



LOW BACK PAIN

Anatomy

Conditions: Facet Joint Syndrome • Muscular Spasm • Pinched Nerve • Spinal Stenosis • Discogenic Low Back Pain • Sacroiliac Joint Pain • Vertebral Compression Fracture

Procedures: Epidural & Steroid Injection • SNRB • Facet Block • SI Joint Injection • Branch Block • Radiofrequency Ablation • Discography • IDET • DeKompressor • Vertebroplasty • EMG/NCS • Nonprocedural Treatments

Surgery



ANATOMY

The normal anatomy of the spine is usually described by dividing up the spine into 3 major sections: the **cervical**, the **thoracic**, and the **lumbar** spine. (Below the lumbar spine is a bone called the **sacrum**, which is part of the pelvis).

The lumbar spine is in the lower back region. Each section of the spine is made up of individual bones called **vertebrae**. There are 7 cervical vertebrae, 12 thoracic vertebrae, and 5 lumbar vertebrae. An individual vertebra is made up of several parts. The body of the vertebra is the primary area of weight bearing and provides a resting place for the **fibrous discs** which separate each of the vertebrae. The **lamina** covers the spinal canal, the large hole in the center of the vertebra through which the spinal nerves pass. The **spinous process** is the bone you can feel when running your hands down your back. The paired **transverse processes** are oriented 90 degrees to the spinous process and provide attachment for back muscles.

There are four **facet joints** associated with each vertebra. A pair that face upward and another pair that face downward. These interlock with the adjacent vertebrae and provide stability to the spine. The vertebrae are separated by intervertebral discs which act as cushions between the bones. Each disc is made up of two parts. The hard, tough outer layer called the **annulus** surrounds a soft gelatinous center termed the **nucleus**.

When a disc herniates or ruptures, the soft nucleus spurts out through a tear in the annulus, and can compress a nerve root. The nucleus can squirt out on either side of the disc or in some cases both sides. The amount of pain associated with a disc rupture often depends upon the amount of nucleus that breaks through the annulus, and whether it compresses a nerve.

To help alleviate the pain, PHYSICAL THERAPY, MODALITIES, INJECTIONS, MEDICATIONS OR SURGERY may be necessary.



CONDITIONS

Facet Joint Syndrome

The vertebral bodies are stacked one on top of another to form the entire structure we call the spine. In between vertebral bodies are tiny joints called facet joints. As arthritic change and inflammation of the joints occur, the nerves to the facet joints can convey severe and diffuse pain. The pain does not follow a nerve root pattern. It is actually called 'referred pain', as the brain has trouble localizing these internal structures. Patients often complain



of pain in a generalized poorly defined region of the neck or back. There may be some tenderness overlying the involved joints as well.

It is usually caused by trauma (auto accidents, whiplash, a bad fall) or a degenerated or herniated disc. These all cause the spine to sub-lux (move out of joint) and the joint capsule is irritated. It is usually worsened by sudden movements or prolonged episodes of poor posture, (e.g. kneeling in the garden, bending over to lift or straining to read a book or a computer terminal).

Many patients find the worst time is at night, when all the muscles relax and the joints grind together. It can be mistaken for a condition called fibromyalgia or for myo-fascial syndrome. Oftentimes there is an associated SPASM of the muscles in the paraspinal region [on either side of the spine] which can further confuse diagnosis.

Muscular Spasm

The muscles around the spine can tighten up as the result of trauma or underlying disease and result in a painful spasm. This is usually the component of pain which responds to massage and heat the best. Often there are several things going on at the same time which necessitate treatment. When the underlying condition causing the spasm is improved and treated, the spasm often resolves.

Spasm usually responds to MODALITIES, THERAPY, and MEDICATIONS

Lumbar Radiculopathy ['Pinched Nerve']

Degeneration of the spine can result in several different conditions that cause problems. These are usually divided between problems that come from mechanical problems in the neck and problems which come from nerves being irritated or pinched. A radiculopathy is a problem that results when a nerve in the back is irritated as it leaves the spinal canal. This condition usually occurs when a nerve root is being pinched by a herniated disc or a bone spur

Symptoms: Weakness, Tingling sensations in the back and/or leg, numbness and loss of reflexes may all occur. These symptoms may worsen when the back is in different positions such as flexion and extension. It may worsen with increases in abdominal pressure as when you sneeze, cough, laugh or go to the bathroom. The distribution of sensory symptoms may follow a discrete pattern specific for each nerve root involved. We call this sensory distribution on the skin a dermatome and it helps diagnose where the injury is.

