



# Effects of positional coracohumeral ligament stretching on the size of calcium deposits in adhesive capsulitis

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## ABSTRACT

Adhesive capsulitis is a painful condition of unknown etiology with restriction of active and passive movements of the glenohumeral joint. The condition is a result of inflammation, adherence, and swelling in the lining of the shoulder joint capsule and its associated ligaments, causing resultant contracture of the capsule. We describe a patient with calcified and thickened coracohumeral ligament with adhesive capsulitis and diabetes mellitus.

**Keywords:** Adhesive capsulitis; coracohumeral ligament; calcification; stretching; positional stretch; musculoskeletal ultrasound

## INTRODUCTION

Adhesive capsulitis of the shoulder is a clinical condition characterized by progressive limitation of active and passive mobility of the glenohumeral joint, generally associated with high levels of pain (1). The prevalence of adhesive capsulitis in the general population is 2-5%, with most of the patients being above 40 years of age and women being slightly more affected than men. The condition is a result of inflammation, adherence, and swelling in the lining of the shoulder joint capsule and its associated ligaments, causing resultant contracture of the capsule.

It is marked by the presence of multiregional synovitis, consistent with inflammation, yet is featured by focal vascularity and synovial angiogenesis rather than synovitis. Along with angiogenesis, there is evidence of new nerve growth in the capsuloligamentous complex, explaining the increased severity of pain during rest and motion (2).

## CASE REPORT

We report a case of a 49-year-old female presenting with complaints of the left shoulder pain for the past 6 months. The pain was gradual in onset, with difficulty on same side lying; she developed difficulty in pinning her dress, reaching the opposite shoulder, taking her hand behind, bathing, and taking objects from above. She was a known case of diabetes mellitus for the past 20 years, with a fasting blood sugar level of 207 mg/dL, and postprandial value of 294 mg/dL.

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On physical examination, she had rounded shoulders, a tender anteromedial joint line, and pain severity measuring 7 on a 10-point numeric pain rating scale. The movement analysis revealed an 80° shoulder elevation range of motion (ROM) in the scaption plane, and external rotation ROM measured 10° (Table 1).

Musculoskeletal ultrasound was done with the subject in a sitting posture and shoulder joint in a neutral position. The transducer was placed in an axial oblique plane on the lateral border of the acromion to obtain a longitudinal image. The transducer was rotated to 90° to obtain the sagittal plane view, obtaining a transverse image of the ligament, and coracohumeral ligament (CHL) thickness was electronically measured.

The ultrasonographic impressions indicated the absence of subacromial-sub-deltoid (SASD) fluid on dynamic assessment (3) and on performing shoulder internal and external rotation, the capsule moved in the anteroposterior direction as a whole unit, confirming the diagnosis of adhesive capsulitis (4). The imaging findings revealed hypoechogenicity of the SASD bursa, and thickened (2.0 mm) and calcified (3.88 mm) CHL (Figure 1). The unaffected side thickness of the CHL was observed to be 1.46 mm with no calcification. Before the procedure, moist heat therapy was rendered for 15 minutes to warm the part for effective stretching and to promote a soothing effect. Procedure for positional stretching of CHL (5): The subject was positioned lying on her side with the affected limb on top; the limb was taken into extension until the restriction was felt. Further, the shoulder joint was moved into the extension to 10° and externally rotated with 10° of adduction. This stretch position was held for 45 seconds and relaxed for 15 seconds, and the procedure was repeated 5 times. Following 2 weeks of positional stretching of the CHL, imaging of the CHL revealed a reduction of calcification to 1.74 mm, and a minimal amount of fluid in the SASD bursa, whereas the thickness of the CHL measured 2.1 mm (Figure 2). The clinical measurement of shoulder elevation ROM in the scaption plane improved to 165° and external rotation to 70°, with decreased pain severity.

