



ORTHOPÆDICS

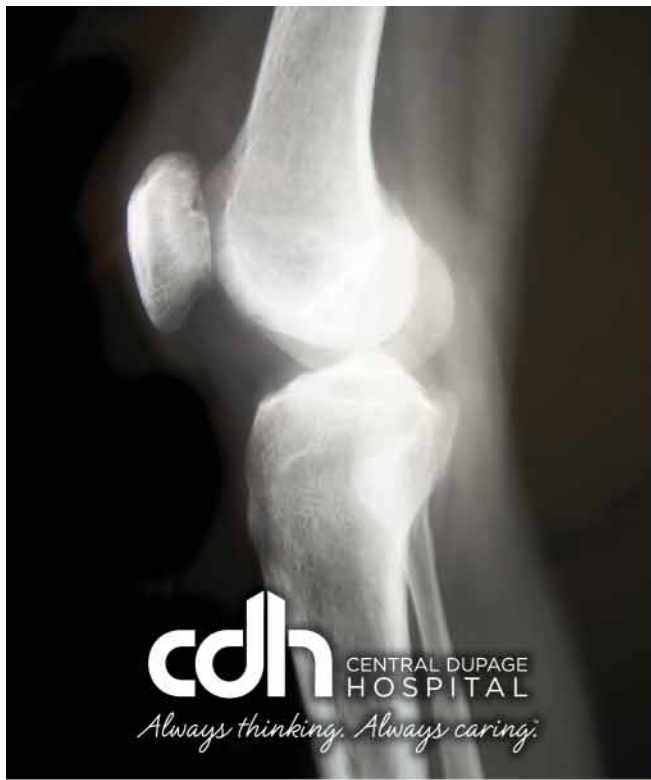
A complimentary publication from OAD Orthopaedics
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Review



Fusion or Replacement?





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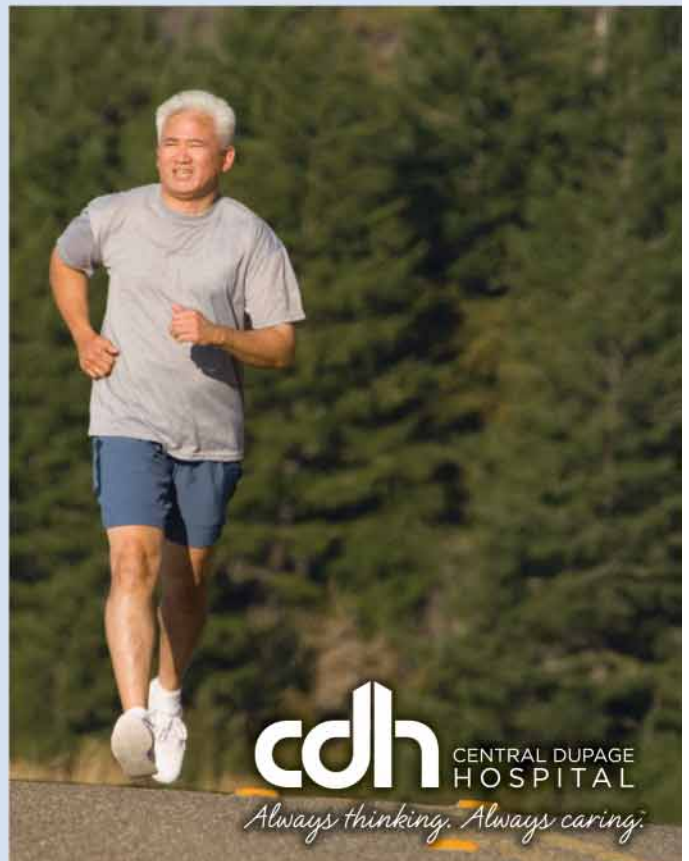
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Back-to-Back Expertise

Welcome to the eighth issue of *OAD Orthopaedics Review*! This issue features conservative and surgical spine-related topics, with a focus on cervical (neck) spine conditions and low back pain. Patients who suffer with neck and/or low back pain are often surprised and relieved to discover the spectrum of treatment options now available. With OAD's full range of specialists and services, any type of spine, neck or musculoskeletal problem can be thoroughly evaluated, treated and rehabilitated in one convenient location.

OAD's *Spine Center of Excellence* consists of three fellowship-trained spine surgeons and four physical medicine and rehabilitation specialists (physiatrists). Spine surgeons, John Andreshak, MD, Stephen Heim, MD and Jerome Kolavo, MD, collaborate with OAD's physiatrists, Beth Froese, MD, Vinita Mathew, MD, Steven Mayer, MD and Mary Norek, MD, to ensure patients have access to the most comprehensive neck, spine and musculoskeletal expertise.

