

## Undulation as a Movement Lesson, Assessment Tool, and Therapeutic Aid

By Anita Boser, LMP, CHP

Movement is fundamental to the field of Structural Integration. As practitioners, we support our clients' physical and metaphysical growth—growth that is not possible without movement. Therefore, we are movement facilitators, movement teachers, and movement models. How this manifests in our practices depends on the diversity of our personalities, training, and continuing education.

Hellerwork<sup>®</sup> Structural Integration incorporates movement lessons that are commonly tied to particular sessions. Session One starts with breathing, sitting, and standing. Session Two introduces walking, which is then augmented throughout the Series. In Session Six, with the focus on organizing the back of the core, practitioners teach undulation.

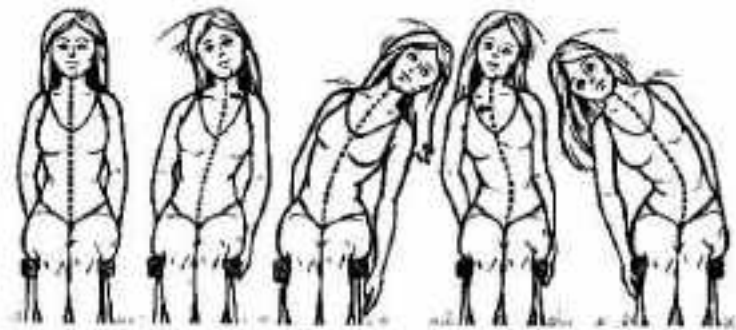
“The undulation movement resembles the wave motion that moves along the length of a cracking whip. Undulation of the spine is a natural movement pattern that most of our bodies have forgotten. It requires the effective functioning of all of the core muscles along the spine.”<sup>1</sup>

Hellerwork Client Handbook

Joseph Heller incorporated the exercise into the sixth session after he noticed a trend of chronic back compression. He experimented with different ways to teach how to initiate movement around the spine and determined that a side-to-side sway was the best starting point for most.

“The undulation movement can be restored through practice. Begin by sitting on a chair on your sit bones (see Section One). Let your spine sway from side to side like a willow in the wind, as shown in Figure 4. Imagine that you are being pulled from side to side by a string that attaches to the center of your chest. Let the rest of your body relax and simply respond to this movement . . . Undulation can also be practiced moving from front to back and free form.”<sup>2</sup>

Hellerwork Client Handbook



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I've taken this simple and effective movement lesson and applied it to several areas of my practice. My clients enjoy undulation's many applications, how it helps them let go of rigidity and improve the function of the entire body, starting with spine.

## A Functional Spine

“All of the spinal column's 186 joints are involved in every movement of the body.”<sup>3</sup>

The Endless Web

An integrated body requires a functional spine in which the articulations between all 24 vertebrae, the sacrum, the occiput, and the ribs are free. Following is a summary of key joints in the adult spine.

### Intervertebral Discs (23 joints)

The largest and most well-known joints of the spine are the intervertebral discs. From C-2 down to the sacrum, each vertebral body is separated by a disc, which is sandwiched between layers of hyaline cartilage. This joint allows for limited movement in all three planes, but mostly flexion and extension. Some discs are thicker anteriorly, giving support to the cervical and lumbar curves.

“Discs constitute one-quarter to one-fifth of the spinal structure. Therefore, establishing or maintaining a good fluid balance in the discs is important in maintaining healthy spinal performance.”<sup>4</sup>

Rolfing: Reestablishing the Natural Alignment and Structural Integration of the Human Body for Vitality and Well-Being

“Except for their peripheries, supplied from adjacent blood vessels, discs are avascular and supported by diffusion through trabecular bone of adjacent vertebrae.”<sup>5</sup>

Gray's Anatomy, 38<sup>th</sup> Edition

Muscular activity fosters fluid exchange in the tissues. Therefore movement around the spine is vital to disc health. People who are concerned about or who have problems with their discs tend to be rigid; actually their discs would benefit from gentle movement.

### Facet Joints (46 joints)

The facet joints are located posterior to the vertebral bodies, one to the left of center and one to the right. The inferior facets of one vertebra articulate with the superior facets of the vertebra directly caudal. They are gliding, synovial joints. The angle of the facets determines the range of motion between vertebrae.

The angle in the lumbar spine limits rotation. In the thoracic spine, together with the limitations posed by the ribs, flexion and extension are the primary movements. The facet joint angle in the cervical spine allows for range of motion in all three planes.