Diagnosis: It may be diagnosed by imaging, such as X-RAYS, MRI or CT. Testing such as EMG/NCS may also be performed to examine the 'electrical system' of the body and determine the severity of nerve compression.

Treatment may consist of THERAPY, MODALITIES, INJECTIONS, MEDICATIONS or SURGERY

Spinal Stenosis

Most back pain is due to degenerative changes that occur in the intervertebral discs and the joints between each vertebra. Perhaps the most serious of the problems caused by degeneration of the spinal segment in the lumbar spine is the condition of spinal stenosis. In the late stages of spinal degeneration, bone spurs from the degenerative process can cause a condition known as spinal stenosis. As the bone spurs form, the size of the spinal canal becomes smaller. The bone spurs begin to press on the spinal cord or the nerve roots. Pressure on the nerves in the spinal cord can cause numbness, tingling, or pain in the and legs and feet. This condition is sometimes called lumbar myelopathy.

SYMPTOMS: When there is narrowing of the spinal canal, the bony tube through which the spinal cord runs, the whole spinal cord may be affected. This is different than when the bone spurs only narrow one of the foramen - the openings where the nerve roots exit. The symptoms are much different. Pressure on the spinal cord, as it runs through the lumbar spine, can cause many symptoms. It can cause weakness and spasticity in the legs.

Spasticity means you to lose control over your legs and you may have a great deal of difficulty walking due to loss of control of where you place your feet. You may have numbness in the lower extremities. Your reflexes may be



increased in the legs. You may lose your "position sense". This is the sensation that allows you to "know" where your feet and legs are when you have your eyes closed. For example, you may not be able to tell whether your foot is up in the air or down on the floor, unless you can see it. There may be a tingling "pins and needles" sensation in the legs such as when your leg falls "asleep". Symptoms are usually worse with standing rather than sitting, as standing upright further compresses the spinal canal.

Diagnosis: It may be diagnosed by imaging, such as X-RAYS, MRI or CT. Testing such as EMG/NCS may also be performed to examine the 'electrical system' of the body and determine the severity of nerve compression.

Treatment may consist of THERAPY, MODALITIES, INJECTIONS, MEDICATIONS or SURGERY

Discogenic Low Back Pain

We now know that the nucleus center of the intervertebral discs contains a noxious irritating substance called phospholipase A2. This is a strong irritant, and is actually a component of cobra venom! When it leaks out, pain can occur. Symptoms are the product of the degree of protrusion and the location. The herniation or outpouching of the nucleus can be contained in the fibrous annulus, extruded out or sequestered. It is also possible for the nucleus contents to simply protrude partially through tiny fissures in the disc's outer portion, called the annulus fibrosis, where the noxious contents stimulate nerve fibers and cause pain. Treatment is dependent on the nature of the disease. Accurate diagnosis is essential, but is complicated by the fact that conventional imaging techniques such as MRI, X-rays and CT scans, although helpful for large pathology might not show the tiny fissures. A test called a DISCOGRAM is called for and can show the tiny tears in the annulus. We also check the pressure inside the disc, kind of like checking the pressure in a tire. This shows us if the involved disc is the culprit in the back pain. If so, we can treat the damaged disc with a revolutionary procedure called IDET. New surgical procedures are also developing which involve decompression and excision of the disc material through tiny incisions or even through a very narrow probe.

Sacroiliac ['SI'] joint pain

Similar to the facets, the SI JOINT can become inflamed and irritated. This usually presents as lower back pain which worsens with extension and rotation and flexion to either side. Often this pain inflammation occurs in conjunction with other disease processes as well. Diagnosis may include diagnostic imaging and a comprehensive physical exam by a pain physician.

Treatment includes SI JOINT INJECTION or BRANCH BLOCK.

Vertebral Compression Fracture

Osteoporosis is a major health problem throughout the United States and the developed world. In the United States alone, more than 700,000 vertebral body fractures are diagnosed yearly, resulting in more than 100,000 hospital admissions. These compression fractures are the reason for the 'hump-back' deformity [kyphosis] often seen in elderly osteoporotic women. Because the bones are so brittle and weak, these fractures often occur without any known trauma.

With an aging population, the number of osteoporotic fractures is expected to increase significantly in the coming years. Most people with compressive spinal fractures complain of pain. This typically lasts four to six weeks in duration and may leave the patient bedridden and at risk of pneumonia and deep venous thrombosis (blood clots of the legs).

