



Diagram 1. Spinal vertebrae

IMPORTANCE OF ALIGNMENT SPINE AND SACRUM

Yoga is a spiritual practice and a tool to personal growth, so do we need to focus on alignment?

We have all read the promise that a regular asana practice can improve posture, muscular strength, flexibility, joint mobility, and stability: and that, through regular practice, the body becomes fit, toned, and pain free. Asana can give us all these musculoskeletal benefits when practiced anatomically correctly. However, if we regularly repeat anatomically incorrect alignments, we can create patterns that can lead to unexpected and unwanted results, such as injury and pain. Instead of juicy and healthy vertebral discs, misaligned asana can create dry and degenerating, or painful bulging discs. Instead of stabilising the pelvis, misalignment can create sacroiliac problems. Instead of keeping the joint surfaces healthy with ideal weight distribution, misalignment can place an enormous pressure over a small surface area and wear out the cartilage, which can result in osteoarthritis and other degenerative joint conditions.

By practicing anatomically correct postures, the bones fit properly, meeting at their centre. This is the most mechanically efficient positioning of the joints and therefore causes the least amount of musculoskeletal strain. In this article, we will focus on the spine and sacrum, as the integrity of the spine is the central focus in each yoga pose.

Anatomically correct spinal alignment

When Circus Oz was recently in town, I couldn't help but marvel at the spinal alignments of the performers. I'm not talking about bending their backs into pretzel shapes, but the clean and anatomically correct alignment of their Mountain Pose (Tadasana). During one of their formations, three women stood in Mountain Pose on each other's shoulders; the lowest of the three carrying the weight of the other two. They all looked comfortable and at ease, which is a clear sign of proper alignment. Carrying that much weight requires correct force transmission through the spine. You can test this at home. Ask a friend to place a lot of weight on your shoulders. Check where you feel the pressure. If you feel the weight distribution on the shoulders and feet, but nowhere in between, you know that the weight transmits correctly through the spine and sacrum into the legs. But if you feel pressure in the lower back, the weight doesn't go through the spine but straight into it. The vertebrae have a thick weight-bearing portion in the front side (anterior) and more delicate structures at the backside (posterior), including muscle attachment sites called processes and articulating surfaces called facet joints. Even if you don't plan to do circus tricks, plan to modify your standing posture sooner rather than later, as sway back posture

puts a great amount of pressure on the delicate parts of the vertebrae that aren't designed to bear weight. This can lead to acute facet joint strain, chronic degeneration of the facet joints, or even fractures in the vertebrae.

In her book *Making Connections*, Peggy Hackney introduces a tool for a dynamic sense of alignment. Stand in Mountain Pose and imagine a figure 8 loop around your pelvis and ribcage viewed from the side. Start tracing the figure 8 from the lower back towards the tailbone, then from the pubis up towards the navel. Continue tracing the figure 8 through the navel to the upper back towards the head, and finally down from the sternum towards the navel. This is an easy tool to keep the lumbar spine long and the bottom of the sternum 'hooked down' towards the navel to prevent the lower ribs splaying out when opening the chest (refer to image 1 and 2).

Sacroiliac joints in lateral standing poses

You can use the figure 8 loop in all asanas to correct the spinal alignment in the sagittal plane, i.e., correcting the forward or backward tilts. To keep the sacrum safe in hip opening poses and standing lateral poses, it helps to understand the anatomy of the pelvis. The sacrum is the large triangle shaped bone at the bottom of the spine. It consists of five fused vertebrae and is tightly wedged



1. Correct figure 8-loop keeps the lower back long and the lower ribs contained. This allows for ideal weight transmission through the spine.



2. Incorrect 'reverse' figure 8-loop shortens the lower back and lets the lower ribs poke out. This places pressure on the lumbar spine.

between the pelvic bones, connected together at the sacroiliac joints. The sacroiliac joints offer limited mobility, as their main task is to stay stable and transfer weight from the legs into the spine and vice versa.

