

# Est-ce que les exercices pendulaires selon Codman sont utiles ?

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## Introduction

Codman's pendular shoulder exercises have been widely used for decades as means of passively mobilizing the glenohumeral (GH) joint while not compromising recently injured or repaired tissues. Neurophysiological studies have confirmed the largely passive nature of the exercises, but no studies have actually shown that the exercises result in true GH movement. The aim of this study was thus to quantify GH motion during pendular exercises using a patient-specific measurement technique combining medical imaging and motion capture. The hypothesis was that these exercises involved little if any GH motion at all.

## Methods

Ten healthy volunteers without hyperlaxity were recruited for this study. Shoulder kinematics were analyzed based on a previously validated biomechanical model. During motion capture, participants were instructed to perform latero-medial, antero-posterior, and circular Codman pendular exercises. GH range of motion (ROM), scapulothoracic (ST) ROM, thoracohumeral (TH) ROM and overall amplitude of the performed exercises were calculated for each sequence. Linear regression analyses were carried out to establish an association between different components of shoulder motion.

## Results

Mean overall exercise amplitude was  $33.95 \pm 10.16^\circ$  (range:  $21.1^\circ$  to  $56.39^\circ$ ) for latero-medial exercises,  $32.47 \pm 14.78^\circ$  (range:  $6.67^\circ$  to  $54.05^\circ$ ) for antero-posterior exercises and  $21.56 \pm 7.63^\circ$  (range:  $14.01^\circ$  to  $35.49^\circ$ ) for circular exercises. GH and ST involvement were minimal in all exercise types. Mean GH amplitudes ranged from  $4.88^\circ$  to  $11.47^\circ$ , mean ST amplitudes from  $0.82^\circ$  to  $3.54^\circ$  and mean TH amplitudes ranged from  $8.62^\circ$  to  $25.93^\circ$ . Linear regression analyses only showed moderate association of overall exercise amplitudes with TH amplitudes ( $R = 0.68$ ,  $P = 1.26E-6$ ), while no association was observed with GH ( $R = 0.33$ ,  $P = 0.03$ ) or ST amplitudes (adjusted  $R^2 = 0.34$ ,  $P = 0.003$ ).

## *Conclusion*

This study demonstrates that Codman pendular exercises are mainly the result of truncal movement with only little involvement of the GH and ST joints. These exercises can therefore not be supported as an effective contribution to passive shoulder rehabilitation.