Physiatrists' nonsurgical treatments include personalized exercise and physical rehabilitation regimens, medications, injection therapies such as trigger point, sacroiliac, peripheral joint injections and lumbar epidural steroid injections (*Epidural Steroid Injections, p.7*). At the forefront of spinal surgery, Doctors Andreshak (*Cervical Disc Replacement Offers Alternative Option to Disc Fusion, p.4*), Heim and Kolavo perform discectomies, fusions, lumbar and cervical spine microsurgery, advanced/complex cervical procedures and reconstructive spinal surgery.

The integral role of physical therapy in patients' orthopaedic health cannot be understated. Staffing OAD Rehabilitation Departments with first-rate physical, occupational, hand and massage therapists is paramount to us. OAD's signature therapy services help countless patients be relieved of pain, regain physical mobility and strength, resume activities and enjoy a more active lifestyle.

Enjoy our publication and another OAD educational experience. We thank our vendors and business partners for supporting this ongoing OAD initiative as we are dedicated to being your *Orthopaedic Experts, Close to Home*.

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Review

A publication from



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Cervical Disc Replacement Offers Patients Alternative Option to Disc Fusion

By John L. Andreshak, MD

Neck pain and arm pain from a herniated disc are two of the most common reasons people seek the care of a spine/cervical spine specialist. Many patients do well with a combination of medicine, therapy and sometimes injections. However, when conservative measures fail, surgery is highly successful in resolving the problem. In the past, the standard surgery to resolve these symptoms was an Anterior Cervical Discectomy and Fusion (ACDF). Today, however, a new option is avail-

able—Cervical Disc Replacement (CDR).

The cervical herniated disc is the most common cause of neck pain and arm pain. This is often accompanied by feelings of numbness or even weakness and is called radiculopathy. This may be intermittent or may be constant, varying in intensity. It is often caused by activities like driving, sitting in front of a computer or working overhead. Radiculopathy can also be caused by the normal degeneration/aging process that naturally occurs

in the spine, resulting in formation of bone spurs. These arthritic occurrences create pressure on the nerves and can result in neck pain with arm pain, weakness and/or numbness. The C5/6 and C6/7 discs are the most common culprits. Often, these symptoms will resolve without intervention, but recurrences are common. Often your doctor may try a combination of nonsurgical treatments to include medications, physical therapy and epidural steroid injections. When

nonsurgical treatment fails, surgery is an excellent option with highly successful results. In the past, ACDF has been the gold standard procedure with minimal complications and long-term success. Greater than 90 percent of patients achieve resolution of their arm symptoms. Strength will usually return within several months. Numbness may be persistent for more than a year in some patients. Neck pain usually improves with physical therapy.

WHY CHANGE WHAT ALREADY WORKS?

Understanding the anatomy of the neck and how it functions will help explain why the CDR may actually improve the patient's outcome if surgery is needed.

The cervical spine has seven bones allowing motion of the neck. The neck bends forward, backwards, side to side and rotates. The ACDF removes motion of one or two discs due to the fusion and plating. The simple fusion of one or two discs does not noticeably change the neck's motion. Most patients do not notice this loss of motion in the neck. This is different than a fusion of the hip or knee, which was a common operation in the past for arthritis. The complete loss of motion in the knee needed to be compensated by the hip joint, ankle joint or the spine. Over time, the hip, ankle or spine would wear out faster which then required

medical care. This same process has been found to occur in the neck after a cervical fusion or ACDF. Eventually, the cervical fusion causes the adjacent levels to wear out, resulting in new symptoms, again, in the neck or arm. Approximately 30 percent of patients with an ACDF experience

forward bending requires a complex series of movements. There is sliding, compression, along with the forward bending at the disc. These combined movements vary at each level in the spine. Currently, there are two FDA-approved cervical disc replacements. Many more

Neck pain and arm pain from a herniated disc are two of the most common reasons people seek the care of a spine/cervical spine specialist.

the "new" symptoms 10 years after their initial fusion. Similar to the development of hip and knee replacements, the cervical disc replacements have been designed and tested over many years to solve this dilemma. We will examine the pros and cons of CDR while identifying who qualifies and is best suited for the procedure.

WHAT ARE ITS BENEFITS?

The Cervical Disc Replacements (i.e., prostheses) vary in their design. They range in material construction from metal moving on metal, metal sandwiching a polyethylene core (similar to a knee replacement prosthesis) to a viscoelastic, compressible disc replacement. Each prosthesis tries to mimic the normal motion of the cervical disc. The task of simple

are in trials or awaiting FDA decisions. Each of them are intended for placement at a single disc level only.

The CDR operation is nearly identical to the ACDF and involves two aspects. First is a discectomy to remove the disc and any pressure (e.g., bone spurs, ligaments, herniations) on the nerve roots. Because of the continued movement in the spine, the surgeon must do a meticulous removal of all offending compression to prevent recurrence. The procedure's second part is the placement of the prosthesis into the disc space instead of the bone graft and plate. The prostheses are held in place by various methods including screws, keels, prongs and rough surfaces for bone ingrowth onto the prosthesis (similar to hip replacements.)



