

Pre-, Intra-, and Postprocedure Nursing Care and Assessment of Patients Undergoing Diagnostic Neuroradiological Procedures

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ABSTRACT: Many patients with back pain are referred to the radiology department for invasive diagnostic testing before spinal surgery. The most common of these procedures are epidural injection, selective nerve root injection, facet joint injection, and provocative discography. With the exception of discography, these procedures are therapeutic as well as diagnostic, providing symptomatic relief for up to 6 months. This article discusses the purpose and method of these procedures, as well as the relative pre-, intra-, and postprocedure care and assessments. (*J Radiol Nurs* 2005;24:22-25.)

OVERVIEW OF EPIDURAL, SELECTIVE NERVE ROOT, AND FACET JOINT INJECTIONS

Epidural, selective nerve root, and facet joint injections are procedures in which a local anesthetic such as lidocaine and an anti-inflammatory agent such as cortisone are injected. The difference in these three procedures is the anatomical location of the injection. For an epidural injection, the medications are injected into the epidural space—a potential space above the dura (Figure 1). For a selective nerve root injection, the medication is injected around the nerve root where the nerve leaves the spinal canal (Figure 2). For a facet

joint injection, the medication is injected into the facet joints (Wagner, 2003). The facet joints are small stabilizing joints located between and behind adjacent vertebrae (Figure 3). These joints provide about 20% of the torsional stability in the neck and low back (Ullrich, 2004).

The local anesthetic is used for diagnostic purposes. If the patient's pain is relieved after the injection, then it is diagnostic that the pain is from a disorder at the location of the injection. The steroid will hopefully then provide symptom relief for a period of time after the injection. Wagner (2003) notes that long-term (6 months) relief can be obtained in 30% to 50% of patients.

The typical diagnosis for epidural and nerve root injections is radiculopathy, which is compression of a nerve root. Epidural injections are typically used when the pathology is located centrally in the spinal canal, such as in spondylolisthesis. A nerve root injection is more appropriate when one or two specific nerves can be identified as the most likely source of the symptoms (Wagner, 2003).

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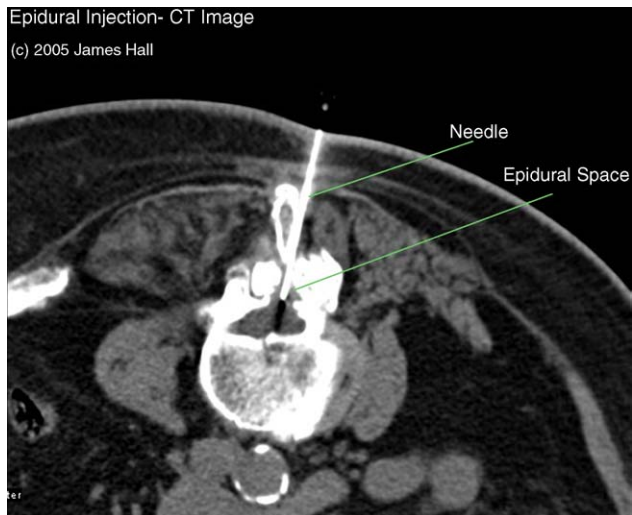


Figure 1. Computed tomography (CT) slice of spinal needle placed into epidural space of spine to inject mixture of local anesthetic and corticosteroid medications.

Arthritis is a common diagnosis for facet pain, but synovitis and nonradicular pain occurring after laminectomy are also indications for facet injections (Wagner, 2003).

OVERVIEW OF SPINAL DISC ANATOMY AND PROVOCATIVE DISCOGRAPHY

The gelatinous central portion of the disc is called the nucleus. It is composed of 70% to 80% water (Patel, 2004). The outer ring around the nucleus is called the annulus, and it seals the nucleus and allows pressures to rise within the disc. The annulus also allows stresses to be distributed through the annulus under normal loading

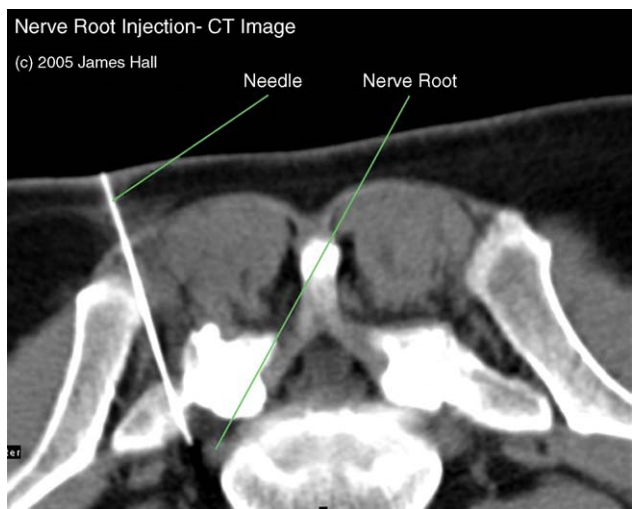


Figure 2. CT image of spinal needle placed within a centimeter of nerve root to inject mixture of local anesthetic and corticosteroid medications.

