



SELF-MANAGEMENT: CLINICAL SECTION

## A modern approach to abdominal training—Part II: Facilitating the abdominal brace<sup>☆</sup>

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### Introduction

Abdominal bracing is important to “set” the lumbar spine in a neutral range. This provides a stability margin or sufficient stability so the spine can remain stable during various tasks. Incorporating a conscious abdominal brace (AB) into exercises can help “groove” stability patterns into activities of daily living, work demands, and recreational or sports activities.

The AB involves a general tightening of the core in 360° with the goal to stiffen the spine against an external force (McGill, 2006). Grenier and McGill (2007) have shown that the AB provides more stability than the abdominal hollowing technique which isolates the transversus abdominis muscle. This was demonstrated via electromyography and spine kinematic evaluation of spine stability while holding either a bilateral or asymmetric weight in the hands. This dovetails with research that showed that the individual muscles contributing to stability varied with each different stability challenge (Kavcic et al., 2004).

Spine stability has been shown to be greatly enhanced by co-contraction (or co-activation) of

antagonistic trunk muscles (Cholewicki and McGill, 1996; Gardner-Morse and Stokes, 1998; Granata and Marras, 2000). Such co-contractions are most obvious during reactions to unexpected or sudden loading (Lavender et al., 1989). Cholewicki et al. (2005) have shown that external perturbations such as from having a weight held in the torso shifting leads to a slower reaction in agonist-antagonist trunk muscle co-contractions in individuals likely to develop future back pain than in those who are less likely to develop future trouble.

### Indications

Lower back pain or prevention of lower back pain. Its purpose is to create a “safety margin” with all trunk exercises/activities.

### Procedure

Explore the patient’s “functional range” (FR) and find a “neutral spine” posture (e.g. one with slight lordosis). Tense muscles in 360° around the lower lumbar spine—as if someone was about to push you—while continuing to breathe naturally (see Figure 1). Practice the AB in a variety of positions (supine, prone, quadruped, sitting, and standing).

Morgan (1988) emphasizes the motor control aspects of identifying the patient’s FR. “After the patient has learned the limits of his or her FR,

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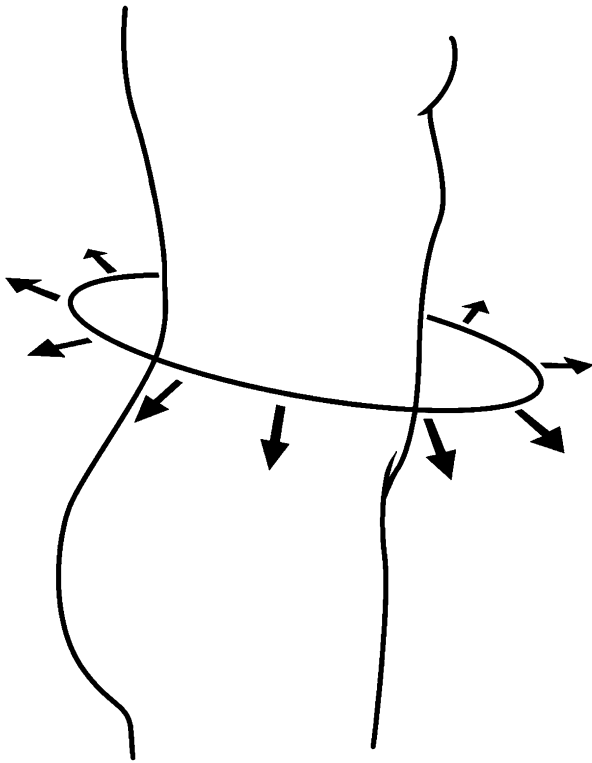


Figure 1 The abdominal brace.

conditioning and training for activities of daily living can safely begin...The patient must develop the coordination to control and feel the back position. Such coordination must become second nature so that the habit is maintained during all activities..."

This is a central point that is often missed. Namely, that the AB is not something a person or athlete should consciously think about when performing their tasks. Rather, it is something that is entrained when exercising, so that it will become automatic or subcortical during task performance.

