategy was an intra-articular injection of corticosteroid (3 mL) and lidocaine (3 mL). Active range of motion exercise was initiated immediately after the injection and performed four times daily. The evaluation included the recording of a detailed medical and orthopedic history, and the assessment of pain and function by determining the Constant score at baseline (before injection) and every 2 weeks thereafter. Patients were classified as normal weight (body mass index [BMI] < 25 kg/m^2) or overweight (BMI ≥ 25 kg/m^2). The Constant scores of all patients were compared at 8 weeks after injection.

Results: After clinical examinations and radiographic and ultrasonographic studies, 79 patients were treated for adhesive capsulitis between 2010 and 2012. In the normal-weight group, the mean Constant score increased from 35.4 to 74.6 after 8 weeks, whereas in the overweight group, the mean Constant score increased from 32.0 to 47.2. There was a significant difference in the mean Constant score between the normal-weight and overweight groups at 8 weeks.

Conclusion: Active range of motion exercise after an intra-articular injection of corticosteroid and lidocaine improved pain and functional outcome at 8 weeks in normal-weight (BMI < 25 kg/m^2) patients with primary adhesive capsulitis. Manipulation under anesthesia may be considered a priority in overweight patients.

Keywords: adhesive capsulitis; Constant score; corticosteroid; intra-articular injection; lidocaine

1. Introduction

Adhesive capsulitis (frozen shoulder) is characterized by a gradual increase in stiffness and pain in the shoulder. It is said to be self-limiting over a period of 1−2 years, during which time it can cause considerable disability. Many treatment regimens, including conservative treatment, manipulation under anesthesia, and intra-articular injection, have been used to accelerate recovery and relieve pain associated with frozen shoulder.[1,2] Excellent results following distension of the shoulder joint, which can be performed with or without arthrography or steroid injection, have been reported.[3,4]

Adhesive capsulitis is commonly associated with diabetes mellitus, hyperthyroidism, hypothyroidism, cardiac disease, and pulmonary disease.[5] Obesity is commonly defined in terms of body mass index (BMI) and is related to the over-production of inflammatory cytokines. Currently, there is no

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study in the literature discussing the relationship between obesity and adhesive capsulitis.

We present a prospective study of a series of patients with frozen shoulders treated using a protocol consisting of self-assisted active range of motion exercise after receiving a single injection of corticosteroid and a local anesthetic in the frozen phase. The purpose of this study was to examine the effects of this protocol on the functional results of primary frozen shoulder, and to compare the outcomes in overweight and normal-weight patients.

2. Methods

Between 2010 and 2012, 79 patients with primary adhesive capsulitis in only one shoulder were enrolled in this study after institutional review board approval. Patients with rotator cuff tear or rheumatic disease, and those who had received a steroid injection or undergone previous shoulder surgery in the affected shoulder were excluded.

All patients received a 3-mL intra-articular injection of corticosteroid (Shincort, 10 mg/mL) mixed with 3 mL of 2% lidocaine (Xylocaine 2%, 20 mg/mL) in the 1st. The mixture was injected into the glenohumeral joint by an experienced orthopedic surgeon. Patients were seated in a chair, and the affected shoulder was bent and adducted. After intra-articular injection at the outpatient department of our institution, these patients participated in a self-assisted exercise program consisting of gentle active-assisted forward flexion, abduction, external rotation, and adduction. The exercises were repeated 15–20 times slowly within 15 minutes at a frequency of four times per day. Additionally, patients were instructed to stretch the shoulder gently against the limits of tolerance, and to avoid strengthening exercises until shoulder pain subsided. We did not specifically prescribe, discourage, or prohibit the use of oral nonsteroidal anti-inflammatory medications. More aggressive treatment (manipulation or capsular release) was not recommended until it was determined that the protocol had failed (the patient was dissatisfied with the outcome) after performing the exercise program for at least 3 months.

Initial evaluation included the recording of a detailed medical history, including the history of the shoulder problem. Subjective patient function and pain were evaluated by determining the Constant score at each follow-up visit. Additional follow-up included patient assessments at 2, 4, and 8 weeks, and 6 months at the outpatient department. The need for continuing compliance with the exercise protocol was strongly reiterated and recommended at each visit.

Demographic data, including age, sex, and presence of diabetes mellitus, were also obtained. BMI was calculated for each patient using the weight in kilograms divided by height in meters squared. For the purposes of statistical analysis, patients were classified as normal weight (BMI < 25 kg/m^2) or overweight (BMI ≥ 25 kg/m^2). Mean differences between baseline and 8-week scores were compared between the overweight and normal-weight patients. Statistical analysis was performed using paired Student's t test. The p values < 0.05 were considered statistically significant.

3. Results

Seventy-nine patients completed an after-treatment follow-up of 8 weeks, including physical examination and outcome assessment. Forty-seven patients were classified into the normal weight group, and 32 were deemed overweight. There were 22 (28%) men and 57 (72%) women, with a mean age of 52.3 years (range 42–63 years). There was no significant difference between the ages of the male and female patients between the two groups. The mean duration of shoulder pain was 4.1 months (range 3–6 months).

Baseline demographic data of the two groups were similar with regard to age, sex, presence of diabetes mellitus, and duration of symptoms (Table 1). There was one patient with a thyroid goiter who had normal thyroid function. The percentage of patients with diabetes mellitus was slightly higher in the overweight group than the normal-weight group, but the difference was not significant.

At 8 weeks, there were 55 (69.6%) patients with excellent results, and 16 (7.5%) patients with good results according to the Constant score. Of the patients with 55 excellent results, there were 42 (76.3%) women and 13 (23.7%) men. Eight patients reported poor functional outcome based on the Constant score. These eight patients were deemed as treatment failures, and included five women and three men. Three patients with no improvement after 3 months of treatment were also reported to have poor outcomes. All three patients, including one patient with diabetes mellitus, underwent successful manipulation under anesthesia.

At 8 weeks, the mean Constant score increased from 35.4 to 74.6 in the normal-weight group, and from 32.0 to 47.6 in the overweight group. It was noted that there was a significant difference between the Constant score in the normal weight and overweight groups (Table 2). In the eight poor outcomes at 8 weeks, the demographic variables were analyzed for any association with subjective dissatisfaction, and the eventual need for manipulation under anesthesia. Treatment failure and the need for manipulation were not associated with age, sex, duration of symptoms, or the presence of diabetes mellitus. In the eight failed patients, the mean BMI was 27.8 kg/m^2 (range, 24.0–32.3 kg/m^2). Satisfaction with the outcomes then was determined by questioning the patients. Four of the eight patients (50%) were satisfied with the improvement in pain, and one was considered to be unchanged.

Table 1
Demographic data.

	Normal weight	Overweight	p
Number	47	32	—
Mean BMI	23.4	29.3	0.04
Mean age	48.6	56.0	0.74
Gender (% male)	34.0	18.8	0.37
Diabetes mellitus (%)	34.0	40.6	0.72
Duration of symptoms (mo)	4.5	3.6	0.84