Flexion or forward bending view from the side



Extension view or back bending view from the side

Results have been excellent, predictable and consistent with the ACDF with relief of radiculopathy and neck pain. After a fusion there are often lifting restrictions and sometimes a cervical collar for approximately three months or until the fusion is solid and stable. Benefits of the CDR include the immediate use of the neck with no restrictions. With a Cervical Disc Replacement, stability is almost immediate, and the patient is not given lifting restrictions or a collar; driving can be resumed when the patient is able.

WHO IS A CANDIDATE FOR A CERVICAL DISC REPLACEMENT?

Any patient with a single disc herniation and radiculopathy who has failed nonoperative management is an ideal candidate. Patients with spinal stenosis in the neck have also been successfully treated. The herniation must be between C3 and C7 as the other disc levels have not been tested in the studies. The prostheses have not been designed for these levels. Based on the size and anatomy of the C2 and T1 vertebral bodies, these levels may not hold the prosthesis correctly and therefore should not be included. The person must be in good health and able to tolerate the general anesthesia required. As is the case with hip and knee replacements, candidates must not have any active

infections (i.e., urinary tract, pneumonia, skin, dental). All patients should be seen by their medical doctor prior to any surgery to discuss their medications and medical problems.

means that if new symptoms occur in the neck or arms, an MRI may be useless or non-diagnostic due to artifact from the metal, so a myelogram may need to be used. Although the need for a second

With a Cervical Disc Replacement, stability is almost immediate, and the patient is not given lifting restrictions or a collar; driving can be resumed when the patient is able.

For CDR, some conditions need to be met to qualify and prevent complications or problems. If the disc level is very arthritic and collapsed already, it may not move even if a disc replacement is implanted and can cause more pain. A candidate cannot have arthritis in the portion called the facet joints (the small shingle joints) in the back of the neck. X-rays, MRI (magnetic resonance imaging) or CT scans (computed tomography) can determine if such arthritis exists. If this arthritis is present, the patient may continue to have neck pain or even continued nerve pain after a disc replacement. There can't be any instability or abnormal movements at the disc level. This is called spondylolisthesis and is often described as a slippage of the spine. It may also be due to ligament damage. If a CDR is implanted, the prosthesis may not function correctly or may fail. Since the prosthesis needs to be held in place by the screws, keels or ridges that contact the bone, the bone must be strong. Therefore, Cervical Disc Replacement is not recommended with the presence of osteoporosis and/or weak bones.

WHAT ARE THE CONCERNS WITH THIS NEW PROCEDURE?

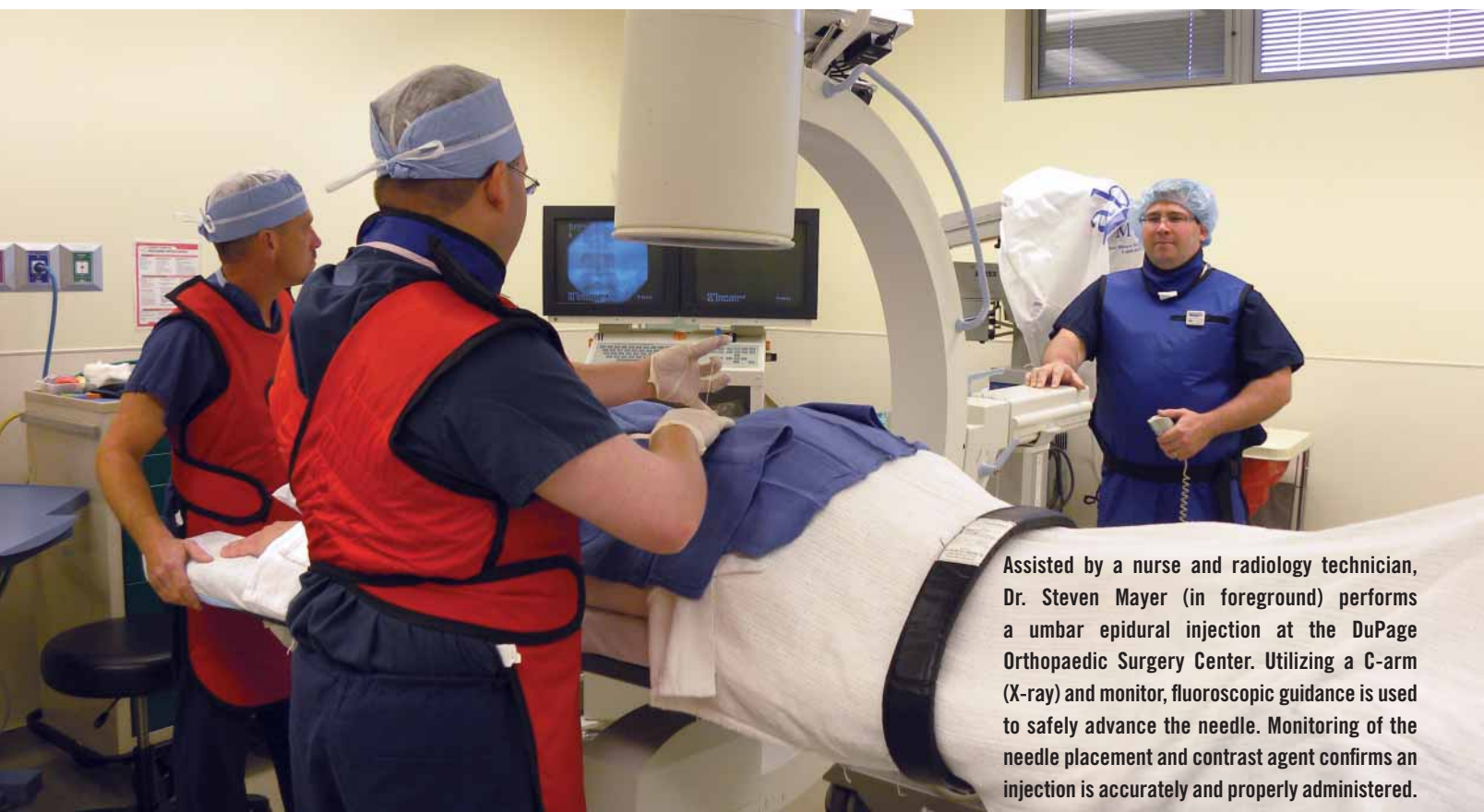
Disc replacements in the neck have been closely studied for about 10 years. Long-term (20–30 years) results are also not known. How long the prosthesis lasts, or whether it will need to be revised is unknown. The longevity of the prosthesis and the need for revision will only be found with time. The current CDRs use metals that interfere with MRIs. This

