What is the evidence for supporting the use of epidural and facet injections for back pain?

Which patients are optimal candidates for these procedures?

Optimal candidates for these procedures

Patients with
- moderate to severe pain (radicular or nonradicular) with significant functional limitation
  - who have failed conservative therapy
  - with or without findings of a possible pain generator on imaging
- and, who are without contraindications, such as
  - bacterial infection (local or systemic)
  - bleeding diathesis
  - pregnancy or possible pregnancy
- and, who have few or no relative contraindications, such as
  - anti-platelet or anticoagulant therapy
  - artificial heart valves
  - diabetes, especially if uncontrolled
  - glaucoma, especially if uncontrolled
- and, who have few or no negative predictors, such as
  - cigarette smoking
  - increased number of treatments including medications
  - pain not affected by activities
  - prolonged duration of pain
  - unemployment related to pain

**PEARL**
Radiologic findings in degenerative disc and facet disease:
- Loss of disc space height
- Joint space narrowing
- Osteophyte formation
- End plate sclerosis
- Sclerosis of articular facets
- Subluxation

**Diagram of Injection Types and Approaches**

- Intraarticular (facet joint) injection
- Epidural: Transforaminal approach
- Provocative discography
- Epidural: Interlaminar approach
- Alternative to Epidural for radicular symptoms
Referral and Approach

Optimal Candidate
- Failed conservative therapy
- Moderate to severe pain and functional limitation

Epidural injection**
Selective nerve root block
- Speed symptom resolution
- Relief: 2-6 weeks duration
Transformaminal approach: study ongoing

Nonradicular pain

Intraarticular (facet joint) injection
Medial branch block**

Therapeutic options
Intraarticular (facet joint) injection
Medial branch block
Medial branch neurotomy
- Relief: 6-12 months

Suspected pain generator
Facet joint

Diagnostic procedure
Intraarticular (facet joint) injection
Medial branch block**

Suspected pain generator
Disc
Common: L4-L5 and L5-S1

Diagnostic procedure
Epidural injection
Provocative discography
- Painful, invasive, reserved for failure of epidural or preoperative cases

Therapeutic options
Epidural injection
Intradiskal electrothermal therapy (IDET)
Intradiskal therapies (emerging)
Surgical intervention: fusion

PEARL
Disc is likely the pain generator if:
- Age < 55
- Mid-line pain
- Positive sustained hip flexion test

Intraarticular injection
Medial branch block

Initial diagnostic evaluation
History
Examination
Imaging

PEARL
Imaging is not predictive of painful facet joints

Radicular symptoms

Nonradicular pain

** = best evidence supporting use

Summary/Professional Recommendations

If radicular symptoms are present and short-term (2-6 weeks) pain relief is needed because it is particularly severe or functionally limiting and/or for a specific reason (i.e. prior to a trip or event), an epidural injection (or nerve root block) is an evidence-based option. If it is non-radicular pain, referral to an interventional pain specialist is appropriate when conservative therapy fails and/or when a more specific diagnosis would assist in treatment planning. If the facet joint is the pain generator, medial branch neurotomy has the best supported evidence, providing 6-12 months of pain relief. If the disc is the pain generator, though less evidence supports its use, epidural injections are a reasonable option.
3a. What is the evidence for supporting the use of epidural and facet injections for back pain?

Systematic reviews and consensus guidelines on interventional pain therapy differ in their interpretation of the available evidence. Specific “flaws” in published studies have been described. Overall, the inherent difficulty in measuring a subjective outcome (pain), the unpredictable (waxing/waning) natural history of back pain itself, and an operator-dependent interventional procedure contribute to inconsistencies in published literature. The evidence for the use of interventional procedures (particularly epidural injections) for radicular pain is more robust and consistent than for non-radicular pain.

Radicular symptoms, whether acute or chronic, may indicate herniated nucleus pulposus, narrowing of intervertebral foramina compressing spinal nerve roots, or central spinal stenosis. Epidural injections (caudal, interlaminar, transforaminal) may speed resolution of symptoms and relieve pain for two to six weeks post-injection. According to American Society of Interventional Pain Physicians, the evidence is strong for all 3 approaches for short-term pain relief (<6 weeks) but either moderate or limited for long term pain relief (>3 or >6 months). Each of the 3 approaches to the epidural space have been reviewed independently.

- The caudal approach has evidence for effectiveness for short and long term pain relief (< or > 6 months) for radicular symptoms as a result of several different causes (disc herniation, radiculitis, spinal stenosis).
- The interlaminar approach without fluoroscopy for radicular symptoms may have some effectiveness for short term relief (< 6 months) in radicular pain from disc herniation or radiculitis. However, this 2009 systematic review cautions literature interpretation because it reflects a “blind” interlaminar approach that is no longer the standard of practice.
- The transforaminal approach may reduce pain by 64-81%, disability by 60-63%, and depression by 56% at least in the short term (<6 months).

