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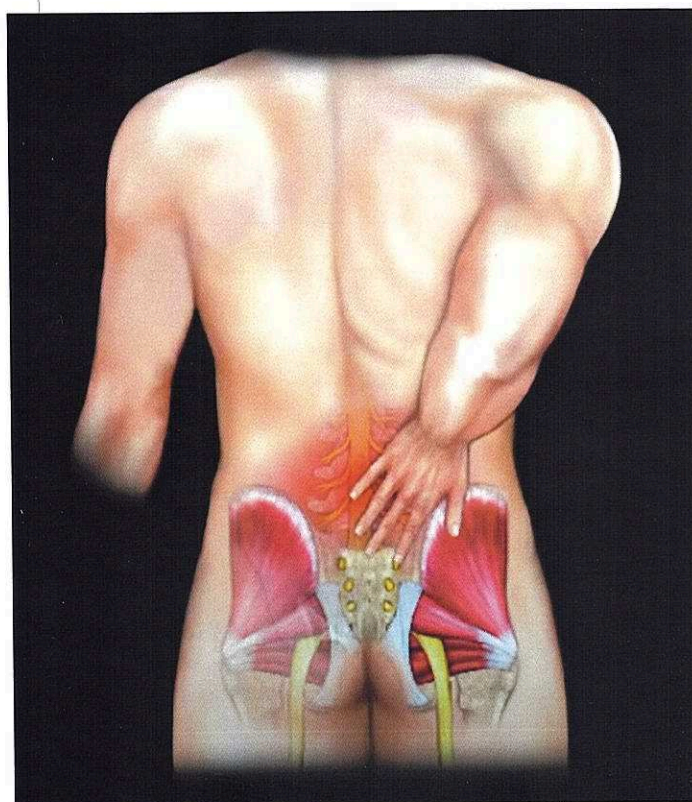
# ORTHOPAEDIC MONTHLY

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## Common Causes of Low Back Pain

By Nabil A Ebraheim MD & Jason Bowman MD

Lower back pain is one of the most common orthopedic problems. One can expect that about 90% of patients with lower back pain will improve with conservative treatment within one month. Conservative treatment consists of activity modification, nonsteroidal anti-inflammatory medications and time. Risk factors for lower back pain include job dissatisfaction, twisting, excessive continuous vibratory forces at work, heaving lifting, physical stress on the back as well as psychological factors such as anxiety and depression. Nicotine use, low-income status, and male gender are risk factors for developing lower back pain. Nicotine use adversely affects the vascularity and the nutrition of the intervertebral discs. Intradiscal pressure (IDP) changes with body positioning. The lowest IDP is measured while the patient is lying supine, and the highest IDP is measured while the patient is sitting and leaning forward. The physical exam during evaluation of lower back pain is helpful in determining an etiology. If the patient's pain is worse with flexion, such as with sitting, then there is likely a disc problem. If the pain radiates to the leg then there is possibly a disc herniation. Pain localized to the back that does not radiate is often indicative of discogenic back pain. If the patient's pain is worse with extension this could indicate spondylosis or spondylolisthesis. If the patient's pain is worse with extension and there is more back pain than leg pain, then there is probably spinal stenosis. The straight leg raise test is helpful in identifying lumbar disc herniation. To perform the straight leg raise test, the patient will be supine and keep the knee extended as you flex the hip. This maneuver stretches the sciatic nerve. If the patient has pain between 35-70 degrees this is a positive result indicating that there is an irritation of the nerve roots. Typically, the nerve roots irritated are the L5 and S1 nerve roots. A positive contralateral straight leg raise test is very specific for lumbar disc herniation. A straight leg raise test could be indicative of nerve root irritation by a herniated disc. The Waddell signs regarding lower back pain are controversial. The presence of multiple Waddell signs on examination of the patient could indicate a nonorganic symptom etiology. These signs include overreaction, exaggeration, and tenderness to light touch. If you distract the patient during the physical examination, the patient may give you a different response or the patient will give a pain response in a nonanatomic distribution. It is critical that a physician refrain from being judgmental or accusatory during the patient examination. When evaluating patients with lower back pain and concern for herniated