surgery during the FDA studies was lower in the Cervical Disc Replacements compared to the ACDF, it was not zero. Some prostheses needed repositioning or conversion to a fusion. As with any new procedure, you should discuss your options with your doctor. The Cervical Disc Replacement at this time appears to be as successful as the ACDF with regard to relief of neck pain and radiculopathy. The ability to quickly return to normal function, work and recreational activities is better than waiting three months for a fusion to heal. The benefits of not fusing the neck, and whether the other levels wear out adjacent to the prosthesis will be best decided in time as study/outcome data continues to be gathered and reported.



John L. Andreshak, MD, earned his medical degree from the Chicago Medical School and completed an internship and orthopaedic residency at Loyola University Medical Center. He completed a fellowship in spine surgery at the Mayo Clinic combining both orthopaedic and neurosurgical techniques. Certified by the American Board of Orthopaedic Surgery, Dr. Andreshak specializes in the surgical and nonsurgical treatment of adult spine problems such as herniated discs, degenerative discs and spondylolysis. His expertise includes cervical disc replacements, complex cervical spine surgery, minimally invasive lumbar spinal fusions and discectomies. Dr. Andreshak joined OAD Orthopaedics in 2002.





Assisted by a nurse and radiology technician, Dr. Steven Mayer (in foreground) performs a lumbar epidural injection at the DuPage Orthopaedic Surgery Center. Utilizing a C-arm (X-ray) and monitor, fluoroscopic guidance is used to safely advance the needle. Monitoring of the needle placement and contrast agent confirms an injection is accurately and properly administered.

Lumbar Epidural Steroid Injections

By Steven E. Mayer, MD

Low back pain and sciatica is one of the most common reasons to visit a physician and is one of the most common reasons for disability. The vast majority of patients who present with low back pain do very well with physical therapy, anti-inflammatory medications and time. Unfortunately, for a select few patients, symptoms persist and continue to adversely affect their quality of life. In most circumstances, surgical intervention is neither indicated nor desired by patients. As a spine care provider, I am often asked the question, “What can I do if conservative treatments are ineffective and surgery is not indicated or desired?” Such patients may find epidural steroid injections (ESIs) to be a viable, nonsurgical option.

WHAT IS A LUMBAR EPIDURAL INJECTION?

