SYNERGY
SPINE CENTER

The Leader in Spinal Medicine and Minimally Invasive Spinal Surgery

457 Bypass 123
Seneca, SC 29678
(864) 886-9888 office
(864) 886-9777 fax
www.synergyspinecenter.com

Marion R. McMillan MD

Epidural corticosteroid injections for spinal pain; too much risk, too little benefit

Marion R. McMillan MD

Injection of epidural corticosteroids into the spine has been a well established treatment for various upper and lower extremity radicular pain syndromes in lieu of spinal surgery for the last 50 years. While historically considered to be safe, more recent evidence from closed legal claims analysis [1], case series in the literature [2], and warnings from the U.S. Food and Drug Administration [3] suggest that the risk of serious patient injury including permanent neurologic injury and death may occur from their use. While the actual risk of individual patient injury may be low, the sheer frequency of use, the gravity of complications when they occur, and the lack of proven efficacy to change the natural history of common spinal conditions associated with radicular pain suggests that their routine use should be called in to question. At a minimum, experts agree that informed consent procedures should be expanded to accurately reflect the potential for serious complications resulting from the use of epidural steroid injections, especially in the context of newer, minimally invasive percutaneous and endoscopic outpatient surgical therapies with proven efficacy to correct the conditions causing radicular spinal pain.

Risks associated with spinal epidural administration of glucocorticoids

Corticosteroid compounds may be obtained as particulate suspensions or soluble preparations in sterile water, with or without preservatives from FDA regulated manufacturers, or compounded by independent pharmacies loosely regulated by state law and prepared as specified by the end user. They are most commonly used in combination with local anesthetics, which themselves compound the risk of patient injury including brain damage and death [1]. Unintended intravascular injection of local anesthetic/steroid mixtures can cause seizures or cardiac arrest,

and unintended subarachnoid (spinal) injection of these local anesthetic/steroid mixtures may produce high spinal anesthesia with concomitant cardiopulmonary arrest, or direct neurotoxicity from preservatives contained in the steroid preparations. Compounded steroid preparations carry the additional risk of contamination and infection from improper preparation procedures as recently demonstrated with a national outbreak of fungal contamination and infection at a large compounding pharmacy in New England [4]. Other infections associated with the use of epidural steroid injections may include epidural abscess, meningitis, or osteomyelitis of the spine. Bleeding complications such as epidural hematoma and possible paralysis may occur in patients using anticoagulants or those with unknown bleeding disorders. Commonly used commercial or compounded particulate steroid preparations may also cause vascular occlusion and spinal infarction with permanent paralysis, cortical blindness [5], or stroke from unintended intravascular injection. Patients with preexisting vascular or prior spinal surgery near the injection site are particularly susceptible to intravascular complications. The degree to which the use of soluble, non-particulate steroid preparations may reduce the incidence of vascular or ischemic injury is often discussed, but unknown with certainty. Multiple injections are the usual practice, with the majority of practitioners performing three injections, 1-2 weeks apart. Additional courses of injections are not unusual, and each single injection carries the same independent risk of a procedurally related adverse event. There is no evidence that epidural injections of corticosteroids change the natural history of spinal conditions associated with radicular pain or correct these conditions. At best, their anti-inflammatory effects are thought to provide short term temporary relief of pain symptoms to allow time for natural healing or spontaneous resolution of symptoms to occur.

A recent analysis of closed malpractice claims from 1980-2011 resulting from chronic pain management activities demonstrated that injections into the neck (cervical spine) carry the greatest risk and adverse events are on the rise [6]. Claims resulting from cervical spinal injections (all types, including epidural injections) increased from 6% of all claims in the 1980's to 33% of all claims after the year 2000 [6] for the administration of epidural corticosteroids in pain management settings. This study indicated that the most common adverse outcome resulting in a malpractice claim for lumbar and cervical injections was severe, permanent disabling injury, often involving the spinal cord. The National Anesthesia Outcomes Registry (NOCOR) database consisting of data on 303,267 procedures indicated that lumbar injections accounted for 61% of pain management injection procedures, compared to 23% for cervical injections. In contrast, 29% of *malpractice claims* were associated with lumbar injection procedures, whereas 44% of claims were associated with cervical injection procedures. The original closed malpractice claims analysis of the American Society of Anesthesiologists (2004) [1] reported that epidural steroid injections accounted for fully 40% of all malpractice claims associated with chronic pain management. Brain damage and death occurred with epidural steroid injections only when narcotics or local anesthetics were included in the injection cocktail.

