the effects of postural distortion

Clients come into our office for many reasons. More and more of them are presenting with a physical problem that they would like addressed and/or resolved.

While massage therapy has effects throughout the entire body, most physical complaints of clients that you encounter are musculoskeletal in nature. Of all musculoskeletal regions, the most commonly afflicted regions are back and neck problems that are related to the spine.

When addressing any symptomatic region of the body, posture should be evaluated. Even though posture is not always the cause of pain or other symptoms, postural deviations do place physical stressors upon the body that predispose people to pain. To better understand the nature and cause of spine related problems, it is important to know and evaluate the spinal postures of our clients.

When evaluating a client's posture, it is important to recognize that a postural distortion can be one of two things: 1) primary, meaning that it originates in that region of the body, or 2) secondary, meaning it is caused by another postural distortion that exists elsewhere in the body. Postural distortions of the spine may be primary; however they are often sec-

ondary to pelvic postural distortions because the spine sits on the sacrum of the pelvis. Consequently, any postural distortion of the pelvis will immediately translate into a compensatory postural distortion of the spine. Therefore, when a client presents with a postural distortion of the spine, it is essential that we evaluate the posture of the pelvis.

Many factors can affect and create pelvic postural distortions, such as a dropped arch (over-pronation), wearing high-heeled shoes, structural difference in the length of the femurs and/or tibias, and idiopathic scoliosis. However, this article will focus on just one of those factors—asymmetric pull of pelvic musculature, i.e., an imbalance of pull of the muscle groups that act on the pelvis.

The posture of the pelvis can be evaluated in each of the three cardinal planes: sagittal, frontal and transverse. Within the sagittal plane, the pelvis can tilt anteriorly and posteriorly. The sagittal plane resting posture of the pelvis is a position of balance between these two joint actions. A measure of this sagittal plane posture of the pelvis is the sacral base angle, which is formed by the intersection of a horizontal line and a line that runs along the base of the sacrum: This angle is important because it indicates the posture of the sacrum in the sagittal plane, which determines the degree of lordosis of the lumbar spine.

A healthy posture of the pelvis in the sagittal plane usually results in a sacral base angle of approximately 30 degrees (Figure 1a). A sacral base angle that measures markedly greater than 30 degrees creates an excessively anteriorly tilted pelvis (Figure 1b), while a sacral base angle that measures markedly less than 30 degrees creates a posteriorly tilted pelvis (Figure 1c).

When the pelvis moves, it is possible for the spine to stay fixed to the pelvis and move along with it. If the head is to stay level, however, then a change in pelvic posture requires the spine to posturally compensate, resulting in a compensatory postural distortion of the spine.

These postural deviations of the lumbar spine seen in Figures 1b and 1c cause a decrease in proper biomechanical functioning of the spine and place increased physical stress upon the body. Specifically, a hypolordotic lumbar spine is less able to absorb shock when walking and running, resulting in greater compressive shock waves transmitting into the upper back, neck and head. A hyperlordotic lumbar spine directly results in greater physical stress upon the facet joints and posterior discs of the lumbar spine, predisposing the client to facet syndrome, degenerative osteoarthritic changes and disc pathologies.

With muscular pull on the pelvis in the sagittal plane, the muscles of posterior tilt are the muscles of the anterior abdominal wall and the hip extensor muscles; the muscles of anterior tilt are the paraspinal extensor muscles of the low back and the hip flexor muscles (see Figures 2a and 2b). The abdomen is actually the entire lumbar region of the body located between the ribcage and the pelvis, 360 degrees around the body. Therefore, the abdomen is located anteriorly, laterally and posteriorly.

If the relative pulls of both the posterior tilt and anterior tilt groups are bal-

» To read tips on maintaining a healthy back, go to **www.nih.gov/od/ors/ds/ergonomics/wellbackhealth.html.**

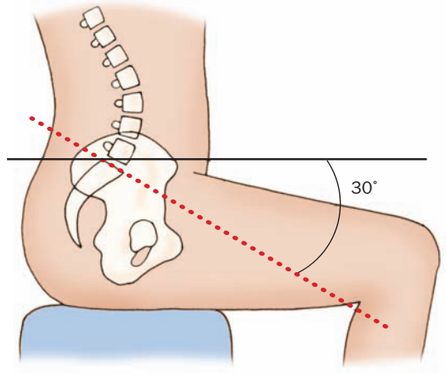

Figure 1a. A healthy sacral base angle of 30 degrees creates a healthy lordosis of the lumbar spine.

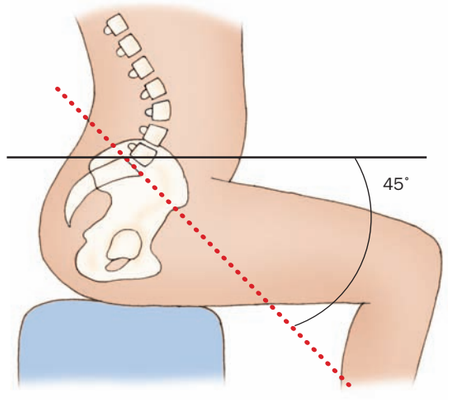

Figure 1b. An increased sacral base angle of 45 degrees creates a hyperlordotic lumbar spine.