It is helpful to first learn about what is called

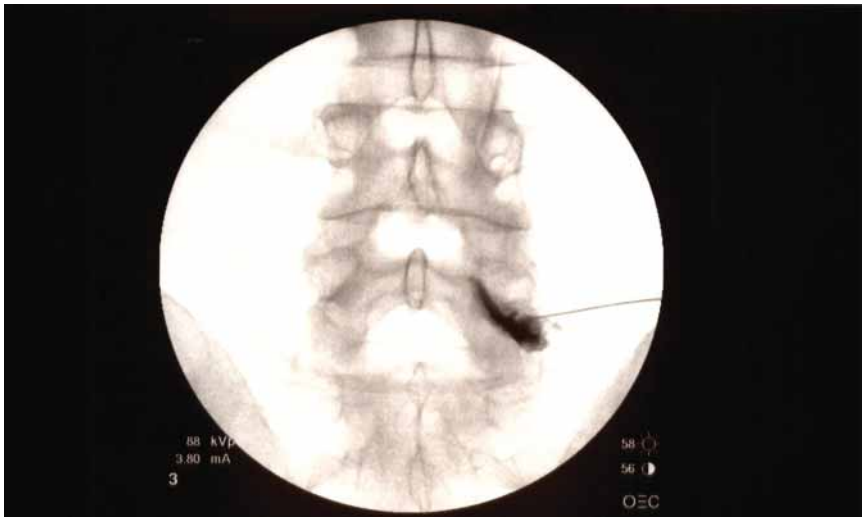
the epidural space. It’s a space between the bony part of the spinal canal and the spinal cord. It is normally triangular in shape and contains fat. A needle is carefully guided to this space with the use of fluoroscopy (x-ray). A contrast agent (similar to a dye) is then injected to confirm accurate needle placement. Once needle placement is confirmed, a steroid solution (and typically an anesthetic) is injected. The goal of an epidural steroid injection is to fight/relieve inflammation at the potential source of pain.

TYPES OF ESIS

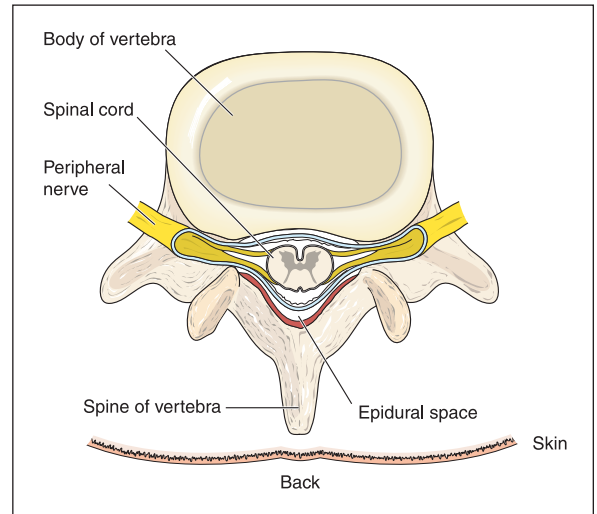
There are two types of epidural steroid injections that can be done in the low back: interlaminar and transforaminal. The interlaminar technique involves a needle being guided directly into the epidural space between the spinous processes of the spine. This type of injection is directed

into the middle and posterior portion of the epidural space. The medicine tends to spread across a wide area with this technique. With the transforaminal technique, the needle is guided at an angle to the spine to be directed into the epidural space surrounding the nerve root as it exits the spine. The needle then enters the epidural space off to the side and more anterior. This concentrates the medication along a specific point of interest.

Which technique is better depends on many factors including the type and distribution of the patient’s pain. This is typically discussed in detail prior to the procedure. The transforaminal approach can be a better choice for some patients who have a classic pain distribution and/or for those considering surgery. For example, if a patient has a herniated disc pinching a specific nerve and this



Contrast flow for a right L5 transforaminal epidural steroid injection. Needle is seen coming in from right side with contrast flow along nerve root beneath the circular pedicle.



The spine and epidural space

correlates clinically with the pain pattern, then the transforaminal approach is desired. Additionally, if a patient has multiple levels from which pain may be emanating, then the transforaminal approach has the advantage of providing diagnostic information which may become helpful if further injections or surgery are considered in the future. The interlaminar technique provides very little diagnostic information other than to sometimes differentiate pain emanating from the low back versus the hip joint.

Who should consider an epidural steroid injection? Epidural steroid injections have been shown to benefit those patients who have radicular symptoms (radiating symptoms down the leg) typically from a disc herniation. There is also some evidence supporting the use of ESIs for lumbar spinal stenosis (narrowing of the spinal canal). ESIs should be considered as a potential treatment option for patients with radiating pain who have not had significant relief with physical therapy and anti-inflammatory medications.

EFFECTIVENESS OF ESIs

How effective are epidural steroid injections? Studies vary on this answer in the medical literature. On average, approximately 60 percent to 70 percent of ESI patients experience pain relief. Sometimes the injection's effects are

short-lived, but for many patients, relief may continue for several months or longer. Patients experiencing limited success with physical therapy and pain medications may find an epidural steroid injection a feasible option in the alleviation of acute sciatica or even chronic pain.

In general, the risks to ESIs are rare and the common side effects are short-lived. Common side effects are typically self-limiting and may include facial flushing, changes in appetite, blood sugar elevation and water retention, to name a few. The risks are also rare and include bleeding, infection, allergic reaction, headaches and weakness. Patients should have a thorough discussion of the risks, benefits and alternatives to treatment with their spine care provider prior to the procedure. Many patients are able to avoid surgery with this treatment. For some patients who must proceed with surgical intervention, administered injections can diagnostically help the surgeon evaluate the appropriateness for surgery and the anatomic location for surgery.