## Evaluation

*Common errors* include moving outside of "neutral spine" posture by posterior pelvic tilting, kyphosing the lumbo-sacral spine, hyperextending from thoracolumbar junction, or holding the breath. The *patient audit* (what the patient should feel) should be that the patient feels that they are tightening their "core".

Vladimir Janda (1998) taught a test of the AB where he stood behind a person and gave a slight shove against the sacrum (see Figure 2). He looked for the following instability signs:

- depth of forward sway;
- number of oscillations before equilibrium was restored;

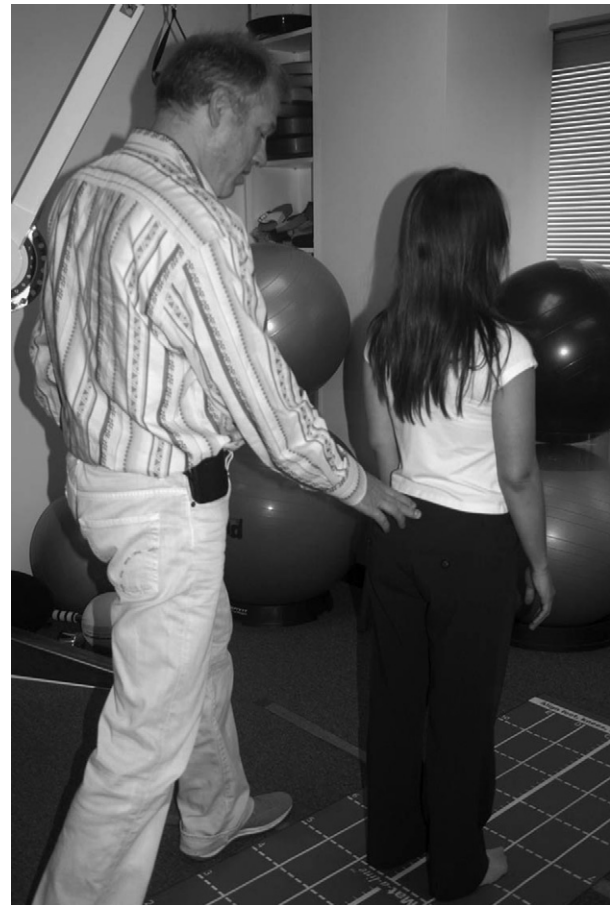


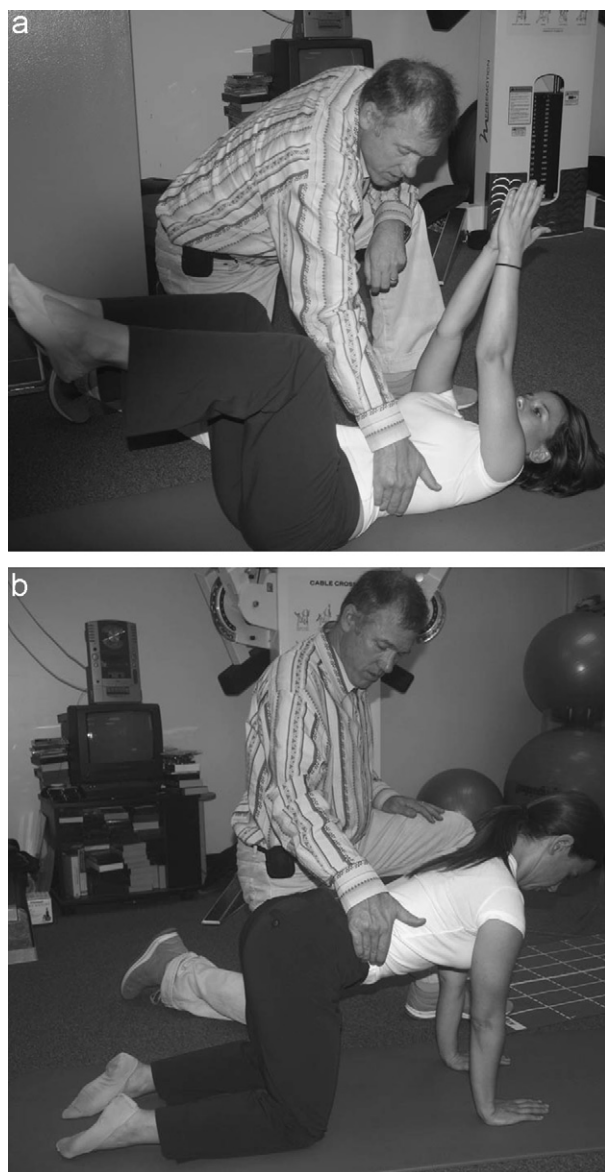
Figure 2 Janda's sudden, external perturbation test.

