IN VIVO TRIDIMENSIONAL CERVICAL MOTION BEFORE AND IMMEDIATELY AFTER A SPINE MANIPULATION IN MECHANICAL CHRONIC NECK PAIN PATIENTS

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INTRODUCTION

In vivo studies have shown that during active motion of the neck in a primary plane, coupled motion (CM) occurred concomittantly in the other planes [1-3]. It has been suggested that the orientation of the zygapophysial and uncovertebral joints contribute mainly to this coupling pattern [4]. In addition, there is some evidence that neck pain patients exhibit lower CM or even abnormal pattern of motion during active movement compared to asymptomatic subjects [1,2]. Although it has been reported that manual therapy alleviate pain and increase primary motion (PM) [5], no study has already explored its influence on the tridimensional (3D) kinematics of the neck. The aim of this study was to examine the immediate impact of manipulation on the in vivo 3D cervical motion of neck pain patients.

METHODS

Eleven patients (37±12 years) with a history of mechanical neck pain (>12 months) performed 3 maximal active neck axial rotations bilaterally at a self-selected speed before (pre; pre +5min: pre5) and immediately after (post) manipulation. A single manipulation was applied on the main hypomobile segment by an experienced therapist. PM and CM were measured using an ultrasonographic Zebris system (Figure 1). CM/PM ratio for each coupled plane was calculated to estimate the 3D-kinematics pattern of the neck [2-4].

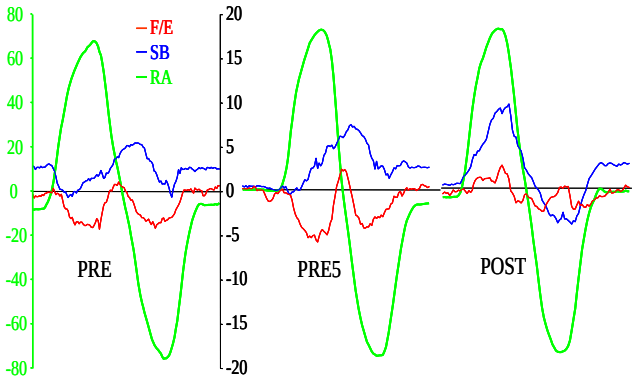

Figure 1: Typical PM axial rotation (RA, *green scale*) and CM motions (side-bending: SB; flexion/extension: F/E, *black scale*) before (pre, pre5) and after (post) manipulation in degrees (°). Left RA, SB and extension are negative.

RESULTS AND DISCUSSION

There was an immediate pain relief during motion by two-fold after manipulation for both sides (P<0.001). Axial rotation PM did not significantly change (5%, P>0.05) whereas side-bending CM increased significantly after manipulation (right: 28%, left: 36%, P<0.01, Figure 2). The ratio of coupled side-bending-to-primary axial rotation increased after manipulation for both sides (12-16%, P<0.05). No difference was found between pre-manipulation trials for pain and motion. Average speed of motion was 12-15% higher at pre5 and post than pre (P<0.01).

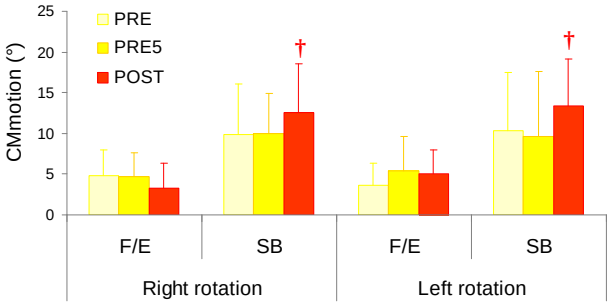

Figure 2: Mean (°± SD) coupled motion (CM) during primary active right and left rotation. F/E: flexion/extension; SB: side-bending. †P<0.01: post vs. pre and pre5.

Our results showed that side-bending CM increased after manipulation (30%, Figure 2) as well as the ratio between side-bending CM and axial rotation PM (14%). Previous studies have reported reduced coupled motion and lower CM/PM ratio particularly during cervical rotation in neck pain patients compared to asymptomatic controls [1,2]. Our findings are in line with those data, indicating that a single manipulation of the main hypomobile spinal segment restored normal kinematics of the neck. This has been recently observed after passive mobilization in a case report [3]. Furthermore, in most of our patients, CM and PM curves seemed to be more synchronized after manipulation as illustrated in Figure 1. We acknowledge that there was no control group in the present study. Nevertheless, there was no difference in neck motion across the two pre-manipulation trials (pre and pre5), suggesting that the intervention had an actual impact on the cervical kinematics of patients [4,5]. However, before conclusions can be drawn, these findings need to be verified with further controlled studies.

CONCLUSIONS

In practice, the assessment of coupled motion during active movement of the neck may be useful for the follow-up of rehabilitation and might provide further insight on the biomechanical implications associated with manual therapy.

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