

Canine Lumbar Spine *(L1-3)
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Anatomy of canine lumbar spine specific to #1-3

The lumbar spine of the dog is incredibly similar to the human spine and with it comes its own share of ailments, injuries and disease processes. The name "lumbar" comes from medieval latin lumbaris for "loin" is part of the axial skeleton, its function is to provide a bony structure/protective covering for the spinal cord and nerves.

Ligaments allow flexibility and stretch, are tough/flexible/fibrous cords of connective tissue banding bones together, and there is a long, thick ligament that runs the length of the spine aligning them into a vertebral "column". Smaller ligaments intertwine among vertebrae anchoring to spinous processes forming a "web" of strong fibrous tissue. Still other ligaments attach bones of the spine to the ribs/pelvis. It is uncommon to have injury to a ligament but it can occur.

Tendons on the other hand connect muscles to bones. Unlike ligaments, tendons have a nerve supply that responds to injury and sends pain signals to the brain. Tendons connect the large/broad/thick band of the latissimus dorsi wrapping across the back side of the rib cage all the way to the base of the spine.

The muscle groups that are directly affected starting with the superficial muscles are the Latissimus dorsi, internal abdominal oblique, and trapezius m. The deeper muscles also affected are the longest thoracic and lumbar muscles, iliocostal, sartorial, dorsal spinal and semispinal m, and sublumbar muscles. The following will describe briefly muscle origins/insertions/and actions.

Longissimus Lumborum: origin at the ileum, and inserts at the lumbar vertebrae. Its action is extension of vertebral column. The iliocostalis lumborum origin is also the ileum, and insertion at 10-13 ribs, action is fixation of vertebral column, lateral movement, and aids in expiration, as it pulls ribs caudally. Without the muscle attachments, the bones would not be able to move, and without the nerve impulses, the muscles would not be "told" when they had to move. The lumbar trunk has both voluntary and involuntary muscle systems. The voluntary muscles move the limbs, and involuntary muscles are innervated directly by the Sympathetic Trunk supplying selected abdominal organs.

All of these muscles are prone to spasm with injury, this serves as a protective reflex to limit motion around the injured area, and is an involuntary response to inflammation/pain. Excess lactic acid buildup occurs with stagnant blood flow in turn causing more pain. With massage, increased blood flow to the area helps bring fresh oxygenated blood to the area, and washes away blood filled with toxins. Will discuss more about this later...

The lumbar area of the spine is one of the largest in the entire spinal column, as it is here where the nerve roots for plexuses supplying the nerves of the limbs originate. The spinal nerves are made of a sensory (dorsal) root as well as a motor (ventral) root which join to form a complete nerve unit. From here, they divide into both dorsal and ventral branches, which in the lumbar area described, these communicate directly with the Sympathetic Trunk. The lumbar splanchnic nerves branch to superior/inferior mesenteric ganglion innervating the inguinal mammary gland, intestines, bladder, the renal plexus affecting the kidneys, and the hypogastric plexus innervating the rectum, prostate, and external genitalia. Nerve systems also include the iliohypogastric, ilioinguinal, lateral cutaneous femoral, genitofemoral, obturator, and femoral nerve which innervate the limbs (specifically the thigh and stifle joint). These nerve "pathways" send messages to effector muscles in both the skin/abdominal organs.

The sympathetic trunk blood vessels run in parallel to nerve pathways to skin and viscera. Blood supply to the lumbar spine originates from the descending abdominal aorta, and branches off to the iliolumbar artery and its collaterals. Paravertebral lumbar anesthesia is sometimes used as an option when

laparoscopic opening of the abdomen by way of the flank area is desirable. CSF cushions the brain and spinal cord, transports nutrients, and regulatory substances.

This most important area can affect the entire body. Injury to the lumbar spine can be acute or chronic (degenerative), and symptoms directly related to level of vertebrae affected. I am going to describe briefly Intervertebral Disk Disease as one of the most common clinical problems encountered in the dog. Seen most frequently in chondrodystrophoid breeds (Dachshunds, Welsh Corgis, Pekingese, Bulldogs, Beagles, Basset Hound, and American Cocker Spaniels.) A genetic disturbance in cartilage development (epiphyseal plates) of long bones causing "dwarfism" of limbs though head and trunk are otherwise normal in size, those beloved "stumpy" dogs we all love.

Each lumbar vertebrae is cushioned with an intervertebral disk which absorbs shock with each movement of your spine. They have an outer layer of cartilage (dorsal annulus), and an inner core of gel like substance (nucleus proposes). They can take a lot of wear/tear before showing any signs of damage. Degeneration (multifactorial causes) occurs with aging, loss of interstitial fluid content alters the gel consistency which in turn decreases its ability to absorb shock and dissipate forces evenly. Acute injury involves complete rupture with protrusion of this disk nucleus material into the spinal canal and mounts a severe inflammatory response. A partial rupture or bulging of nucleus is more typical of the fibroid degenerative process and seen in all breeds in older dogs.

Compression of the spinal cord results in a wide range of symptoms based on many factors which are beyond the scope of this paper. The severity will be based on type, level of injury, and dynamic force of the compression. A thorough history, physical, and neurological exam must be performed as well as radiologic studies to identify level of injury and how this damage will affect spinal cord. Symptoms include: acute pain, motor deficits (paresis/paralysis) and analgesia distal to the level of trauma. Urinary bladder function and anal tone may also be affected. Therapies include crate rest, corticosteroid therapy (controversial), muscle relaxants, bladder expression if incontinent, and clean/soft padded bedding to prevent skin infections/ulceration. Surgery is also considered in select patients as necessary. Physical therapies both pre/post operatively can promote return of function by strengthening the limb muscles and encouraging their use.

Massage can be a very important method of treatment along with hydrotherapy to alleviate pain, enhance blood flow/oxygenation, stimulate lymphatic drainage, reduce edema, enhance flow of CSF, restore ROM and flexibility and strengthens body by stimulating muscles and increasing muscle tone, and help recover limb function, as well as assisting dog's body in releasing toxic effects of anesthetics post operatively. Most of all can help bring the dog back into balance with less pain and attain the best quality of life possible.

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