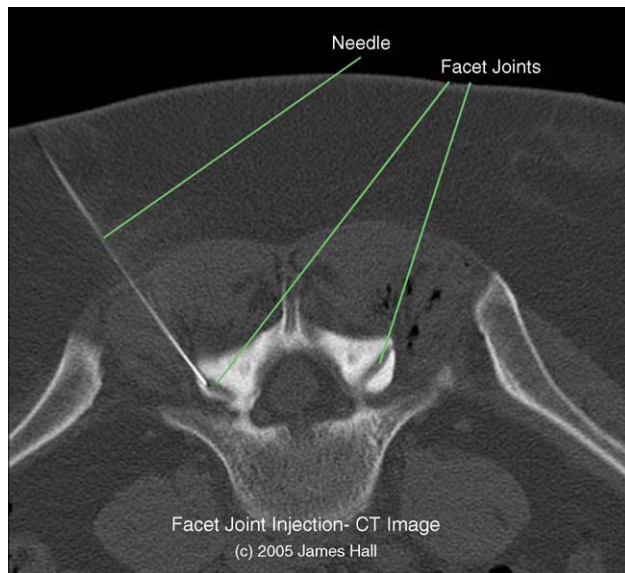


Figure 3. CT image of spinal needle placed within lumbar facet joint to inject mixture of local anesthetic and corticosteroid medications.

without rupture. The disc functions as a hydraulic cylinder. As the nucleus of the disc is pressurized, the annular fibers prevent the nucleus from herniating. The gelatinous nuclear material directs the forces of axial loading outward, and the annular fibers help distribute that force without injury (Ullrich, 2001).

During a discogram, a needle is inserted posteriorly into the center of the disc. Iodine contrast is then injected into the disc (Figure 4), and if injecting the

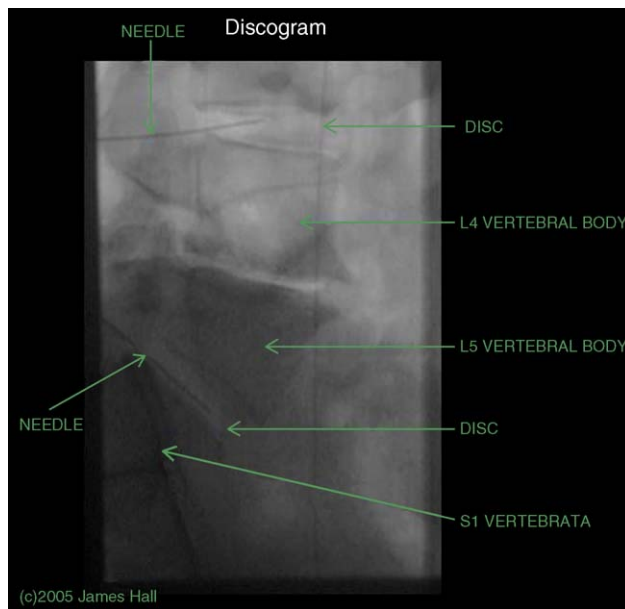


Figure 4. Fluoroscopic imaging of L3 through S1 vertebrae and discs. Spinal needles have been placed in two lumbar discs for provocative discography examination.

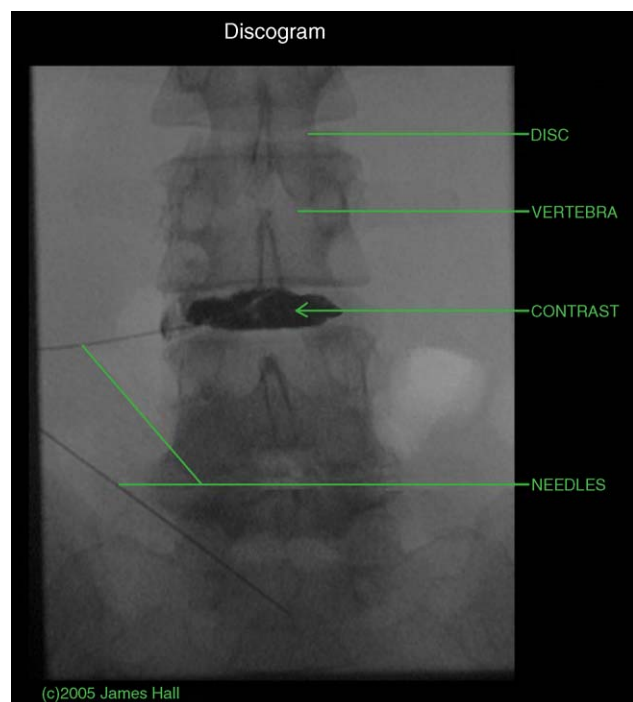


Figure 5. Iodine contrast injected into lumbar disc. Patient is evaluated for complaints of pain, and disc is physically evaluated for pathological changes.

contrast recreates the patient's normal pain (concordant), it is then inferred that the disc that is being tested is the source of pain. If the pain is unlike the patient's normal pain (discordant), the inference can be made that even though the disc may look degenerated on a magnetic resonance imaging (MRI) scan, it is in fact not the source of the patient's pain (Ullrich, 2001).