Warrior II Pose (Virabhadrasana II) is a standing lateral hip opening pose that even beginners practice. Most beginners work really hard in the pose to open the hips by squaring the hipbones to the long edge of the mat. This is the most common misalignment in standing lateral poses, including for example Triangle Pose (Trikonasana) and Extended Side Angle Pose (Utthita Parsvakonasana). If the hipbones are square to the long edge of the mat, and you strongly move the front knee out to keep it above the ankle, the thighbone acts as a lever pushing against the pelvic bone at the end range of hip opening (refer to image 3). This will compress the pelvic bone against the sacrum and grind into the sacroiliac joint. The muscles around the sacrum have to work hard, which in turn creates a vicious circle that leads to a painful locked sacrum and muscular tightness. This incorrect alignment assumes that our thighbones can point out to the sides in a 90-degree angle, which is far from

the truth. Everyone's pelvic structure is different, but the hip sockets always point diagonally forward and to the side, and therefore the external rotation required for a 90-degree angle is out of reach. Keeping that in mind, when you align yourself in standing lateral poses, the primary focus is the front



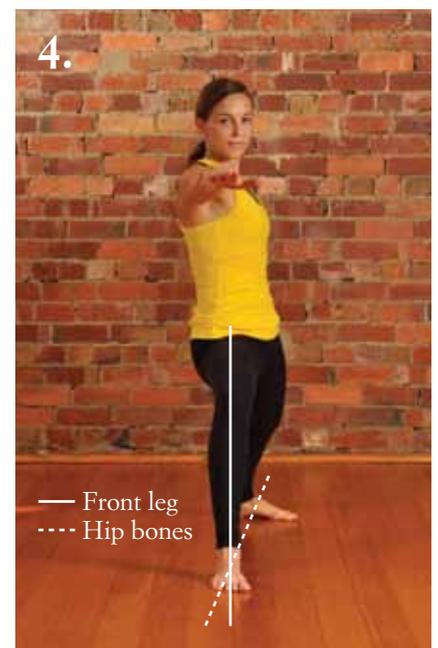
3. Incorrect Warrior II places pressure on the sacroiliac joints.

leg. Keep the main joints of the leg in a straight line by aligning the centre of the ankle, centre of the knee and head of the femur bone (the ball and socket joint in the hips) (refer to image 4). This will move the back hipbone slightly forward, which is exactly what the anatomy of the pelvis requires.

Disc issues

The modern Western posture is increasingly kyphotic – rounded shoulders and back – due to the invention of chairs, couches, cars, and computers. Most people spend most of the day sitting down in front of a desk or behind the wheel. The spine stays in a constant forward fold that places stress to the posterior surface of the intervertebral discs. When this is followed by more forward bends in a yoga class, sometimes even a minor misalignment is enough to create disc problems to a predisposed spine.

The disc is like a doughnut with jelly in the middle; its outer layer, annulus fibrosis, is made from rubbery fibrocartilage and the inner most part, nucleus pulposus, consists of a soft jelly-like elastic structure. This high water content in the nucleus is ideal for shock absorption and force transmission. It's the expansive



4. Correct Warrior II doesn't flatten out the pelvis, but allows the back hip to come slightly forward.

mechanical movement that attracts the fluids into the discs with a 'squeeze and soak' effect.

Ideally, a forward bend involves both hip flexion and spinal flexion. The discs love active movements more than passive movements. Instead of flexing the hips and spine with gravity, focus on firming the hip flexors and spinal flexors (front abdominals) to draw the trunk forward while keeping the lower front ribs in.

In the case of a stiffer student, it is a good idea to test the forward bends in a supine position. Lift one leg up to see whether a 90-degree angle is possible. If not, then the tight hamstrings pull the pelvis into a posterior tilt in seated poses. If the pelvis is tilted back, the entire forward bend takes place in the spine, which pulls the posterior side of the vertebrae apart stretching the discs (refer to image 5). Most of the resistance in forward folds is met by the tension in the posterior outer layer

of the disc. If this is a repetitive action, one day the discs might bulge out by taking more space than designed or even fully herniate, the soft jelly like nucleus leaking out through a tear in the annulus. To prevent this common injury, it's good to remember that less is more in yoga poses. Bend the knees to bring the pelvis back to a neutral tilt and to take the pressure off the discs (refer to image 6).

Path of least resistance

Despite the name, the spinal column is not straight, but rather an S-shape curve when viewed laterally. Different segments of the spine have different ranges of motion. This is determined by the shape of the vertebrae and of the articulating surfaces between adjacent vertebrae. The upper back is naturally kyphotic or rounding, to give space for the lungs, whereas the cervical and lumbar spine are lordotic, or in a natural backbend.

The spine has a strong tendency to move where it's easy. The path of least resistance takes place in the parts of the spine where an inherently mobile segment meets an inherently stable segment. These are areas where the cervical lordosis turns into thoracic kyphosis in the upper back (C7-T1), where thoracic kyphosis turns into lumbar lordosis in the lower back (T12-L1), and where the spine meets the sacrum in the pelvis (L5-S1). These areas of the spine are the most vulnerable in yoga, as there is potential for excessive movement. Therefore, in forward and back bends, it's our lower back that is the most prone to excessive movement, which might lead to bulging discs or jamming into the joints.