**TABLE 1.** Changes in outcomes following positional CHL stretching

Measurements	Initial	After 2 weeks
CHL thickness (mm)	2.0	2.1
Calcification size (mm)	3.88	1.74
NPRS	7	2
Shoulder elevation (degrees)	80	165
Shoulder external rotation (degrees)	10	70

NPRS: Numerical pain rating scale, CHL: Coracohumeral ligament



**FIGURE 1.** Baseline musculoskeletal ultrasound image of coracohumeral ligament calcification size.



**FIGURE 2.** Post-treatment musculoskeletal ultrasound image of coracohumeral ligament calcification size.

## DISCUSSION

The significance of this case report is in developing a treatment strategy for acute adhesive capsulitis, for rapid and immediate recovery of shoulder functions. It has been proposed that the capsule in

adhesive capsulitis of a diabetic individual undergoes a fibrotic response, which reduces capsule elasticity and consequently impairs the shoulder ROM. Fibrosis particularly affects the rotator interval (the anterior capsule, supraspinatus, subscapularis, and CHL), and the prognosis is noted to be poor. A similar finding was observed in this patient, who presented with adhesive capsulitis and diabetes mellitus. The CHL thickness was 2.0 mm with calcific changes; following 2 weeks of positional CHL stretching, there was no change in the thickness of the CHL (2.01 mm), but the calcification of the ligament was reduced. Glycemic levels were observed to be similar to their baseline values after 2 weeks, thus proving the negative impact of the glycemic level on CHL thickness. Moreover, CHL stretching had a positive impact on calcification, which further prevented fibrotic changes and facilitated clinical improvement.

The findings of this case report depict an inverse relationship between the calcification size and shoulder joint functions and further show that a strong correlation exists between decreased calcification size and better clinical outcomes. The size of calcium deposits declined by 55% from baseline, and clinical outcomes of pain severity and ROM improved dramatically. Further, there was 86% improvement in shoulder external rotation ROM and 50% improvement in shoulder elevation ROM after 2 weeks of the CHL stretching program. The first case report (6) on CHL positional stretching also reported a 51° gain in shoulder external rotation and 60° gain in abduction ROM.

A similar case report (7) on a calcified rotator cuff tendon using the proprioceptive neuromuscular facilitation (PNF) technique demonstrated a decrease in calcification size. Although the procedure of positional stretching of the CHL mimics a diagonal pattern (PNF pattern), the maneuver of combined movements in CHL stretching addressed the flexibility of the structure, leading to positive results. The positive impact of therapeutic exercise (7) reaffirms its benefit for calcified shoulder tendons, but the present case report extends this finding to a similar passive-structure “ligament.”

The case report also outlines a modification in the protocol of CHL stretching, with 45 seconds of

stretch hold and 15 seconds of relaxation for five repetitions. This is under a research report explaining that the optimal duration of 30 seconds of stretch for a single bout was classified as long-duration stretch to produce changes in connective tissue (8). The cadaveric study advocated the stretch duration be maintained for 5 minutes for effective lengthening of the CHL. It was not practically feasible to hold in a stretched position for 5 minutes, as there is an increase in inflammation triggered by hyperglycemia. This case report warrants the inclusion of positional stretching of the CHL as a part of the rehabilitation protocol for a better functional outcome and earlier recovery of shoulder ROM.

The present case study was attempted without the influence of cointerventions such as anti-inflammatory medications or modalities and other forms of therapeutics. Cryotherapy was provided following stretching sessions to reduce soreness. In the future, experimental designs with a large sample size addressing the effects of coracohumeral stretching in adhesive capsulitis are warranted.

## CONCLUSION

The new trial of clinical application of CHL positional stretching was observed to exhibit meaningful results clinically and radiologically. In addition, the case report recommends a way to achieve improved shoulder functions of patients with thickened and calcified CHL with a relatively short duration of 2 weeks. Hence, future research is warranted to determine the efficacy of positional CHL stretching at all stages of adhesive capsulitis using randomized controlled trials.

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