### Ribs (62 joints)

The thoracic vertebrae also articulate with the ribs. Demifacets are located on the lateral bodies (T1-10) or pedicles (T10-12) for articulation with the rib heads. T10-12

have one demifacet on each side; the rest have two, one on the superior lateral border and one on the inferior lateral border. Each rib from 2-9 articulates with two vertebrae. The main junction is at the superior demifacet of the same numbered vertebrae, but the fibrous capsule also encompasses the smaller inferior demifacet of the vertebra just superior—and the intervertebral disc between them. In addition, the costotubercular facet on each rib (1-9) articulates with the transverse processes of the same number.

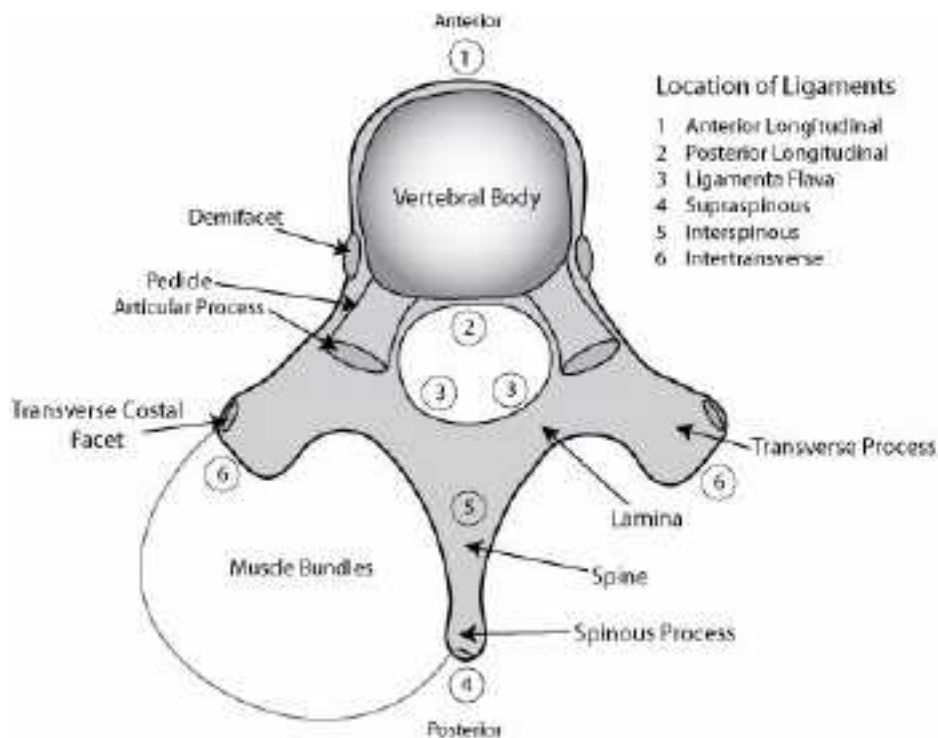
To summarize, most ribs attach to the thoracic vertebrae in three places. For example, the joints of rib 5 include the superior demifacet of T5, the inferior demifacet of T4 (and the disc between the vertebrae) and the transverse costal facet of T5.

### Atlas, Axis and Occiput (6 joints)

Most cervical spine rotation happens at four joints of the atlas (C1) and axis (C2) that operate simultaneously. The atlas also has limited articulation with the occiput in two fibrous joints, much like the facets of other vertebrae.

### Sacrum and Coccyx (3 joints)

The sacrum articulates with L5 at facet joints and a disc, which were noted in the above sections. In addition, the symphysis between the sacrum and coccyx includes a fibrocartilage-disc. And the two sacro-iliac joints allow for small movement between the sacrum and ilium, which may become fibrosed and sometimes even ossified in adults.



### Ligaments

The ligaments create the spine's column and partially form many of the joint capsules.

The anterior longitudinal and posterior longitudinal ligaments support the vertebral bodies and discs. The ligamenta flava (one left of midline and one right) connect the laminae from the C1 to S1. The supraspinous ligament connects the spinous processes

from T1 to S1; the nuchal ligament serves this function in the cervical spine. The interspinous ligaments connect adjoining spinous processes between the supraspinous ligament and the ligamenta flava. One more ligament, the intertransverse ligament, attaches between the transverse processes.