In the past, with no adequate treatment for these types of spinal fractures, doctors have primarily focused on hormonal replacement for osteoporosis and analgesics (pain killers) for relief of pain. However, a relatively new procedure known as VERTEBROPLASTY (ver-tee-bro-plasty) promises dramatic relief from painful vertebral body compression fractures.



PROCEDURES

Epidural Anesthetic Block and Steroid Injection

A block that is performed under fluoroscopy to confirm a specific diagnosis and/or decrease pain and inflammation.

HOW IS IT DONE?

A local skin anesthetic is given. A special needle is then inserted into the epidural space of the Cervical, Thoracic, lumbar or caudal spine. Fluoroscopy is used to guide the needle and prevent complications from the needle. Contrast medium is injected into the space to confirm proper placement and outline the effect of the herniation on the spine and nerve roots, films are taken for review with the patient. An anesthetic and then a steroid (usually a long acting- slow release type of cortisone) are injected into the epidural space.

EXPECTED RESULTS?

Relief of pain if the medication reaches the inflamed area or source of pain.

HOW LONG DOES IT TAKE?

Fifteen minutes plus approximately fifteen to forty-five minutes recovery time depending on whether sedation is given.

WHAT IS EPIDURAL SPACE?

The epidural space is a fatty space outside the fibrous sheath [called the dural sac] surrounding the spinal cord. It tracks up and down the spinal cord, covering it and its exiting nerve roots like a blanket. Because of its location, medications injected into it can gradually diffuse out and bathe the irritated nervous tissue and help decrease inflammation and pain.

Selective Nerve Root Block (SNRB)

A block that is performed to determine if a specific spinal nerve root is the source of pain and reduce inflammation around the nerve root (usually from a herniated disc at this level) thus decreasing or relieving the pain.

HOW IS IT DONE?

The patient is given a local anesthetic - the physician then locates, under fluoroscopy, a specific spinal nerve root. A needle is introduced through the skin into the area adjacent to the nerve root. Dye is injected to confirm proper placement. Medication (anesthetic then steroid) is then injected into the area bathing the nerve root.

EXPECTED RESULTS?

Relief of neck and arm pain.

HOW LONG DOES IT TAKE?

Fifteen to twenty minutes. Plus recovery time.



Facet Block

A block (or local anesthetic injection) that is performed to confirm that a facet joint is the source of pain and decrease pain and inflammation in a facet joint or joints. Actually this is the only true way to diagnose Facet Joint Syndrome, as an abnormal looking joint on X-ray or CT scan, may be painless, and vice versa a normal looking joint may be the pain generator.

HOW IS IT DONE?

The patient is given the option of light, (or deep in rare cases) IV sedation under monitoring of the EKG, pulse oximeter by a pain physician. A tiny needle (smaller than the size of a paper clip) is then inserted into the area of the facet joint where the nerve reaches it (or directly inside the facet capsule, in some cases) and the physician injects an anesthetic and steroid. The entire procedure is done under x-ray [fluoroscopic] guidance.

EXPECTED RESULTS?

Decrease in or relief of neck pain. More importantly confirmation of the diagnosis, with the allowance of rational treatment.

HOW LONG DOES IT TAKE?

Fifteen to Thirty minutes, depending on the number of levels performed.

SI Joint Injection

A block (or local anesthetic injection) that is performed to confirm that the SI joint is the source of pain and to decrease pain and inflammation.

HOW IS IT DONE?

The patient is given the option of light, (or deep in rare cases) IV sedation under monitoring of the EKG, pulse oximeter by a pain physician. A tiny needle (smaller than the size of a paper clip) is then inserted into the area of the SI joint where the nerve reaches it (or directly inside the facet capsule, in some cases) and the physician injects an anesthetic and steroid. The entire procedure is done under fluoroscopic [X-ray] guidance.

EXPECTED RESULTS?

Decrease in or relief of neck pain. More importantly confirmation of the diagnosis, with the allowance of rational treatment.

HOW LONG DOES IT TAKE?

Fifteen to Thirty minutes, depending on the number of levels performed.

Branch Blocks

A block (or local anesthetic injection) that is performed to confirm that the SI joint or Facet joint is the source of pain. It is purely a diagnostic measure, and does not in itself improve the pain on a long term basis. If the test produces about 80% pain improvement on two separate tests, we then know that blocking the tiny nerve fibers from the involved joint can result in pain relief. If this is the case, a tool called a radiofrequency ablator can often result in long term pain relief from the joint inflammation.



HOW IS IT DONE?