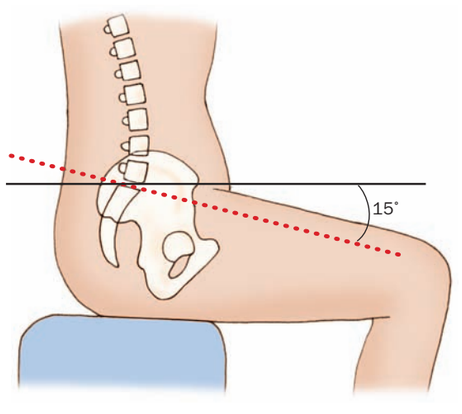

Figure 1c. A decreased sacral base angle of 15 degrees creates a hypolordotic lumbar spine.

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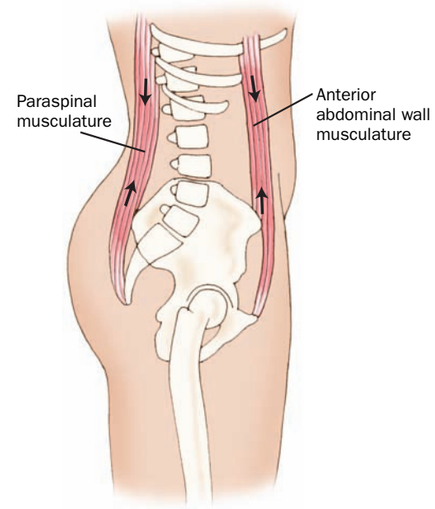


Figure 2a. This illustration shows the musculature that moves the pelvis relative to the trunk at the lumbosacral joint.

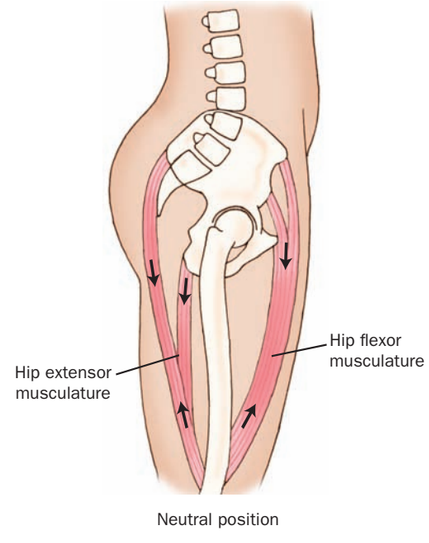
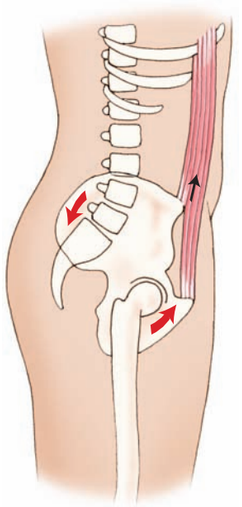
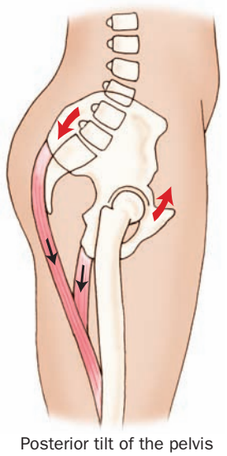


Figure 2b. This demonstrates the musculature that moves the pelvis relative to the thighs at the hip joints.



Posterior tilt of the pelvis

Figure 3a. This illustrates the pull of the anterior abdominal wall muscles upon the pelvis.



Posterior tilt of the pelvis

Figure 3b. This shows the pull of the hip extensor muscles upon the pelvis.

anced, the pelvis will have a healthy sagittal plane posture and will be neither excessively anteriorly tilted nor excessively posteriorly tilted. However, if either the anterior abdominal wall muscles and/or the hip extensor muscles are stronger/tighter than their antagonists, the pelvis will be pulled into posterior tilt (Figures 3a and 3b). Similarly, if the paraspinal extensor muscles of the low back and/or the hip flexor muscles are stronger/tighter than their antagonists, the pelvis will be pulled into anterior tilt (Figure 4a and 4b).

In a similar manner, postural distortions of the pelvis within the frontal and transverse planes can create compensatory secondary postural distortions of the spine. Within the frontal plane, one side of the pelvis can depress or elevate. The resting posture of the pelvis in the frontal plane should be a balance between depression and elevation of the two sides of the pelvis so if a line drawn was "drawn" along the tops of the iliac crests it would be level (Figure 5a and 5b). When the posture of the pelvis is dropped on one side, the spine must compensate if the head is to remain level; this results in a lateral flexion spinal curve within the frontal plane (Figure 5b).