disc, the physician must be careful when deciding when to do surgery. Patients who have positive straight leg raise test, a disc herniation identified on imaging study, and neurological findings on exam have been found to have about a 95% chance that the patient's pain is attributable to a herniated disc. Findings of a positive straight leg raise test and the finding of a disc herniation on an imaging study have about an 85% chance that the patient's pain is attributable to a herniated disc. The finding of a positive straight leg raise test alone has about a 66% chance that the patient's symptoms can be attributed to a lumbar disc herniation. Typically, the first imaging test ordered is an x-ray. When ordering an MRI it is important to remember that an MRI will show an abnormal disc in about 1/3 of asymptomatic people that are younger than 40 years old, and an MRI will show an abnormal disc in about 90% of asymptomatic individuals that are older than 60 years old. Given the high incidence



*continued*

of MRI findings in normal individuals it is important that a physician orders MRI's on the right patients. An MRI should be ordered when there is pain that lasts more than four weeks without improvement. If you suspect cauda equina syndrome, infection, tumor, or trauma, an MRI is indicated. An MRI should be ordered in patients with Ankylosing spondylitis or DISH even with minor trauma. MRI with gadolinium can help to differentiate between recurrent disc herniation from fibrous scar tissue from previous surgery. Fibrous tissue enhances with gadolinium and recurrent disc herniations do not enhance with gadolinium. The most common causes of lower back pain include intervertebral disc disorders, lumbar stenosis, spondylolisthesis, degenerative scoliosis, failed back syndrome, and sacroiliac joint dysfunction. A herniated disc causes back pain and leg pain (radicular pain). The levels most frequently affected by a herniated disc are L4-L5 and L5-S1. The usual anatomic location for disc herniation is posterolateral. Posterolateral disc herniation at the L4-L5 level will affect the traversing nerve root L5. If the disc herniation at the L4-L5 level is a far lateral disc herniation, it will affect the exiting nerve root L4. Cauda equina syndrome can be due to a central disc herniation which affects multiple nerve roots that control the bladder and bowel. Patients with cauda equina syndrome will typically present with back pain more than radicular pain and will also complain of bladder and bowel symptoms such as incontinence and altered sensation over the perianal area. Early diagnosis with an MRI followed by early surgery is critical. Internal disc disruption is called discogenic back pain. Early disc degeneration can occur due to annular tears in the disc. Patients with discogenic back pain will usually have back pain without leg pain, with the pain being worse with flexion and sitting. With degenerative disc disease, there will be loss of the disc height. Lumbar stenosis is narrowing and degeneration of the spinal canal. There are two types of lumbar stenosis: central type and lateral type. In the central type, the pain is worsened with extension, and the patient may have neurogenic claudication. It is important to rule out vascular problems and the clinician should examine the peripheral pulses. In lumbar stenosis, sitting and flexion of the spine will relieve the pain (grocery cart sign) because it increases the spinal canal diameter. In the lateral type of lumbar stenosis, there will be radicular symptoms. If there is a bony defect in the pars

interarticularis, this is called spondylolysis. If the stress fracture weakens the bone so much that it is unable to maintain its proper position, the vertebra can start to shift out of place. This condition of vertebral slippage is called spondylolisthesis. Slippage of the vertebra could compress the nerves and narrow the spinal canal. It can occur in younger age groups from repeated activities such as gymnastics. There will be pain with extension of the spine, and it may progress with time. There are multiple types of spondylolisthesis. The isthmic type occurs more in males (L5-S1 is usually involved), and it will typically involve the L5 nerve root causing hamstring spasticity. With the isthmic type there is the, "scotty dog," sign on imaging showing a pars defect which is seen on oblique x-rays. The degenerative type occurs most often in middle age females, and it usually affects the L4-L5 level. In the degenerative type the degree of slippage is typically not severe and the pars remains intact. In degenerative scoliosis, there are degenerative changes in the spinal disc and the facet joints causing the spine to curve. Sacroiliac joint dysfunction is a possible cause of low back pain. The pain is in the lower back region located on either the right or the left side. The Faber test is helpful in determining the presence of SI joint problems. The best method for diagnosing the presence of sacroiliac joint problems is by administering an injection into the SI joint to localize the source of the pain. Other etiologies of lower back pain to look for include osteoporotic compression fractures in the elderly as well as primary and metastatic bone tumors. It is important to rule out other etiologies of pain such as hip conditions when you are dealing with spine conditions. Additionally, it is important to differentiate between sciatica that is caused by a disc herniation from sciatica that is caused by piriformis syndrome. Post-surgical lower back pain can come from a number of causes including postoperative infection, adhesions, epidural fibrosis, as well as possible nonmechanical causes such as psychological factors. It also may be due to mechanical causes such as inadequate decompression during surgery, recurrent disc herniation, failure of fusion and/or fixation, and possible instability of the spine. During surgery if the surgeon removed one facet on one side, or 50% partial facet removal that is done bilaterally without stabilization may cause iatrogenic spondylolisthesis.