The patient is given the option of light, (or deep in rare cases) IV sedation under monitoring of the EKG, pulse oximeter by a pain physician. A tiny needle (smaller than the size of a paper clip) is then inserted into the area of the nerve fibers to the SI or facet joint and the physician injects an anesthetic and steroid. The entire procedure is done under fluoroscopic [X-ray] guidance.

EXPECTED RESULTS:

Accurate confirmation of the diagnosis, with the allowance of rational treatment. This treatment may consist of RADIOFREQUENCY ABLATION to 'zap' the nerves conveying pain. In this case, I guess it's advisable to 'shoot the messenger'!

HOW LONG DOES IT TAKE?

Thirty to Forty five minutes, depending on the number of levels performed.

Radiofrequency Ablation

Once Branch blocks have confirmed the origin of pain from a given joint, if the test produces about 80% pain improvement on two separate tests, we then know that blocking the tiny nerve fibers from the involved joint can result in pain relief. If this is the case, a tool called a radiofrequency ablator [image] can often result in long term pain relief from the joint inflammation.

HOW IS IT DONE?

The patient is given the option of light, (or deep in rare cases) IV sedation under monitoring of the EKG, pulse oximeter by a pain physician. A tiny needle (smaller than the size of a paper clip) is then inserted into the area of the nerve fibers to the SI or facet joint and the physician confirms placement with a light nerve stimulation. Once proper needle placement is achieved, a small current is used to get rid of the nerve carrying pain information. The entire procedure is done under fluoroscopic [X-ray] guidance.

EXPECTED RESULTS?

Pain relief.

HOW LONG DOES IT TAKE?

Forty five minutes to an hour, depending on the number of levels performed.

Discography

A discogram is a diagnostic test performed to view and assess the internal structure of a disc and determine if it is a source of pain.

HOW IS IT DONE?

The patient is given intravenous medication as a relaxant and pain reliever. A local anesthetic is injected into the patient's skin in the area that is being examined. A needle is inserted through the skin and into the disc under fluoroscopy. A saline solution and radiopaque dye are injected into the disc or discs if more than one disc is being examined. A x-ray image is usually performed on the painful disc after the dye is injected to obtain images of the dye distribution. This will demonstrate annular tears, scarring, disc bulges and changes in the nucleus of the disc.



EXPECTED RESULTS?

accurate assessment of the discs and whether pain is originating from degenerative tears in them.

HOW LONG DOES IT TAKE?

About one hour, possibly slightly longer depending on the number of levels performed.

Intradiscal Electrotherapy ['IDET']

With age or due to injury, cracks or fissures may develop in the wall of the intervertebral disc. Filled with small nerve endings and blood vessels, these fissures are a chronic source of pain in many patients.

Additionally, the inner disc tissue (nucleus) will frequently bulge (herniate) into these fissures in the outer region of the disc, likewise stimulating pain sensors within the disc. SpineCATH IDET therapy is a minimally invasive treatment in which the physician applies controlled levels of thermal energy (heat) to a broad section of the affected disc wall. This heat contracts and thickens the collagen of the disc wall. Therapy may result in contraction or closure of the disc wall fissures and a reduction in the bulge of the inner disk material.

HOW IS IT DONE?

SpineCATH IDET therapy is usually performed on an outpatient basis. Local anesthesia and mild sedation may be used to reduce discomfort during the procedure. You will be awake and alert so that you can provide important feedback to the physician. With the guidance of x-ray images, your physician will advance a needle into the disc. The SpineCATH catheter will be passed through the needle and into the disc. Once it is in the appropriate position, the temperature of the heating section of the catheter will be gradually increased, raising the disc wall temperature. During the heating protocol, your physician will monitor your condition and comfort level closely. You will most probably feel a reproduction of your usual lower back pain. This is a strong indication that the heat is being applied to the appropriate areas. Once the therapy is completed, the catheter and needle are removed, and you will likely be sent home with a Band-Aid over the needle insertion site.

EXPECTED RESULTS?

Reports indicate that properly selected patients with appropriate post-procedure care, most patients have at least partial improvement in their pain. Prognosis for results will depend on your particular case. SpineCATH IDET therapy, like any surgical procedure, has some risks. Not all patients will find relief for their back pain and relieved symptoms may recur over time. Please consult your physician about the risks and potential complications of SpineCATH IDET therapy.

Many additional factors may prevent your physician from recommending SpineCATH IDET therapy for your condition. Such factors may include, but are not limited to, very narrow disc height, severe disc herniation, spinal instability, very advanced stages of disc degeneration, or various general health concerns.

