

# The Effects of Lateral Trunk Bending on Muscle Recruitments When Resisting Nonsagittally Symmetric Bending Moments

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**Study Design.** Surface electromyographic activities were measured in 15 subjects as they maintained a static laterally bent trunk posture and resisted sagittally symmetric and asymmetric moments applied to their torsos. The moment magnitudes were 20 and 40 Nm and had transverse plane directional components in 30° increments surrounding the subjects' torsos.

**Objectives.** To quantify the myoelectric responses from eight trunk muscles as asymmetric loads were applied to the laterally bent torso.

**Summary of Background Data.** Asymmetric material handling frequently results in lateral bending of the torso. Each of these factors have been linked via epidemiologic investigations to the incidence of low back disorders. Little information is available that describes the response of the trunk muscles when the trunk is bent to the side.

**Methods.** Subjects stood in a reference frame and adjusted their trunk posture to marks on a video display that indicated when a 20° lateral bend to the right had been achieved. Moments were applied to the torso by connecting weights via cables and pulleys to a chest harness. Electromyographic activities were recorded bilaterally from the erector spinae, latissimus dorsi, rectus abdominis, and external oblique muscles.

**Results.** The electromyographic data indicated that the muscles showed the greatest activity when they were in opposition to the applied sagittal and frontal plane moments. The left external oblique showed the greatest response and was sensitive to the widest range of moment direction conditions. All of the muscles, except for the left latissimus dorsi, at times contributed antagonistic moments in the sagittal plane or the frontal plane, or in both planes. These data were compared with previously obtained data from an upright neutral posture.

**Conclusions.** Statistical analyses indicated that the responses of both external obliques and the left erector spinae to the moment direction conditions were significantly different between the laterally bent and neutral postures. [Key words: asymmetry, electromyography, lateral bending, spine biomechanics, trunk muscles]

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