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## **Pes Anserine Bursitis**

*By Nabil A Ebraheim MD & Ethan Sawyer MD*

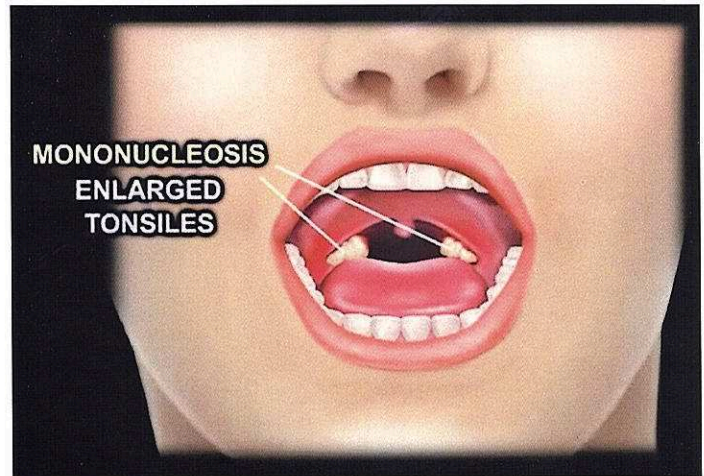
There are several fluid filled sacs called bursa surrounding the knee. These include the suprapatellar, prepatellar, infrapatellar, and pes anserine bursae, any of which can become inflamed resulting in a condition called bursitis. The pes anserine bursa is a small fluid filled sac located between the tibia and the three tendons of the sartorius, gracilis, and the semitendinosus. Pes anserine bursitis or "breast stroke knee" is an inflammatory condition of the medial knee at the pes anserine bursa that is common in swimmers. The pes anserine is the common area of insertion for the three tendons along the

proximal, medial aspect of the tibia. The insertion point of these tendons is sometimes referred to as "goose foot" because it resembles the shape of a goose's foot. With pes anserine bursitis, the pain is located on the medial aspect of the knee. The pain is typically below the joint line on the medial part of the proximal tibia which is where the bursa is located deep to the tendons. Treatment is physical therapy, NSAIDs, and injections. In patients who have pain in this region, it is also important to rule out meniscal tears, stress fractures, and osteonecrosis of the tibia.

# Infectious Mononucleosis

By Nabil A Ebraheim MD & Cody Smith MD

Infectious mononucleosis is a viral infection that is spread through saliva. The infected person passes the virus to other individuals mostly by sharing food and drink or kissing. It is a self-limiting viral infection that affects mostly adolescence and young adults. Infectious mononucleosis is caused by a member of the herpes virus family, notably the Epstein-Barr virus. The Epstein-Barr virus enters the mouth through the infected saliva and infects the epithelial cells in the pharynx. Infection spreads to B-cells by the CD-21 receptor in the tonsils, causing pharyngitis, then spreads through lymphatic tissue in the body. Generally laboratory analysis will show a mild to moderate increase in absolute and relative percentage of lymphocytes in the blood and the presence of heterophile antibodies, indicated by a positive mono spot test. Microscopic examination of a blood smear will also demonstrate atypical lymphocytes, recognizable by a larger than normal nucleus with nucleoli and a larger than normal amount of cytoplasm. Heterophile antibodies are produced by the abnormal B-cells infected by the virus. The classic triad of symptoms are fever, sore throat/pharyngitis, and lymphadenopathy. Lymphadenopathy is an enlargement of lymph nodes reflective of increased reactivity, easily notable in neck lymph nodes. The patient will also have fatigue and splenomegaly (occurs in about 50% of patients). Splenomegaly is an important clinical finding, but unfortunately splenomegaly is palpable in only half of cases. Splenomegaly is an important finding as it increases risk for splenic rupture, most commonly occurring in the first three weeks of infection. Measuring the spleen by ultrasound or by examination is controversial. Due to risk of rupture, most clinicians caution against return to contact sports sooner than four weeks after onset of symptoms. The return to play is based on the physical examination and the imaging studies, but also on the risk of splenic rupture. The clinical evidence supports the return to all