If SpineCATH IDET therapy is recommended for you, we advise you to openly discuss your treatment expectations with your physician, as he or she is best suited to ensure your expectations are reasonable given your personal condition.

HOW LONG DOES IT TAKE?

The procedure takes about forty five minutes, followed by a short stay in recovery. Post-procedure, a brace is worn for a couple of weeks, and a gradual program of physical therapy is necessary to optimize the result.

DeKompressor



Percutaneous Discectomy is an option for patients suffering from low back and leg (radicular) pain due to contained disc herniations who have failed conservative treatments and are interested in trying minimally invasive options prior to having traditional surgery. It can be performed under direct vision in a similar fashion to microdiscectomy or it may be performed entirely under x-ray (fluoroscopy) which reduces the entry site size to that of a standard injection (less than 1/16" needle prick, about the size of a small freckle). By comparison, standard open discectomy can involve incisions of 1" and greater.

The procedure is done with local anesthetic at the introduction site. Light conscious sedation may be used, as necessary, to help calm the patient. General anesthesia is not required (contraindicated). The total required procedure time may vary between 15 minutes and 1 hour. Total operation time of the DEKOMPRESSOR® should range from 1 to 10 minutes. There should be no pain generated by the operation of the device. The cannula may be slightly curved to help facilitate access to difficult anatomy including the L5/S1 disc.

Vertebroplasty

A relatively new procedure known as vertebroplasty (ver-tee-bro-plasty) promises dramatic relief from painful vertebral body compression fractures. Bone cement is injected into the crushed vertebral body, filling it back up and correcting the deformity while alleviating the pain as well.

HOW IS IT DONE?

After a thorough workup, including blood tests and imaging tests (x-rays, bone scan, CT scan, or MRI scan) a patient may, in consultation with his/her primary physician, elect to undergo the procedure. Vertebroplasty is generally performed with local anesthesia and intravenous sedation. Prophylactic antibiotics may also be administered before or during the procedure.

The patient lies on his/her stomach, monitors are connected to assess heart rate, blood pressure, and oxygenation. The skin is washed with antiseptic solution and covered with sterile towels. Using x-ray guidance, a needle is carefully placed through the skin in the back into the affected vertebra in the spine. Once the needle is properly positioned, polymethylmethacrylate (PMMA), or "bone cement" is slowly injected into the spine using x-ray guidance.

Usually, less than 5 cc of cement is necessary to fill the vertebrae. The needle is then removed, and if necessary the procedure may be repeated at other spinal levels.

EMG/NCS

An electromyogram/nerve conduction study (EMG/NCS) is a diagnostic test that looks at the function of the nerve roots leaving the spine as well as their terminal branches in the arms and legs. The test is done by inserting tiny electrodes into the muscles of the lower extremity and by surface electrodes to check the speed and magnitude of signal transmission. By looking for abnormal electrical signals in the muscles, the EMG/NCS can show if a nerve is being irritated, or pinched as it leaves the spine. The test is similar to checking the electrical system in a car to find out where the wiring is not functioning properly. Based on the EMG/NCS, a physician can better formulate a treatment plan.

Nonprocedural Treatments

PHYSICAL AND OCCUPATIONAL THERAPY

This type of therapy may consist of exercises to improve range of motion, strength and conditioning. A good therapist will examine you, assess your deficits and disease and formulate a plan based on optimizing function and minimizing pain. These exercises are specific for the nature of your injury and should be executed under the supervision of a physician who understands your case.



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MODALITIES

Modalities include simple age-old treatments such as heat, cold and massage as well as newer treatment methods such as acupuncture, manipulation, and electrical stimulation. Your physician and therapists should formulate an optimal treatment protocol to maximize your healing potential. These modalities are often used in conjunction with Physical and Occupational therapy.

MEDICATIONS

Depending on the nature of your problem, Non-steroidal antiinflammatory drugs ['NSAIDS'], corticosteroids, and opioids [narcotic] medications may be used. If there is a muscular spasm, a muscle-relaxant may help alleviate that aspect of your pain. Narcotics should be minimized and used only for short periods if at all possible due to rapid tolerance and all the attendant risks associated with abuse of a controlled substance.



SURGERY

Dr. Sandhu performs minimally invasive surgeries which result in a rapid recovery and minimal risk to the patient. Although we do not perform large-scale open surgeries in our clinics, there are occasions where a problem requires surgical intervention.

We can help screen potential surgical candidates and send them for evaluation by the appropriate specialist. These surgeons are usually orthopedic surgeons or neurosurgeons with specialized training for the particular disease process involved.