

TerranearPMC Safety Share

Week of January 16, 2012- Anatomy of the Back, Spine and Vertebrae

According to the Bureau of Labor and Statistics, more than one million workers suffer back injuries and account for one in five workplace injuries. 80% of these injuries are to the lower back (lumbar spine). Back injuries cost the US economy billions of dollars each year.

The anatomical structure of the spine is a remarkable combination of strong bones, flexible ligaments and tendons, large muscles and highly sensitive nerves. It is comprised of 31 bones called *vertebrae*: 7 cervical vertebrae (neck), 12 thoracic vertebrae (upper and middle back), 5 lumbar vertebrae (lower back), 5 sacral vertebrae (sacrum), and 2 lowest vertebrae that are fused (known as the coccygeal vertebrae or tailbone). Each vertebra comprises a vertebral body and a vertebral arch, which form an enclosed opening (or vertebral foramen). The vertebrae are stacked on top of each other, aligning the vertebral foramen and forming the spinal column. The spine is supported by ligaments and muscles. The natural shape of the spine creates three balanced curves (referred to as the lodrotic cervical region, kyphotic thoracic region and lordotic lumbar region – for all you folks out there that prefer the scientific terminology).

The spine is designed to be incredibly strong, protecting the highly sensitive nerve roots, yet highly flexible, providing for mobility on many different planes. Most of us take this juxtaposition of strength, structure and flexibility for granted in our everyday lives—until something goes wrong. Once we have back pain, we're driven to know what's wrong and what it will take to relieve the pain and prevent a recurrence. The fact is, there are many reasons for back pain; however the following are typical causes that are associated with the discomfort and even debilitating circumstances that has affected so many people in the work force. These are:

- The large nerve roots that go to the legs and arms are irritated
- The smaller nerves that innervate the spine are irritated
- The large paired back muscles (erector spinae) are strained
- The bones, ligaments or joints themselves are injured
- The disc space itself is a source of pain.

The following presents some of the more common medical conditions that are associated with specific locations within the spine when they are impaired.

The cervical spine (neck)

The neck supports the weight of the head and protects the nerves that come from the brain to the rest of the body. This section of the spine has seven vertebral bodies (bones) that get smaller as they get closer to the base of the skull. Most of the rotation of the cervical spine comes from the top two segments whereas most of the flexion/extension movement comes from the fifth, sixth and seventh vertebrae (C5, C6 and C7). Acute neck pain is most often caused by a muscle, ligament or tendon strain such as from a sudden force or straining the neck, and will usually heal with time without any type of serious medical treatment. Typical treatment involves ice and/or heat application, OTC medications, or possibly chiropractic or osteopathic manipulation. Symptoms can include:

- Breathing difficulties (from paralysis of the breathing muscles, if the injury is high up in the neck)
- Loss of normal bowel and bladder control (may include constipation, incontinence, bladder spasms)
- Numbness
- Sensory changes

- Spasticity (increased muscle tone)
- Pain
- Weakness, paralysis

The thoracic spine (upper back)

The 12 vertebral bodies in the upper back make up the thoracic spine. The firm attachment of the rib cage at each level of the thoracic spine provides stability and structural support to the upper back and allows very little motion. The thoracic spine is basically a strong cage and it is designed to protect the vital organs of the heart and lungs. The upper back is not designed for motion, and subsequently, injuries to the thoracic spine are rare. However, irritation of the large back and shoulder muscles or joint dysfunction in the upper back can produce very noticeable back pain. When spinal injuries occur at thoracic level, symptoms can cause:

- Loss of normal bowel and bladder control (may include constipation, incontinence, bladder spasms)
- Numbness
- Sensory changes
- Spasticity (increased muscle tone)
- Pain
- Weakness, paralysis

Lumbar spine (lower back) and sacral region (bottom of the spine)

The lower back has a lot more motion than the thoracic spine and also carries all the weight of the torso, making it the most frequently injured area of the spine. The motion in the lumbar spine is divided between five motion segments, although a disproportionate amount of the motion is in the lower segments. Consequently, these two segments are the most likely to breakdown from wear and tear (e.g. osteoarthritis). The two lowest discs take the most strain and are the most likely to herniate. This can cause lower back pain and possibly numbness that radiates through the leg and down to the foot (sciatica).

Below the lumbar spine is a bone called the sacrum, which makes up the back part of the pelvis. This bone is shaped like a triangle that fits between the two halves of the pelvis, connecting the spine to the lower half of the body. The sacrum is connected to part of the pelvis (the iliac bones) by the sacroiliac joints. Pain in the sacrum is often called sacroiliac joint dysfunction, and is more common in women than men. When spinal injuries occur at the lower back level, varying degrees of symptoms can affect one or both legs, as well as the muscles that control your bowels and bladder. Symptoms include:

- Loss of normal bowel and bladder control (you may have constipation, leakage, and bladder spasms)
- Numbness
- Pain
- Sensory changes
- Spasticity (increased muscle tone)
- Weakness and paralysis

As we can see, back problems are numerous and can affect many different areas and systems in the body. The best way to not have back problems is to practice proper lifting techniques and to maintain your fitness through back strengthening/dexterity exercises.

“Let no man pull you so low as to hate him.”

Martin Luther King Jr.