To avoid the path of least resistance, the aim is to mobilise the stiff areas and stabilise the mobile areas, using muscular activations around those joint complexes. In the case of the spine, the awareness of Uddiyana and Mula

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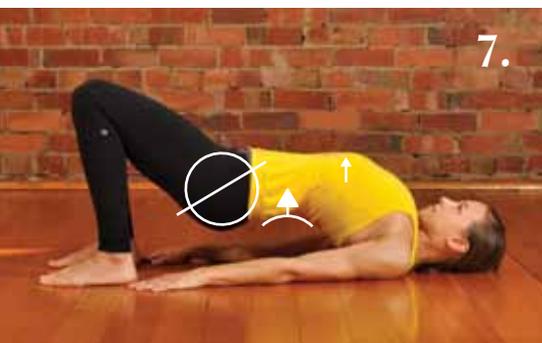
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5. *Incorrect forward bend. Posterior tilt of the pelvis places pressure on the lumbar discs.*



6. *Correct forward bend. Bend in the knees tilts the pelvis forward to take the pressure off the discs.*



7. *Relaxed gluteus maximus in backbend allow the spinal extensors to shorten the lumbar spine.*



8. *Active gluteus maximus lengthen the lumbar spine and support the sacrum in backbends.*

Bandhas is an essential foundation for asana practice. Creating Uddiyana Bandha will engage the transverse abdominus, the weightlifter's belt muscle, which wrap around the waist to give a gentle pull to the lumbar fascia and make the lumbar ligaments taut to support that mobile structure. With the activation of Mula Bandha, the pelvic floor muscles will stabilise the sacrum itself, as it attaches to the tailbone at the bottom of the sacrum. These are the main spinal bandhas (locks) that yoga teachers often talk about. However, there is one more bandha that we can create around the pelvis to protect the sacrum and lower back. Let's look into this in more detail with a controversial back bending topic: whether or not to activate gluteus maximus, the biggest buttock muscle.

To clench or not to clench

If you have practiced in several yoga studios and tried different yoga styles, you must have noticed that yoga teachers agree to disagree regarding activating the buttocks in back bends. Some teachers advise to clench the buttocks to extend the hips, whereas others say to keep the buttocks completely relaxed. These two schools of thought have their own reasoning. The advocates of relaxed buttocks explain that tight gluteus maximus can create compression around the sacroiliac joints. This is indeed the case when the buttocks are very tight and are allowed to externally rotate the hips and therefore possibly jam into the sacrum. The opposite point of view then explains that if backbends are performed with relaxed buttocks, the spinal extensors that run along the spine from the pelvis to the skull, work to lift the upper body up into a backbend, but also work to pull on the pelvis and sacrum. This action deepens the lordosis in the lumbar spine and tilts the pelvis forward (refer to image 7). This in turn makes the lumbar and sacral areas vulnerable, as the lumbar area experiences excessive movement. As always in yoga, if something hurts, don't do it. A good rule of thumb is to see for yourself and choose what suits your body.

Sydney-based yoga teacher and physiotherapist Simon Borg-Olivier teaches that to stabilise and protect the sacrum in asana practice, we can simultaneously activate opposing muscle groups around the pelvis. For example, in Wheel Pose (Urdhva Dhanurasana), this means keeping the feet slightly turned outwards, while 'trying' to turn them inwards by squeezing the heels out and toes in. This activates the internal hip rotators and creates space around the sacrum. Toning the buttocks simultaneously supports the sacroiliac joints and prevents the forward tilt of the pelvis. The co-activation (simultaneous tensing) of opposing muscles around the pelvis that is described here offers a stable foundation for spinal movements (refer to image 8).

Yoga should be an organic process that unfolds without forcing. Often, through a simpler variation of a pose, we can access correct alignment that might not yet be available in more advanced options of the pose. When aligning the spine, pause to appreciate that you're also aligning the spinal cord – i.e., central nervous system. Awareness, mindful movement, comfortable breath, and muscular support help to conserve the integrity of the spine, which is key to a sustainable yoga practice.

References

- Hackney, P. *Making connections: total body integration through Bartenieff fundamentals*, Routledge, 1998.
- Borg-Olivier, S. and Machliss, B. *Applied Anatomy & Physiology of Yoga*, Yoga Synergy Pty Ltd, Sydney, 2007.

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