The frontal plane musculature of the pelvis is made up of spinal lateral flexor musculature as well as hip abductor and adductor musculature. For example, elevation of the right side of the pelvis occurs due to the contraction of ipsilateral (right) spinal lateral flexion musculature, ipsilateral (right) hip adductor musculature, and/or contralateral (left) hip abductor musculature (Figure 6, opposite page). Because elevation of one side of the pelvis is the same as depression of the other side of the pelvis, this musculature would cause depression of the left side of the pelvis.

Similarly, a transverse plane postural distortion of the pelvis will result in a secondary compensatory postural distortion of the spine. If the posture of the pelvis is rotated within the transverse plane, the spine must rotate in the opposite direction if the head is to remain facing forward (Figure 7). Rotational muscles of the pelvis include all spinal rotator muscles that cross the lumbosacral joint and attach onto the pelvis, as well as all hip joint rotator muscles.

Not all spinal distortions are caused by pelvic postural distortions, and those that are do not always have a muscular imbalance as the root cause. But when pelvic muscular imbalances do occur, you can play an important role in helping clients with the spinal distortions that follow.

So the next time that a client presents with a postural distortion of the spine, begin by assessing his or her pelvic posture. If you find it to be unhealthy, proceed by examining the muscle groups that may be responsible. Effective knowledge of assessment of pelvic posture may be the key to helping these clients. ■

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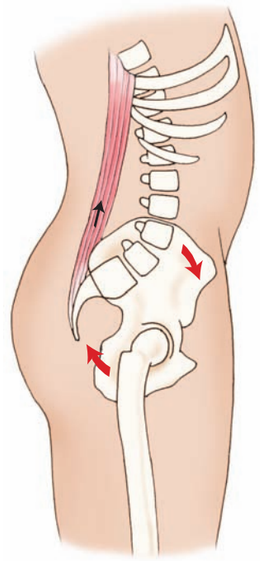
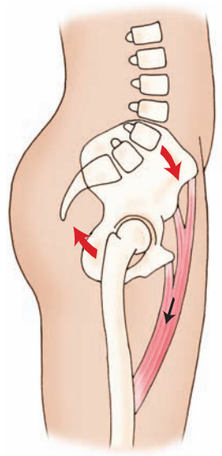


Anterior tilt of the pelvis

Figure 4a The pull of the paraspinal low back muscles upon the pelvis is illustrated here.



Anterior tilt of the pelvis

Figure 4b This illustrates the pull of the hip flexor muscles upon the pelvis.

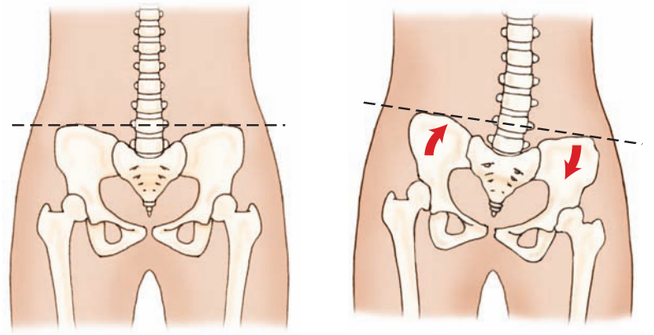


Figure 5a. This shows an anterior view that demonstrates a balanced frontal plane posture of the pelvis as evidenced by a horizontal line drawn across the tops of the iliac crests.

Figure 5b. This is an anterior view that shows an imbalanced frontal plane posture of the pelvis. Note that one iliac crest is higher than the other. An unlevel pelvis in the frontal plane creates a scoliosis, which in this case is a secondary postural distortion of the lumbar spine.

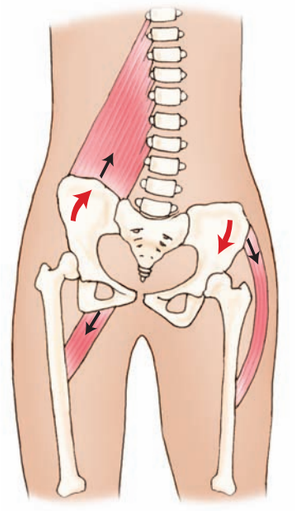


Figure 6. This illustration shows the frontal plane musculature that creates elevation of the right side of the pelvis. These muscles are the lateral flexors of the trunk and adductors of the thigh on the same side of the body (ipsilateral, i.e., right side), and the abductors of the thigh on the opposite side of the body (contralateral, i.e., left side).

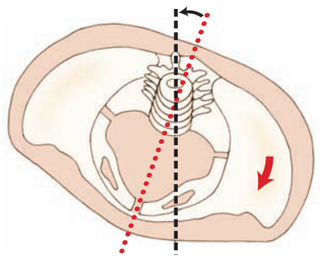


Figure 7. This shows a superior view that demonstrates the effect a pelvis that is rotated within the transverse plane has on the spine. In this illustration, the pelvis is rotated to the right (as indicated by the red arrow), causing the spine to rotate to the left (as indicated by the black arrow). This keeps the head forward.