- length of time until equilibrium was restored.

The coordination of breathing and the AB is another element to evaluate. According to McGill et al. (1995) during vigorous activities the nervous system will have to choose between stabilizing the low back and maintaining normal respiration. A de-conditioned person will automatically destabilize their back in order to "catch" their breath. Many athletes will inadvertently entrain spine stability to exhalation by exhaling with every exertion. One should observe if a patient is unable to perform the AB while breathing in and out.

## Progressions

Once the patient has the kinaesthetic awareness of performing the AB, challenge it by offering the resistance to external perturbations (expected/unexpected, slow/fast), in different planes, especially the transverse plane (Figures 3a and b). This works best in the Vleeming, Janda hip extension, quadruped, dead bug and standing positions. Add a more intense brace and heavy breathing challenge

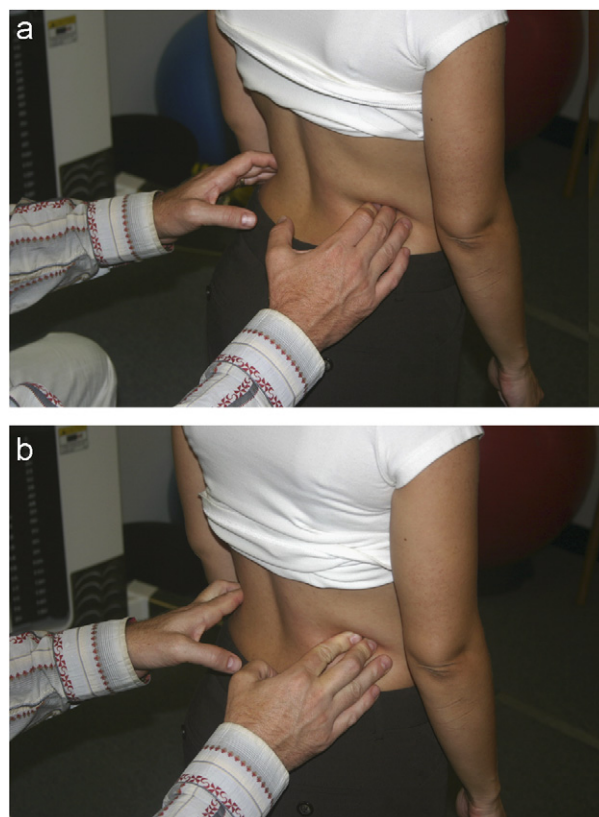


**Figure 3** Training resistance to slow and fast external perturbations: (a) dying bug; (b) bird dog.

to exercises such as the abdominal curl and side bridge.

### Troubleshooting

Have the patient relax their “core” and then gently press a few fingers lateral to medial into the side oblique muscles (see [Figure 4](#)). The patient should push with their muscles out into the clinician’s fingers. This can be tried with the anterior abdominal wall in all 4 quadrants. It can be tried with the extensor muscles. A more advanced version is to have the patient try to press out with the “core” muscles anteriorly and posteriorly at the same time ([Figure 5](#)).



**Figure 4** Abdominal brace facilitation: (a) Relaxed; (b) Pushing laterally.



**Figure 5** Abdominal brace facilitation of right abdominal and left paraspinal regions.

### Conclusion

The AB is a fundamental method for stabilizing the spine. The goal is to facilitate the AB consciously so that wider margin for stability can be in place during abdominal training. The ultimate goal is to enhance the coordination, strength, endurance, speed of

contraction, and speed of relaxation of the abdominal wall during activities of daily living, occupational demands, and sports or recreational activities.

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