In summary, while there is evidence for short-term pain relief, there is still very limited evidence that epidural injections for radicular pain provide extended pain relief, impact function, or affect the need for surgery.

Non-radicular pain, whether acute or chronic, may indicate the facet joint, the disk, or the sacroiliac joint as the pain generator, among others that are less common. According to guidelines, if there are no radicular symptoms yet there is a significant functional deficit, imaging should be considered along with “a more intensive multidisciplinary approach or referral.” When a patient is referred to an interventional pain specialist, there will first be a diagnostic evaluation to determine the pain generator, then based on the findings, a therapeutic intervention may follow.

In most cases (excluding post-laminectomy/failed back syndrome), several different pain generators are uncommon. Thus, the specific pain generator can be identified in 67-75% of cases if fluoroscopically-guided diagnostic interventional techniques are used.

Pain Generator: Facet Joint

If the pain generator is the facet joint (determined by intraarticular (facet joint) injection or medial branch block) the therapeutic approach would be medial branch block or medial branch neurotomy. The data on the two approaches to a diagnosis of facet joint pain shows that while intraarticular (facet joint) injections have not been validated, “lumbar medial branch blocks are the single most validated diagnostic test in interventional pain medicine.”

However, the evidence for benefit from therapeutic intraarticular (facet joint) injections is inconsistent. While one review states there is moderate evidence for short and long term improvement, at least two other reviews conclude that they are not more effective than placebo. Medial branch blocks are effective for short-term relief, typically lasting only as long as the duration of the injected agent.
branch neurotomy (neurolysis) performed by several different techniques (radiofrequency thermoneurolysis utilizing a thermal or pulsed mode, cryoneurolysis, or laser denervation) is an emerging technology. Though evidence is limited, carefully selected patients for medial branch neurotomy based may achieve 6-12 months of pain relief.\textsuperscript{15}

**Pain Generator: Disk**
If the pain generator is the disk (determined by either epidural injection or provocative discography), the therapeutic approach is either an epidural injection, intradiskal electrothermal therapy (IDET), emerging intradiskal therapies, or a surgical procedure (fusion).

Epidural injections for non-radicular pain have little evidence to support their effectiveness in support of clinically significant pain relief and/or functional improvement.\textsuperscript{12,14,16} Several recent systematic reviews based on specific epidural approach concluded there was some evidence of effectiveness of the caudal and transforminal approach in non-radicular pain.\textsuperscript{6-8} Still, the evidence is underwhelming. Without clear evidence or consensus, the practice of epidural injections for non-radicular pain is “knowledge-based” rather than “evidence-based.”

**Complications**
In general, complications from interventional pain therapy are either minor or if serious, extremely rare. Complications include: increased injection site pain (17%); increased radicular pain (0.6-8.8%); light-headedness (6.5%); increased spine pain (2.4-5.1%); nausea (3.7%); headache (1.4-3.1%); vomiting (0.5%); facial flushing (1.2%); vasovagal reaction (0.3%); increased blood sugar (0.3%); and elevated blood pressure (0.3%).\textsuperscript{12}

Though rare, the following complications have been reported (typically with inexperienced operators, lac or with procedures in cervical region): anterior spinal artery syndrome, cauda equina syndrome, cerebral and cerebellar infarct, cerebral edema, spinal cord injury (paraplegia, persistent neurological deficits, quadriplegia), subdural hematoma.\textsuperscript{17,18}

**Definitions**

**Facet (zygapophysial joint or Z-joint) injections** are diagnostic or therapeutic injections of anesthetic, steroid, or both into either a) the intra-articular space between facet joints or b) the medial branch nerves (dorsal rami) that innervate the affected facet joints.

**Medial branch neurotomy:** A therapeutic facet procedure that temporarily denervates the medial branch nerve by several techniques (radiofrequency thermoneurolysis utilizing a thermal or pulsed mode, cryoneurolysis, or laser denervation).

**Epidural injections** are either diagnostic or therapeutic injections of anesthetic, steroid or both into the epidural space to decrease pain caused by inflammation of the spinal nerve roots (radicular symptoms) and/or inflammation surrounding the intervertebral disk. Caudal, interlaminar, and transforminal approaches are used to gain access to the epidural space.

**Provocative discography:** A diagnostic procedure that places needles within the intervertebral disks followed by radiographic contrast in order to reproduce a patient’s typical pain and thereby determine the pain generator.

**Intradiskal electrothermal therapy (IDET):** Thermal energy applied within the posterior annulus fibrosus via a wire in order to destroy nerve fibers within the intervertebral disk as the offending pain generators.
REFERENCES