Recently, the U.S. Food and Drug Administration has weighed in on the issue. In

April of 2014, the FDA required a change in the labeling of injectable glucocorticoids to include a "black box" warning and issued the following statement [3]:

"The U.S. Food and Drug Administration (FDA) is warning that injection of corticosteroids into the epidural space of the spine may result in rare but serious adverse events, including loss of vision, stroke, paralysis, and death. The injections are given to treat neck and back pain, and radiating pain in the arms and legs. We are requiring the addition of a Warning to the drug labels of injectable corticosteroids to describe these risks. Patients should discuss the benefits and risks of epidural corticosteroid injections with their health care professionals, along with the benefits and risks associated with other possible treatments. Injectable corticosteroids are commonly used to reduce swelling or inflammation. Injecting corticosteroids into the epidural space of the spine has been a widespread practice for many decades; however, the effectiveness and safety of the drugs for this use have not been established, and FDA has not approved corticosteroids for such use."

These studies indicate that so called "pain management" with epidural steroid injections is anything but benign and serious complications including death and permanent neurologic injury can and do occur.

Reported benefits of epidural steroid injections for the treatment of spinal radicular pain

- Herniated lumbar disc: As a result of the SPORT trial [7], it is now generally accepted that medical vs. surgical therapy for herniated lumbar disc is equally efficacious after 2 years of observation. While patients treated with surgery enjoyed more rapid resolution of sciatica symptoms, some patients did not improve with surgery, and others suffered surgical complications. After 2 years, similar numbers of patients treated with or without surgery experienced improvement in sciatica symptoms, and some of the non-surgical patients received epidural steroid injections. Many others did not, and still experienced remission of pain symptoms over the period of observation. A subset analysis of patients with herniated disc receiving epidural steroid injection during the conservative therapy arm of the study demonstrated no significant benefit for patients treated with epidural steroid injections compared to other conservative modalities. Another well reported study by Butterman [9] randomized 50 patients with herniated lumbar disc to early discectomy, or epidural steroid injection after 6 weeks of conservative treatment. More than half of the patients originally randomized to epidural steroid injection crossed over to surgery because of treatment failure after an average of 4 ½ months and an average of three epidural steroid injections. Less than half of the patients randomized to epidural steroid injection had prompt resolution of symptoms, providing some support for the use of epidural steroid injections in a minority of patients with herniated disc. There was no control group in the non-surgical arm of the study, making it impossible to exclude a placebo effect of the epidural steroid injection procedure.

Because of an increased awareness of the risks, complications, FDA warnings, and limited effectiveness of epidural steroid injections in this setting, most insurance carriers will approve but no longer require epidural steroid injections in the conservative treatment algorithm for herniated lumbar or cervical disc with sciatica and nerve root compression.

- Spinal stenosis: The same SPORT trial referenced above [7, 8] indicates that unlike herniated disc, patients with spinal stenosis fare much better with surgery than non-surgical therapy for radicular pain and neurologic symptoms affecting the arms and legs. In addition, multiple studies including both the herniated disc [15] and spinal stenosis [16] subgroup analysis of patients receiving epidural steroid injections in the non-surgical arms of the SPORT trial document that patients with herniated disc or spinal stenosis show **little if any significant long term benefit from epidural steroid injections**, and there is some evidence that repeated epidural steroid injections may make eventual spinal stenosis surgery more difficult, notwithstanding the plethora of direct procedural complications outlined above [10, 11, 12].

<u>Conclusions and recommendations concerning epidural steroid injections vs. safer alternatives for spinal radicular pain and sciatica</u>

