Power through Pelvic Stability

THE MUSCLES OF YOUR PELVIS ARE CRUCIAL FOR GOOD POSTURE AND POWER GENERATION WHILE CYCLING. SOPHIA AULD INVESTIGATES THE ROLE OF THE PELVIC MYOFASCIAL SLINGS FOR OPTIMISING RIDING SPEED AND ENDURANCE.

YOUR POWERFUL PELVIS

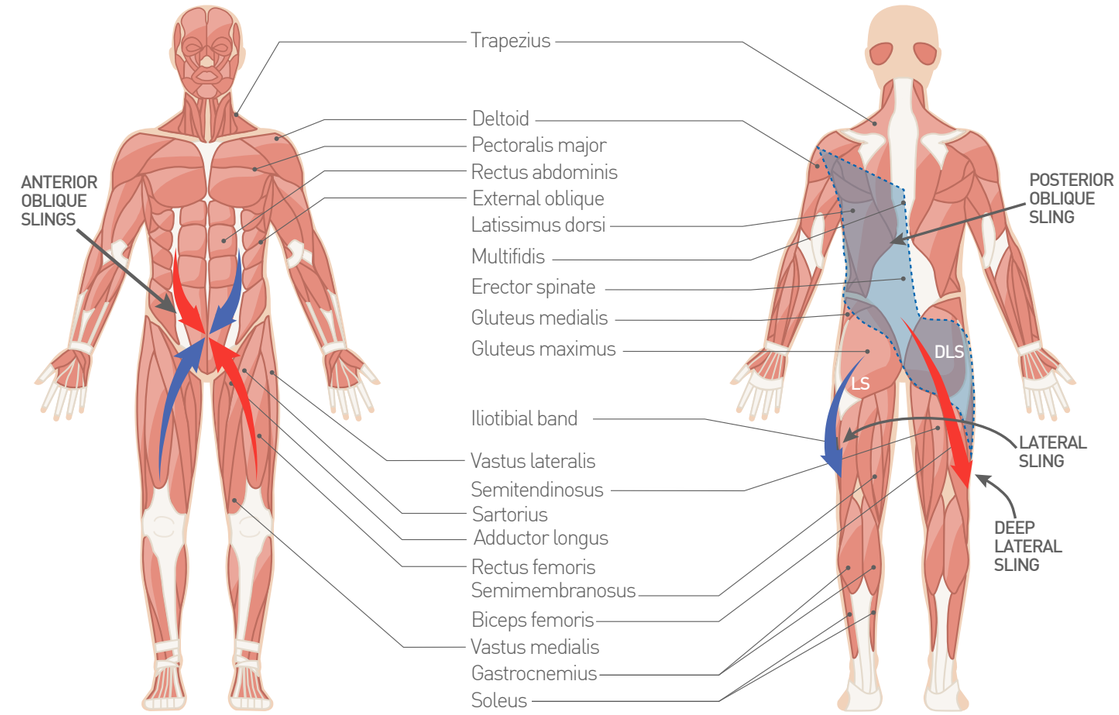
Your pelvis is a ring of bones, held together by strong ligaments, muscles and fascia. It protects vital organs, including the urinary and reproductive systems. The pelvic floor muscles form the base of the pelvis, acting like a sling to support these organs. Numerous muscles attach to the pelvic bones on all sides, providing stability for standing and enabling the strong leg movements required for cycling.

The pelvis transfers forces from the lower limbs to the spine, and vice versa, via the hip and sacroiliac joints. In cycling, where the body weight is supported on the base of the pelvis; the sit bones (or ischial tuberosities), it becomes a platform of stability, enabling the legs to generate force for driving the pedals. Good pelvic posture and muscle control allow the leg muscles to generate maximal power. Endurance improves too when your pelvis is stable and strength is high, by reducing energy wastage from unnecessary movement.

PELVIC MOVEMENT

Your pelvis moves in three planes.

1. Tilt—your pelvis tilts forward and backward, in



HUMAN MUSCULATURE SHOWING MYOFASCIAL SLINGS

THE LATERAL SLING

The Lateral Sling is located down the sides of each leg, the LS's include the gluteus medius, gluteus minimus, tensor fascia lata and iliotibial band, inserting just below the outside of the knee. This sling provides control of the hip and knee joints, and lateral stability of the pelvis i.e. side to side movement. Imbalance in this sling can cause knee turn-out when riding, and problems with hip and knee pain.

You can assess this sling yourself by facing a mirror, and standing on one leg. If your pelvis drops on the opposite side (Trendelenburg sign), this indicates weakness of the LS in the leg you are standing on.

See your health professional for further assessment and corrective exercises.

When riding, keeping a neutral pelvis assists with correct alignment of the lower limb during the pedal stroke, ensuring your hip lines up with your knee and foot. Have a training partner assess your riding posture, or consult a professional for a thorough evaluation.

THE DEEP LONGITUDINAL SLING

The DLS connects the biceps femoris (one of the hamstring muscles) to the sacrotuberous ligament, thoracolumbar fascia, multifidus and erector spinae (back) muscles on the same side of the body. This sling helps to stabilise the sacroiliac joint and the spine, assists with control into lumbar flexion (forward bending) and moving the spine back into extension. The multifidus and erector spinae work to maintain upright posture, so function consistently at low loads, but can be ramped up as required to provide bursts of strength. The biceps femoris is involved in flexing the heel towards the buttock in cycling. Tightness or weakness on one side can lead to loss of power and efficiency.