The iodine contrast also allows x-ray assessment of the disc (Figure 5) to demonstrate annular tears, scarring, disc bulges, and changes in the nucleus of the disc (Hall, 2004).

Because of conflicting reports on the sensitivity, specificity, and predictive value of discography, its use is controversial (Silber et al., 2001). A discogram may, however, prove useful before surgical repair because MRI scans can fail to accurately predict the disc that is causing pain. In the absence of a provocative discogram before surgery, the level adjacent to the fusion may be a source of pain regardless of the MRI findings (Derby, 2003).

PREPROCEDURE CARE AND ASSESSMENT

The preprocedure assessments are identical for all of the previously mentioned procedures. The patient should be assessed for potential difficulty lying in a prone position for the length of the procedure. Depending on the neuroradiologist, the procedure

Table 1. Effect of common anticoagulant drugs on clotting time

Drug	Typical clotting time
Heparin sodium	Half-life 60-90 min (McKeller, 2001)
Warfarin sodium	Half-life 36-42 hr (McKeller, 2001)
Clopidogrel bisulfate	Platelet aggregation and bleeding time gradually return to baseline values typically within 5 days after treatment is discontinued (Bristol-Myers Squibb, 2003)
Acetylsalicylic acid	Irreversible inhibition of platelet lifetime, 7-10 days (McKeller, 2001)

should take about 15 minutes per level being tested (Hall, 2004), not including prep time.

The patient's vital signs should be assessed, with particular attention paid to blood pressure. The neuroradiologist should be made aware of a systolic blood pressure higher than 190.

Medication regime should also be assessed. If the patient is taking an anticoagulant, the physician might order a bleeding time test or even postpone the procedure until the anticoagulants are out of the patient's system (Table 1).

A preprocedure pain assessment should be performed, with particular attention paid to the location of the pain and exacerbating factors. This information will help to identify the location in the spine that is the source of the patient's pain. Pain or weakness in the scapular region, shoulders, arms, and hands indicates problems in the cervical spine. Pain in the low back, and possibly radiating downward to the buttocks and posterior-medial thigh, indicates problems in the lumbar regions L1, L2, and L3. Pain in the low back radiating down the anterior thigh to the ankle indicates problems around the L4 region. Pain radiating from the back to the foot or toes indicates problems in the L5 and sacral (S1) regions (Ullrich, 2004).

Pain that is facet-joint related rarely radiates to the anterior leg and rarely radiates below the knee. Facet pain is usually worsened by standing erect (Ullrich, 2004).

Activities such as sitting, lifting, riding in a car, lumbar flexion, coughing, and sneezing create pressure on the spinal discs. Therefore, pain that is exacerbated by these activities may be discogenic in nature (Patel, 2004).

POSTPROCEDURE CARE AND ASSESSMENT

Facet injections have the lowest risk of postprocedure complications, because the injection is into a joint, not a nerve root or surrounding structure. Procedures involving the lumbar spine have lower risk of serious postprocedure complications than those involving the

cervical or thoracic spine, because the spinal cord does not run through the lumbar spine (Gray, 2000).

Immediate postprocedure assessment of the patient's pain should be made and compared to preprocedure pain assessment. Patients who have undergone discography might need oral analgesics because of the pain-eliciting nature of the procedure.

The patient should rest in bed for the first 15 minutes after the procedure. After this period, he or she should stand up with hands-on supervision. If the motor nerve root was also inadvertently anesthetized, the patient will also experience marked weakness in the corresponding region (Wagner, 2003). If the injection was in the lumbar spine, the patient might have difficulty standing or walking, and if the injection was in the cervical spine, the patient might have weakness in the arms or hands. If able to bear weight independently, the patient should be allowed to walk with close supervision. Assessment of gait and balance should be made at this time.

Spinal anesthesia can occur if the local anesthetic is inadvertently injected into the nerve root sleeve. This complication could be fatal during a cervical procedure, because of the risk of respiratory arrest (Wagner, 2003). The risk of grave harm arising from this potential complication is minimized, however, because injections are typically unilateral.

The patient may be discharged with adult accompaniment when he or she is able to ambulate as well as before the procedure. Discharge instructions include informing the patient that weakness may be experienced for several hours after the procedures because of the local anesthetic. For this reason, the patient should be instructed not to drive for 24 hours. A patient who received an injection of steroids should be instructed to rest as much as possible after the procedure—ideally 24

to 48 hours. This will allow optimal absorption of the steroids in the injection region. The patient should also be instructed about signs and symptoms of bleeding and infection.

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