While each ligament is referred to as one unit that encompasses the entire column, that description is simply for the sake of identification. Like any other connective tissue, the ligaments are made of individual fibers, and these fibers are more complex than any name implies. Each ligament has fibers that reach from one vertebra to the next, so the anterior longitudinal ligament is actually 24 separate ligaments with additional fiber wrappings that unite them into one larger unit. (The interspinous ligament is unique in that it exists between the bones only.)

Lumping individual segments into one homogeneous entity is precisely what happens to our movement patterns. (It's no coincidence that the habits of our thinking become habits of our bodies.) The spine then becomes one amorphous identity. Recovering the coordinated, separate movements of the various joints is undulation's purpose.

### Erectors and Paraspinals

“Although movements between individual vertebrae are small, their summation gives a large total range to the vertebral column in flexion, extension, lateral flexion, rotation, and circumduction.”<sup>6</sup>

Gray's Anatomy, 38<sup>th</sup> Edition

The muscles create movement. While structural integrators are intimately aware of the spinal musculature, this article will include a summary to emphasize the multitude of movement available.

The erectors originate from a thick pad of fascia over the sacrum and adjacent iliac crest; tendrils reach up from this base. Iliocostalis attaches to each rib. Longissimus attaches to the transverse process of each vertebra. Spinalis attaches to the spinous process of each vertebra. That's over 100 individual movement possibilities!

The capacity for movement proliferates when the intricate paraspinals are added. The paraspinals are deeper, shorter, and provide more fine control. Semispinalis crosses two to four vertebrae from the transverse processes to the spines above. Multifidi has many layers in itself, from transverse processes traveling superior to the next one, two, three, and four vertebrae's spines. The rotatores, fully developed only in the thoracic spine, originate from the upper, posterior transverse process and cross to the superior vertebra's lamina with some fibers extending to the base of the spinous process. The interspinales, less developed in the thoracic spine than elsewhere, attach to the spines of contiguous vertebrae. The intertransversarii go from one transverse process to the next and are mostly developed in the cervical spine. Levator costalis attach from each transverse process to the upper edge of the next inferior rib.

But wait—there's more! The prevertebral muscles include longus colli and longus capitis in the cervical spine and the psoas in the lumbar. The lateral spinal muscles include the scalenes and quadratus lumborum. And, the suboccipitals create elaborate movement between the upper cervical spine and the occiput.

In dissection, I found that the muscles, especially the paraspinals, interweave rather than lying on top of each other in layers. One of the pivotal moments in my career was trying to separate strands of a cadaver's paraspinals and realizing how important movement is to prevent adhesions and limited mobility. With so many joints, muscles, attachments, and individual strands—which can operate independently or in combination—the capacity for movement is truly unlimited. Undulation teaches clients to reach more of this potential.

### Assessment Tool

I teach undulation at the beginning of the sixth session after check-in. Here's my usual format. We sit across from each other, and I demonstrate as I describe: "Flow side to side. What part of you moves first? Your neck? Hips? Try initiating from a different place and notice how the quality and quantity of movement changes." Often eyes widen and light bulbs flash inside when my clients become aware that one part of the body is the habitual leader.

We continue. "Now notice what flows easily, what parts of your spine are stiff, and where you feel hinges. Tell me where it's stiff." I also share my observations about the quality of movement and make notes of both our comments. Then I direct undulation through flowing flexion and extension, again to notice where movement is easy and where aliveness is missing.

Using undulation as an assessment helps focus my work during the session (usually the stiff places), but it also gives the client a before-and-after comparison. The comparison makes a tangible difference in the ability for people to create their own internal fluidity after the work.

### Therapeutic Aid

By teaching the movement at the beginning of the session, my clients have a framework for it during manipulation. "Bring movement here" has greater meaning when working the erectors and paraspinals. (I usually also show my clients drawings of the back muscles at the beginning of the session. My Atlas of Human Anatomy by Frank H. Netter, MD falls open to plates 161 and 162.)

It's important to teach that the sacrum is part of the spine, too—undulating from the sacrum brings greater awareness to the deep hip rotators and extensors. The movements are very small and powerful here.

Also, my work improves if I undulate during every session. When I work with tissue that seems to be resisting, I first turn to my intention. Am I clear about the layer and what I'm doing? Then I examine my body mechanics. Am I grounded? Am I in Line? If yes, then I introduce an undulation into my own spine. This reduces my own stiffness, and flow from my body invites flow in my client's.

Also, when my fingers are sore, I undulate them during the session as I work and afterwards. Undulation is the antidote to stiffness.