The slump test will help assess this sling. Perform it slowly, as it stretches the whole nervous system, and can potentially aggravate some lower back conditions. Sit on the edge of a high chair or table, with your legs hanging freely and hands behind your back. Bring your chin down onto your chest, then slouch through your back. Maintaining this position, slowly extend one knee until you feel increased tension in the back or leg.

Lower that leg, then extend the other knee for a comparison. If one side feels tighter, you probably need to stretch the hamstrings on that side.

Also look at pelvic tilt. If your pelvis is tilted backwards (posteriorly), you likely need to stretch hamstrings on both sides.

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conjunction with the lumbar spine. As the pelvis tilts forward (anteriorly), the lower back arches. As it tilts backward (posteriorly), the lower back flattens. Ideal cycling position is midway between these two extremes.

2. Lateral tilt—the pelvis can 'hitch up' or 'drop' sideways.
3. Rotation—the pelvis rotates to the left and right e.g. the left side rotates forward as you swing that leg forward to step. Strength in all three planes is required for optimal control.

STABILITY VS CONTROL

There has been considerable focus in recent years on so-called 'core stability', leading to a lot of training that supposedly strengthens the deep abdominal muscles with static exercises like the plank. While research has proven beyond doubt the importance of the deep muscular layers for a robust spine, this approach has led to a reduced emphasis on the superficial layers, which are also crucial for a strong back and hips. It has also produced a focus on static exercises for isolated muscle groups, rather than considering systems as a whole, operating synergistically under numerous conditions.

Recent research is increasingly using the term 'control' rather than 'stability', to acknowledge the dynamic nature of strategies humans use to move safely and effectively in a variety of environments. Control requires us to continually anticipate and adapt to intrinsic and extrinsic forces. Intrinsic forces include breathing and postural changes.

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THE ANTERIOR OBLIQUE SLING

The AOS consists of the internal and external abdominal obliques, connected to the adductors of the opposite thigh via the abdominal-adductor fascia. When this sling is working correctly on both sides of the body, it causes even loading across the pubic symphysis (where the pubic bones meet), and stabilises the abdominal wall. Imbalance has the potential to cause shearing forces across the front of the pelvis, resulting in groin pain. Imbalance in the obliques may also cause excessive trunk rotation, triggering back pain and reduced cycling efficiency.

To assess for imbalance in the obliques, perform a set of oblique crunches to each side.

If one side is significantly weaker than the other, you are at risk of problems. Build up the weaker side with the same exercise.

Check adductor length by standing with your feet spaced well apart. Ensuring your pelvis stays level, lunge sideways until you feel a stretch in the inner thigh.

Compare this to the other side. If one side is significantly stiffer, work on stretches to that side.

On your bike, extrinsic forces involve things like turning or hitting a pothole. Some of these will be anticipated, allowing the motor control system to prepare, while others will not, meaning the body has to react rapidly to maintain safety and prevent injury.

THE MYOFASCIAL SLINGS

Anatomy slings were first described by researcher Andry Vleeming, who proposed that these superficial structures were important for generating efficient dynamic movement in harmony with the deep muscle groups. Named 'myofascial' slings after the tissues comprising them, they contain muscles, fascia and ligaments, working together to create stability and control mobility.

Muscles within a sling are connected via fascia. Because of these interconnections, a muscle contraction causes forces to be transmitted throughout the sling. These are called force vectors, and they assist in the transfer of load within the pelvis and lumbar spine. When the force vectors between different slings are balanced, they provide optimal alignment. This enables efficient movement, increased force production, and greater speed. Imbalanced force vectors may result in malalignment and the potential for instability and injury.

Four major sling systems around the pelvis have been identified in this region. A qualified health professional can perform a detailed assessment of each of these slings.

Here are some suggestions for self-assessment and treatment:

STRENGTHEN THE SLINGS

Any activity that demands dynamic control of the pelvis will help to strengthen the myofascial slings. To complement your cycling, try walking or running in sand for a sensational sling workout—the softer the sand, the more stability required, increasing demand on the slings. If you really want to smash it, try sand hill running.

Alternatively, deep water running challenges pelvic control without the impact. Swimming a variety of strokes is another option. And, as always, consult your health care professional for specific advice.

THE POSTERIOR OBLIQUE SLING

The POS comprises the latissimus dorsi, and the opposite gluteus maximus, the largest muscle in the body, connected across the lumbosacral region through the thoracolumbar fascia. The lower portion of the gluteus maximus connects to the femur (thigh bone) underneath the iliotibial band on the outer side of the thigh. The POS is critical for stability of the sacroiliac joint, reducing potential for shearing and pain. As the most powerful hip extensor, a strong gluteus maximus is essential for cyclists, and good balance between both sides enables maximum efficiency and reduces risk of inappropriate activation of other muscle groups. The latissimus dorsi helps to maintain the shoulder stability necessary for good arm position when riding.

Assess flexibility in the gluteus maximus by lying on your back with both knees bent. Place the outer side of one ankle onto the opposite knee, allowing the top knee to drop out sideways. Reach between your legs and pull the bottom leg towards your chest until you feel the glute stretching.

Compare this with the other leg. Use this stretch to improve flexibility of the stiff side.

For the latissimus dorsi, raise one arm beside your head with the palm facing inwards. Bend sideways away from that arm and slightly forward until you feel the stretch.

Again, compare one side to the other, and work on stretching the stiffer side.