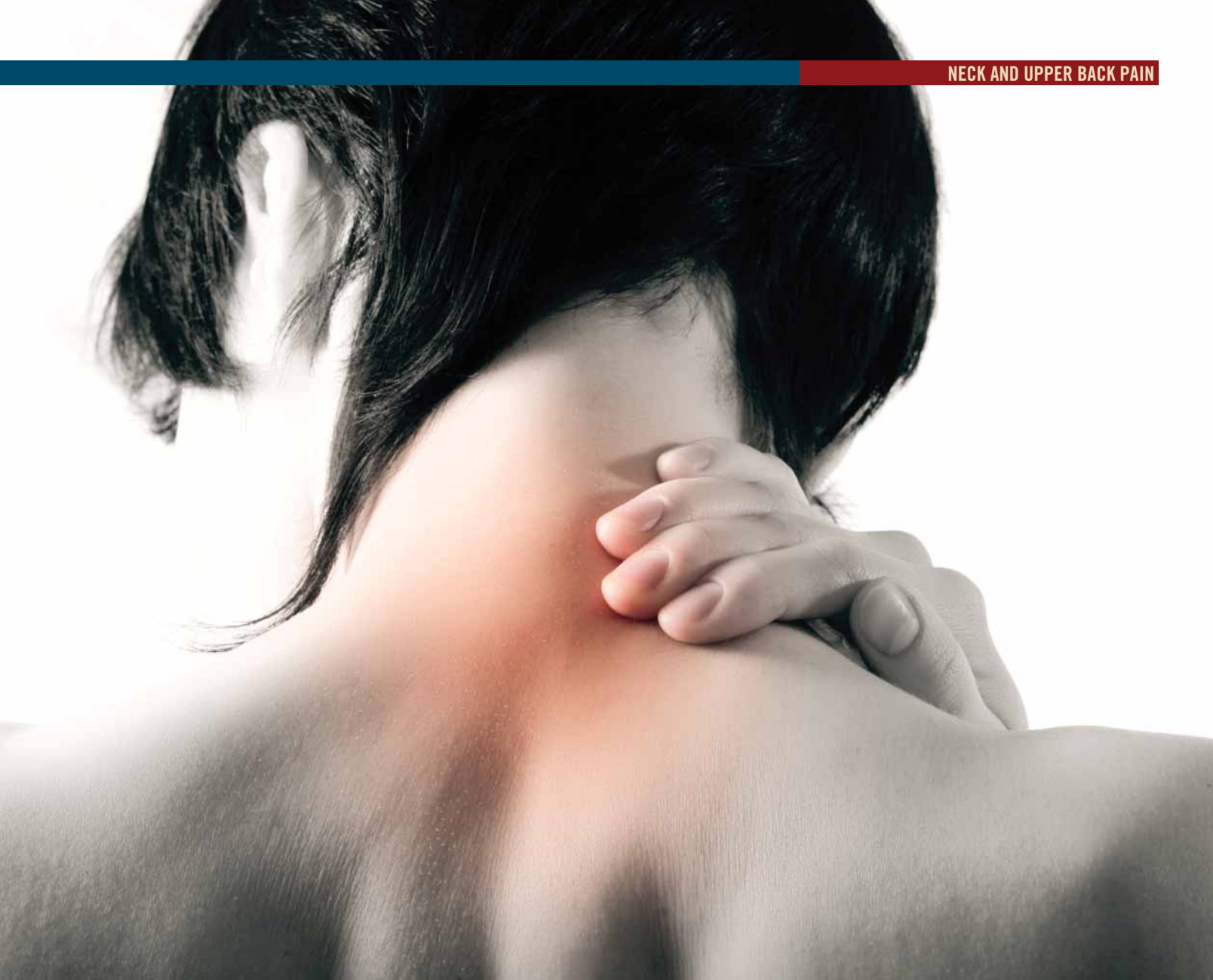
CONCLUSION

Lumbar epidural steroid injections can be an important part of a patient's treatment options with low back pain. Under almost every circumstance patients should be first treated with physical therapy and medication options, and continue their exercise

program after their injection(s) as well. It is important to use a physician with expertise using fluoroscopic guidance so that the injection can be accurately and safely guided and administered. Lumbar ESIs can help relieve pain, improve quality of life and many times, help patients avoid surgery.



Steven E. Mayer, MD, earned his medical degree from the Indiana University School of Medicine and completed a three-year residency in physical medicine and rehabilitation at the University of Wisconsin Hospital and Clinics. Dr. Mayer specializes in the diagnosis and nonsurgical treatment of spine and musculoskeletal disorders with special interest in treating the injured athlete. In addition to electrodiagnostic testing (electromyography/EMG and nerve conduction velocity/NCV), Dr. Mayer performs fluoroscopically-guided lumbar epidural, facet and sacroiliac joint injections, as well as peripheral joint and trigger point injections. He joined OAD Orthopaedics in 2006 and is certified by the American Board of Physical Medicine and Rehabilitation. Dr. Mayer is a Fellow in the American Academy of Physical Medicine and Rehabilitation and a member of the International Spine Intervention Society, the North American Spine Society and the American College of Sports Medicine.



