

THE RELATIONSHIP BETWEEN THE TRANSVERSUS ABDOMINIS MUSCLES, SACROILIAC JOINT MECHANICS AND LOW BACK PAIN

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STUDY DESIGN

Two abdominal muscle patterns were tested in the same group of subjects and their effects compared in relation to sacroiliac joint (SIJ) laxity. One pattern was the contraction of transversus abdominis, independently of the other abdominals, the other a bracing action using all the lateral abdominal muscles.

OBJECTIVES

To demonstrate the biomechanical effect of the exercise for transversus abdominis known to be effective in low back pain.

SUMMARY OF BACKGROUND DATA

Drawing in the abdominal wall is a specific exercise for the transversus abdominis muscle (in co-contraction with multifidus), which is used in the treatment of back pain. Clinical effectiveness has been demonstrated to be a reduction of three-year recurrences from 75% to 35%. Before this study there was no in vivo proof of the biomechanical effect of this specific exercise. Our biomechanical model on SIJ mechanics, however, predicted significant effect of transversus abdominis muscle force.

METHODS

SIJ laxity values were recorded in the prone position during the two abdominal muscle patterns. The values were recorded by means of Doppler imaging of vibrations. Simultaneous recordings of EMG and ultrasound imaging were used to verify the two muscle patterns. Thirteen healthy subjects who could perform the test patterns were included.

RESULTS

The range of SIJ laxity values found in this study was comparable with levels found in earlier studies of healthy subjects. These values decreased significantly in all subjects during both muscle patterns ($p < 0.001$). The independent transversus abdominis contraction decreased SIJ laxity (or rather increased SIJ stiffness) to a significantly greater degree than the general abdominal exercise pattern ($p < 0.0260$).

CONCLUSIONS

The transversus abdominis contraction significantly decreases the laxity of the SIJ. This laxity decrease is larger than a bracing action using all the lateral abdominal muscles. These findings are in line with our biomechanical model predictions and support the use of independent transversus abdominis contractions for the treatment of low back pain.

KEY WORDS

Exercise, biomechanics, low back pain, sacroiliac joints, abdominal muscles.

MINI ABSTRACT OR PRECIS

This study demonstrated the biomechanical effect of the exercise of transversus abdominis muscles known to be effective in treating low back pain. The sacroiliac joint laxity decrease by transversus abdominis contraction was significantly larger than a bracing action using all the lateral abdominal muscles. The findings are in line with our biomechanical model predictions.