All treatments have risk, and the evaluation of the risk benefit ratio of any treatment alternative for spinal radicular pain resulting from herniated disc, spinal stenosis, or nerve root compression is an essential element of the informed consent process. It is now clear that some of the known risks of epidural steroid injections equal or exceed the risks associated with newer techniques of minimally invasive spinal surgery with no potential to correct or repair the underlying disease process. Conversely, high quality randomized controlled trials (RCT's) [13, 14] demonstrate conclusively that in experienced hands, minimally invasive outpatient surgical techniques such as endoscopic spinal surgery, correct pathology and achieve cost effective remission of symptoms in 90% of patients within 2-6 weeks. The most common complication of endoscopic surgery is unintended durotomy or nerve root irritation which is usually self limited and neither requires specific treatment. Significant bleeding, paralysis, seizure, or death have not been reported. While a minority of patients with herniated disc may improve during treatment with epidural steroid injection, they may also experience equal benefit from safer more cost effective conservative modalities such as analgesics, muscle relaxants, oral anti-inflammatory drugs, chiropractic, and physical therapy for 4-6 weeks without the risk of serious complications, before considering definitive minimally invasive outpatient spinal surgery and rapid long term relief of disabling sciatica symptoms. Patients, referring physicians, legal professionals, and third party payors now recognize these injection associated risks, and major insurance carriers no longer require epidural steroid injections as a component of the conservative treatment algorithm before approving definitive outpatient minimally invasive spinal surgery. From a liability perspective, the continued off-label use of epidural steroid injections as a non-FDA approved treatment, poorly supported in the literature,

with new labeling warning of the potential risk of death or serious neurologic complications with each injection, is no longer necessary and should be abandoned. The early use of minimally invasive outpatient endoscopic spinal surgery after 4-6 weeks of alternative conservative therapy is a much safer, highly cost effective, and proven treatment option for greater than 90% of patients presenting with uncomplicated spinal radicular pain from herniated disc or spinal stenosis, with or without minor traumatic or work related spinal injury.

References:

1. Fitzgibbon DR, Posner KL, Domino KB, et.al. Chronic pain management; American Society of Anesthesiologists Closed Claims Project. Anesthesiology 100:98, 2004
2. Pollack KA, Stephens LS, Posner KL, Fitzgibbon DR, et.al. Chronic pain management: A closed claims update. Anesthesiology abstracts BOC02, October 14, 2014
3. FDA Drug safety Communication: FDA requires label changes to warn of rare but serious neurologic problems after epidural corticosteroid injections for pain. April 23, 2014
4. Smith RM, Schaefer MK, Kainer MA, Wise M, et.al. Fungal infections associated with contaminated methylprednisolone injections. New England Journal of Medicine 369:17, 2013
5. McMillan MR, Crumpton C. Cortical blindness and neurologic injury complicating cervical transforaminal injection for cervical radiculopathy. Anesthesiology 2003; 99:509-511
6. Chronic pain malpractice claims on the rise. Medscape October 16, 2014
7. Weinstein JN, Tosteson TD, Lurie JD, et.al. Surgical vs. nonoperative treatment for lumbar disc herniation. The Spine Patient Outcomes Research Trial (SPORT). A randomized trial. Journal of the American Medical Association 296:2441, 2006.
8. Weinstein JN, Tosteson TD, Lurie JD, et.al. Surgical vs. nonsurgical therapy for lumbar spinal stenosis. New England Journal of Medicine 358:794, 2008
9. Butterman GR. Treatment of Lumbar Disc Herniation: Epidural Steroid Injection Compared with Discectomy. Journal of Bone and Joint Surgery 2004;86-A:670-679.
10. Friedly JL, Comstock BA, Turner JA, Heagerty PJ, Deyo RA, et.al. A randomized trial of epidural glucocorticoid injections for spinal stenosis. New England Journal of Medicine 371:11, 2014
11. Atlas SJ. Epidural steroid injections are not effective for patients with lumbar spinal stenosis. Evidence Based Medicine 20:16, 2015

12. Singla A, Yang S, Werner BC, Cancienne JM, et.al., The impact of preoperative epidural injections on postoperative infection in lumbar fusion surgery. Journal of Neurosurgery: Spine 26:645, 2017
13. Ruetten S, Komp M, Merk H, Godolias G. Full endoscopic interlaminar and transforaminal lumbar discectomy versus conventional microsurgical technique. Spine 33:931, 2008
14. Ruetten S, Komp M, Merk H, Godolias G. Surgical treatment for lumbar lateral recess stenosis with the full endoscopic interlaminar approach versus conventional microsurgical technique: a prospective, randomized, controlled study. Journal of Neurosurgery: Spine 10:476, 2009
15. Radcliff K, Hilibrand A, Lurie JD, et. al. The impact of epidural steroid injections on the outcomes of patients treated for lumbar disc herniation. A subgroup analysis of the SPORT trial. J Bone Joint Surg Am. 2012; 94:1353-8, 2012
16. Radcliff K, Kepler C, Hilibrand A, et. al. Epidural steroid injections are associated with less improvement in the treatment of spinal stenosis: A subgroup analysis of the SPORT. Spine 38: 279–291; 2013