sports activities four weeks after the onset of symptoms, provided that the spleen has returned to a normal size. The athlete should be afebrile, well hydrated, and asymptomatic. Athletes with infectious mononucleosis should avoid all physical activity for a period of 3-4 weeks after the onset of symptoms, and should not return to competition for three weeks after their symptoms resolve. Treatment is rest, fluids, and nutrition. Pharyngitis caused by EBV may be mistaken as a bacterial infection and treated by antibiotics, typically ampicillin or amoxicillin. When penicillin derivatives are prescribed for Epstein-Barr virus, it can cause a rash in the body which disappears after the cessation of treatment. This rash may be mistaken for an allergy, and it is important to distinguish improper treatment of EBV from a true penicillin allergy.

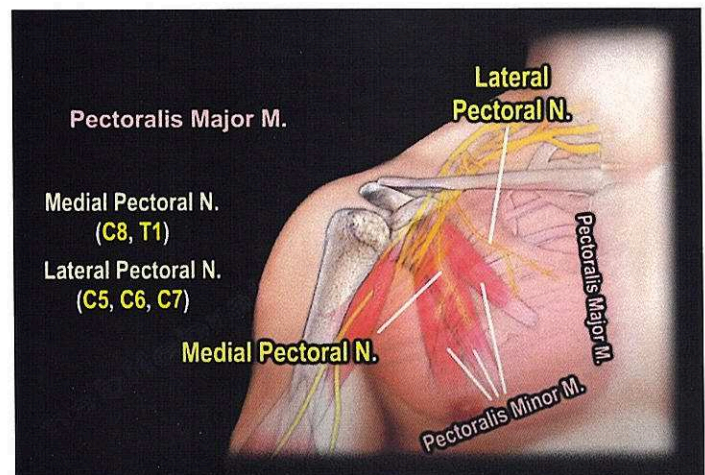
# Muscles with Dual Innervation

By Nabil A Ebraheim MD & Kyle Scarano MD

There are several muscles with dual innervation. The most common of these include pectoralis major, subscapularis, brachialis, flexor digitorum profundus, pectineus, adductor magnus, and biceps femoris.

Pectoralis major is innervated by the medial pectoral nerve (C8, T1) and the lateral pectoral nerve (C5, C6, C7). The medial pectoral nerve (MPN) comes from the medial cord of the brachial plexus while the lateral pectoral nerve (LPN) comes from the lateral cord. The MPN supplies the sternal head of pectoralis major and the LPN supplies the clavicular head.

Subscapularis is innervated by the upper and lower subscapular nerves. These nerves come from the posterior cord of the brachial plexus. The thoracodorsal nerve (innervation for latissimus dorsi) is in the middle of these two branches. The lower subscapular nerve also supplies teres major.



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*Muscles with Dual Innervation continued*

The posterior cord of the brachial plexus ends by two terminal branches, the axillary and radial nerves. The latter innervates the lateral part of brachialis. However, the medial part of brachialis is supplied by the musculocutaneous nerve. This is important because brachialis is a powerful flexor of the elbow.

The flexor digitorum profundus is innervated by the anterior interosseous branch of the median nerve (C8 and T1) on the lateral aspect, and the ulnar nerve (C8 and T1) on the medial aspect. Flexor digitorum profundus is a very strong finger flexor.

The pectineus muscle is supplied by the obturator and femoral nerves.

Adductor magnus is supplied by the obturator and sciatic nerves. The pubic part of the muscle (which performs adduction) is supplied by the posterior division of the obturator nerve. The ischial part of the muscle—which gives rise to the hamstring function—is supplied by the tibial nerve (a subsidiary of the sciatic nerve).

The long head of biceps femoris is supplied by the tibial branch of the sciatic nerve while the short head is supplied by the common peroneal branch of the same nerve.

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