Neck and Upper Back Pain

By Kaarthick Mani, PT, DPT, MS, FAAOMPT

The human spinal column consists of 33 individual bones termed as vertebra. They extend from the base of the skull to the pelvis region. They are subdivided into 4–5 regions: cervical spine (neck, C1–C7), thoracic spine (upper and mid back, T1–T12), lumbar spine (lower back, L1–L5), sacrum (located behind the pelvis, S1–S5) and coccyx (4–5 fused tail bones).

NECK PAIN

It is estimated that 22 percent to 70 percent of the population will have neck pain

sometime in their lives.¹ Prevalence of neck pain increases with age and is more common in women around the fifth decade of life.¹ The neck pain can be caused by arthritis of vertebrae, disc-related issues, trauma, sprain/strain of ligaments/muscles and whiplash-type injuries. The symptoms vary depending on the severity of the condition. Most of the problems are secondary to faulty posture while sitting, driving and computer use. (Fig. 2) A "perfect" head posture shows an imaginary line dropped from the center of the external

auditory meatus (outer ear opening) that would land directly in the center of the shoulder. (Fig. 1) Once the diagnosis of the condition is established, thorough physical examination will be carried out by the physical therapist. Then the treatment based on the patient's symptoms can be discussed with your therapist.

The most common treatments for neck pain are therapeutic exercises to strengthen the neck muscles, and stretching exercises to improve the flexibility of the neck muscles. The

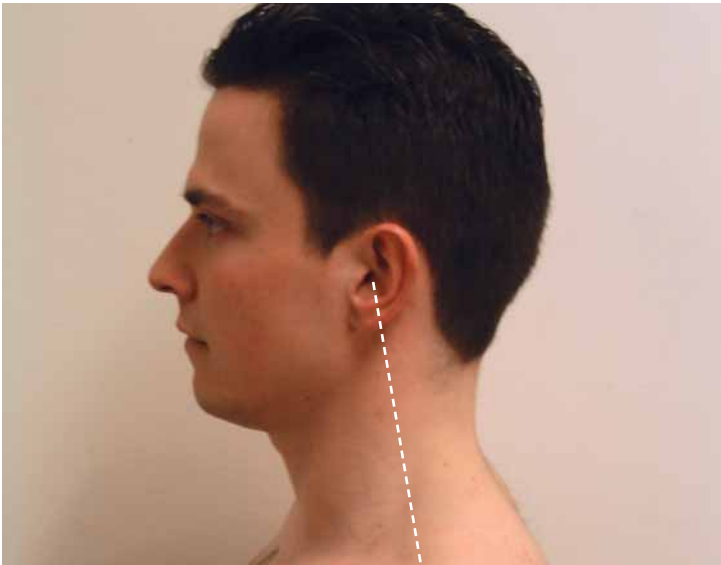


Fig.1 Proper/'correct' head posture



Fig.2 Forward head posture

therapist will provide soft tissue/deep tissue mobilization to loosen up tight structures. Therapists also provide myofascial release which is an effective hands-on technique that eliminates pain and restores movements to the myofascial region surrounding the spine. Cervical mobilization/manipulation techniques to restore motion in the spinal segments are an effective way to address long-term issues related to neck pain. There is quality evidence supporting cervical mobilization/manipulation techniques as the treatment of choice for neck-related symptoms combined with therapeutic exercises to improve strength, endurance and coordination of neck and its surrounding structures.¹ The most commonly used modalities for pain relief are Interferential Current (IFC)/electrical stimulation and therapeutic ultrasound. The IFC/electrical stimulation uses the high frequency (80–150Hz) to stimulate the pain gate mechanisms and thereby mask the pain symptoms. Some physical therapists use stimulation with lower frequencies (1–10Hz) that can be used to activate the opioid mechanisms, again providing a degree of relief. The ultrasound uses ultrasonic sound waves that cause vibration of the local tissue which in turn causes deep heating effects (may not be felt on the superficial part

of the skin) to provide pain relief. They are also known to break down the scar tissues to a certain extent. The cervical traction, and nerve mobilization techniques performed by therapists work well for patients with disc-related symptoms causing neck pain and arm pain. Patient education and counseling regarding their condition is a must and helps in alleviating the symptoms associated with their neck.