"In our experience, the finest and most minute tissues of the body can be reached by way of the courser layers."<sup>7</sup>

## Rolfing: Reestablishing the Natural Alignment and Structural Integration of the Human Body for Vitality and Well-Being

How does one access the finest muscles around the spine? In some places, the client's internal movement is more effective than any finger, knuckle, or elbow can ever be. Through undulation, clients build awareness and bring fluidity to the deepest structures such as the anterior longitudinal ligament, multifidi, and rotatores. In other places, the client's tissues need a deep nudge before movement can be realized. Bodywork frees these areas, such as the rib at the costotubercular facet or at the spinous process while the client is undulating.

### Movement Lesson

Undulations are part of other movement or exercise disciplines, including yoga, dance, and Continuum. But the ability for the spine to transfer movement from one vertebra to the next should also be recognizable in walking, dancing, getting out of a chair, even earnest conversation.

Side-to-side undulation is an excellent lesson and the easiest starting place for most people. But, I've found that many of my clients need specific instruction to restore variety of movement in all parts of the spine. So, I developed a range of exercises that will be published in a book that I hope will reduce rigidity and revolutionize movement patterns.

Undulation is one of the primary tools I use in my practice. It makes clients aware of possibilities and gives them tools to move different parts of the spine and increase their variety of movement. Undulation facilitates balanced strength and flexibility, it teaches people to find hidden places inside their bodies, and it models the fluid state that is necessary for human vitality.

*“We have been following both a personal and a cultural notion—mistaken in both instances—that excellence arises through rigidity, when in fact it is possible, almost always, only through fluidity.”<sup>8</sup>*

Bodywise

Following is one of the exercises from *Undulation: Relieve Stiffness and Feel Young Again*. I suggest this to clients whose bodies could use some fun and/or when the lumbar spine needs greater awareness. If you'd like to see short videos of other examples, please visit [www.undulationexercise.com](http://www.undulationexercise.com).

### Undulation #26 –Tailbone Penmanship

Low back muscles commonly over-stabilize the spine and become stiff. It's difficult to move when the lumbar vertebrae are mortared together like concrete blocks. This undulation softens the mortar and mobilizes the blocks.

1. Get on your hands and knees, with your hands directly under your shoulders and your knees directly under your hip joints.
2. Warm up your body for a minute. Move your hips, back, and shoulders.

3. Pretend your tailbone is a laser pointer that sends a beam of red light to the floor between your ankles.
4. Draw a cursive letter “a” with your laser pointer. Take your time and try to smooth out the curves.
5. Go through the alphabet from “a” to “z.” Try to initiate most of the movement from your pelvis, rather than your legs, so your hips swivel on your thigh bones and nudge your spine from side to side.
6. Coordinate the movement of your tail and spine to create more flexibility in your low back.
7. Write your name.
8. Write the alphabet again in upper case letters, if you feel like your body wants to continue.
9. Lie on your back. Feel the swimming feeling in your low back. Disperse the sensation throughout your body and move into Free Form.
10. Bring your movement to a close and rest.

#### Variation #1

- Draw shapes instead of letters: circles, triangles, stars, clouds, zigzags, and spirals. Anything you can think of.

#### Variation #2

- Draw each letter slowly. Take 10 seconds for each one.

Feel your confidence grow each time you try something new.

I invite you to introduce undulations into your own self-care routine and to your clients. Your back will feel better and more alive. But the best outcome is that stillness is not natural after deep, internal flow is introduced into the body. The waves and reverberations continue for hours.

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<sup>1</sup> Hellerwork Client Handbook (Hellerwork International, 2005) Undulation exercise, p. 21.

<sup>2</sup> Ibid, p. 21.

<sup>3</sup> R. Louis Schultz, Ph. D. and Rosemary Feitis, D.O., The Endless Web (Berkeley, CA: North Atlantic Books, 1996), p. 29.

<sup>4</sup> Ida P. Rolf, Ph.D., Rolfing: Reestablishing the Natural Alignment and Structural Integration of the Human Body for vitality and Well-Being (Rochester, VT: Healing Arts Press, 1989), p. 184.

<sup>5</sup> Gray’s Anatomy, 38<sup>th</sup> Edition (London, England: Churchill Livingstone, 1995, reprint 1999), p. 512.

<sup>6</sup> Ibid, p. 515.

<sup>7</sup> Rolf, Ibid, p. 180.

<sup>8</sup> Joseph Heller and William A. Henkin, Bodywise, (Berkeley, CA: North Atlantic Books, 2004), p. 197.

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