THORACIC PAIN AND RIB PAIN

The upper thoracic spine pain is commonly seen in patients with neck dysfunction. The lower thoracic spine pain is accompanied by lower back pain. The physical therapists perform an examination of the thoracic region while checking the neck or

sharp/dull pain in the chest area which may mimic a heart attack. These patients undergo extensive cardiac work-up to rule out heart issues. Approximately 50 percent of patients presenting to urgent care facilities, emergency departments and outpatient cardiac clinics because of chest pain have a non-cardiac basis for their symptoms. They are often given a non-specific diagnosis.²

It has been suggested that the costovertebral and costotransverse joints are commonly overlooked sources of atypical chest pain.³ During costochondritis, inflammation is one of the sources of pain, but rib movement dysfunction or a 'stuck' (immovable) rib can cause extreme pain and disability. Manual therapy in the form of

The most common treatments for neck pain are therapeutic exercises to strengthen the neck muscles, and stretching exercises to improve the flexibility of the neck muscles.

lower back. Rib pain secondary to costochondritis is the most painful and expensive condition to diagnose. Costochondritis is an inflammation of the junctions, where the ribs join with the breast bone or sternum. It causes

mobilization/manipulation restores the mobility of the stuck rib and its adjacent thoracic spine and thereby alleviates the symptoms as it addresses the root cause. The sooner the patient undergoes physical therapy treatment, the better

the outcome. The physical therapist's goal is to restore joint mobility and re-train the muscles surrounding the joints to achieve the normalcy of the structures. The chronic issues are difficult to treat or do not respond well to treatment as the stuck rib has caused soft tissue shortening or overstretching secondary to prolonged adaptations of the chest wall structures.

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Karthick Mani earned his undergraduate degree in physical therapy from the College of Physiotherapy, SRIPMS, Coimbatore, India. He completed his advanced master's in orthopaedic physical therapy from Quinnipiac University, Hamden, Conn. and earned his clinical doctorate from A. T. Still University, Mesa, Ariz. He underwent post-professional clinical residency training in orthopaedic manual therapy through the Institute of Therapeutic Sciences, Northville, Mich. Recently, he completed his post-doctoral fellowship training in orthopaedic manual physical therapy from Regis University, Denver, Colo. He is among one of the 21 physical therapists who have completed fellowship training in Illinois.

FYI from OAD

Welcome Dr. Gregory Witkowski!



Witkowski

We are pleased to introduce **Gregory Witkowski, MD**. Dr. Witkowski recently completed an advanced fellowship in foot and ankle/lower extremity trauma and reconstructive surgery at the Florida Orthopaedic Institute in Tampa. Dr. Witkowski graduated magna cum laude from the University of Michigan with a Bachelor of Science degree in biology and earned his medical degree with honors from Wayne State University in Detroit. He completed his five-year orthopaedic surgery internship and residency at Wayne State University and William Beaumont Hospital in Royal Oak, Michigan. Dr. Witkowski is a welcome addition to OAD's Orthopaedic Foot and Ankle Center, teaming up with foot and ankle surgeon, **Jeffrey Senall, MD**, and podiatric physician and surgeon, **Rachel Cisko, DPM**. Dr. Witkowski has expertise in traumatic orthopaedic conditions, fracture care, arthritis, deformity correction, arthroscopic and reconstructive procedures for the foot and ankle.

Board Certification



Mathew

OAD congratulates **Vinita Mathew, MD**, on becoming certified by the American Board of Physical Medicine and Rehabilitation (ABPMR). Board certification is granted after meeting the Board's strict requirements and passing the ABPMR oral examination (Part II).

Dr. Mathew, along with OAD's other board certified physical medicine and rehabilitation specialists, **Beth Froese, MD**, **Steven Mayer, MD** and **Mary Norek, MD**, provide a Center of Excellence dedicated to the comprehensive evaluation and nonsurgical management of musculoskeletal disorders, including injection therapies and electrodiagnostic testing (electromyography and nerve conduction velocity).

Congratulations, Dr. Mathew, on this significant accomplishment!

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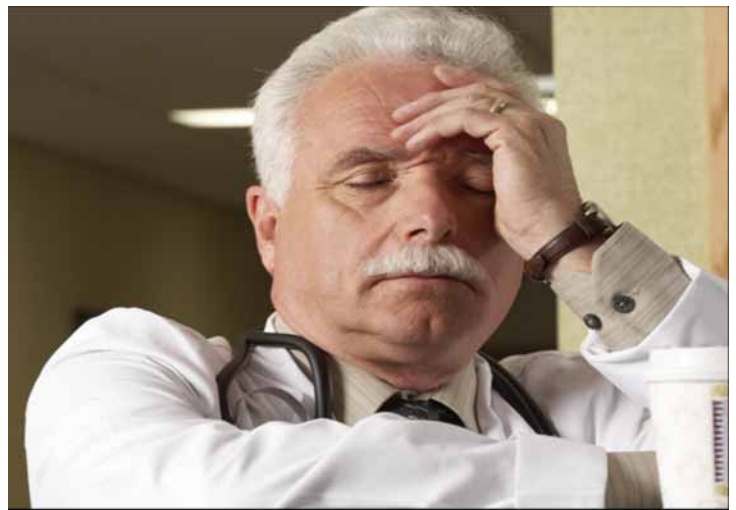
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