

Interventional Pain for the Non-Interventionalist

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Abstract

Chronic spinal pain causes significant morbidity and is a leading cause of why patients seek medical care. Although chronic pain is increasingly common, the treatment is quite different than for acute situations. Interventional pain physicians specialize in the treatment of chronic spinal pain and have underwent years of training in their respective specialties, and at least another year in sub-specialty training. This sub-specialty training focuses on the etiology and treatment of chronic pain, with emphasis on interventional management. Most health care professionals have a basic understanding of pain and how to treat it in a conservative fashion. Once these measures fail to provide adequate relief and the pain has transitioned to a chronic state, treatment is quite different and referral to a pain specialist for consideration of intervention is the next logical step. Acquiring familiarity with chronic spinal pain syndromes and their treatment can help the referring provider and the patient prepare for the upcoming intervention. This article will outline some of the most common spinal pain syndromes and their interventional management to assist the primary provider in this endeavor.

Interventional Pain for the Non-Interventionalist

Pain is defined as unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (International Association for the Study of Pain, 2019). Pain can be further classified into acute and chronic. *Acute pain* is a complex, unpleasant experience with emotional and cognitive, as well as sensory, features that occur in response to tissue trauma (International Association for the Study of Pain, 2019).

Chronic pain is generally considered to be any pain that lasts longer than 3 months or past the usual point of healing (International Association for the Study of Pain, 2019). This simple definition is in the process of reform with the upcoming International Classification of Diseases (ICD)-11 edition, which further classifies chronic pain into primary and secondary diagnoses. *Chronic primary pain* represents chronic pain as a disease in itself. *Chronic secondary pain* is chronic pain where the pain is a symptom of an underlying condition (Treede et al., 2019). *Chronic primary pain* is defined as pain in one or more anatomical regions that persists or recurs for longer than three months and is associated with significant emotional distress or functional disability (interference with activities of daily life and

participation in social roles) and that cannot be better accounted for by another chronic pain condition (Treede et al., 2019). Chronic secondary pain syndromes are linked to other diseases as the underlying cause, for which pain may initially be regarded as a symptom.

Treatment Options

Conservative Measures

The treatment of chronic pain is best approached from a multimodal perspective. This includes physical therapy, chiropractics, acupuncture, massage, psychological counseling, and medication management. In conjunction with these measures, interventional treatment is also recommended, typically once these conservative measures have been performed and were not adequately controlling symptoms.

Interventional Treatment

There are numerous injections available to help control chronic pain. Probably the most recognized chronic pain syndrome, low back pain, is one of the most common reasons for seeking medical care. Most people think of injections for chronic low back pain to be synonymous with lumbar epidural steroid injections (LESIs). Lumbar epidural steroid injections have been used for decades for many different types of low back pain, with more recent studies demonstrating their efficacy more for radicular pain (leg pain) than for axial low back pain (Manchikanti et al., 2013). In regard to the treatment of low back pain, there have been advances in treatment options depending on the source of pain, from different injections to surgery. Surgical intervention is typically reserved for cases where there is significant neurologic compromise or when the other measures referenced above have failed to control the symptoms and there is ongoing pain and disability.

Injections and Minimally Invasive Therapy for Low Back and Radicular Pain

Trigger Point Injections

A trigger point injection (TPI) is an injection of local anesthetic to a painful, irritable point in a muscle that is in spasm. This is usually identified on physical exam by palpation of an exquisitely tender point and taut band in the muscle that may make the patient jump, coined a "jump response". Frequently when the focal point of irritation is encountered, the muscle will twitch and then relax, verifying

correct needle placement. For billing purposes, the CPT codes for this include: 20552 (1-2 muscles) and 20553 (3 or more muscles). Physical therapy is recommended in conjunction with these injections, as is a home exercise program and stretching.

Lumbar Epidural Steroid Injection

A lumbar epidural steroid injection is an injection of steroid to decrease inflammation of the nerve roots, typically associated with compression due to a disc herniation or chemical irritation. Injections are used to decrease pain, improve function, and facilitate participation in therapy. There is no “series” of injections and further injections after the first are based on the patient’s response.

Lumbar Epidural Steroid Injection- Interlaminar

The injection is typically carried out as a same-day procedure using fluoroscopy (i.e., x-ray guidance) for accurate placement. With the patient in the prone position, the low back is prepped in sterile fashion using an antiseptic solution and the skin is numbed using local anesthetic. A needle is placed using fluoroscopy and loss of resistance to air or saline. Once the proper location is found, contrast is injected to outline the epidural space and confirm the location, followed by a mixture of saline and steroid. A band aide is then placed over the injection site and the patient monitored for about 15 minutes and discharged home. Pain relief is usually obtained within the first week and the patient follows up 1-2 weeks after for further evaluation. For billing purposes, the CPT code typically used for this procedure is 62323. No labs are needed prior to the procedure in otherwise healthy patients. Physical therapy is recommended in conjunction with the injection.



Lumbar Epidural Steroid Injection- Transforaminal

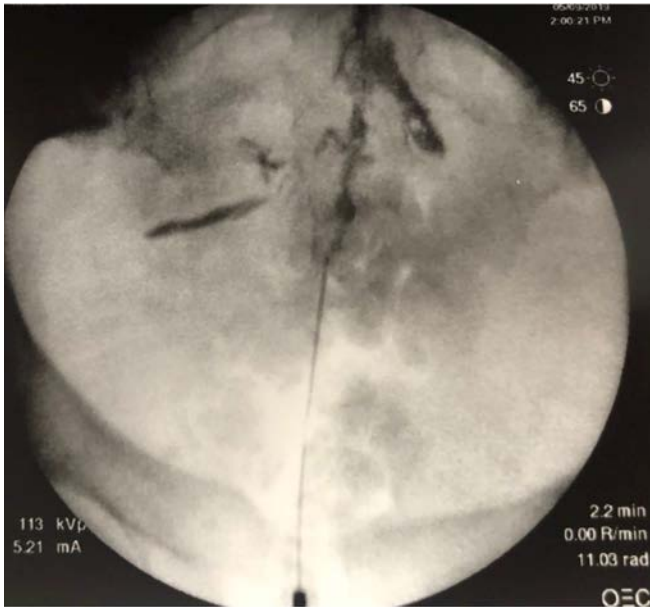
Transforaminal lumbar epidural steroid injections are also known as a selective nerve root block. When one nerve root is suspected as the major site of pain and pathology, this nerve root can be targeted using fluoroscopy. The procedure is approached from the side of the spine, along the nerve root as it exits the foramen instead of the midline. Injection is carried out with the patient in the prone position and with sterile prep and drape. A spinal needle is used under fluoroscopic guidance to be placed next to the nerve root and contrast is injected using live fluoroscopy to ensure no spread of medication to a blood vessel. Once proper needle placement is noted, a mixture of local anesthetic and steroid in a smaller volume, usually 2mLs is injected. The patient is this brought to a recovery room for 15-30 minutes and discharged home, with a follow up in two weeks. For billing purposes, the CPT is 64483. No labs are needed prior to the



procedure in otherwise healthy patients. Physical therapy is recommended in conjunction with the injection.

Lumbar Epidural Steroid Injection- Caudal

This technique approaches the epidural space from the most inferior portion of the epidural space, typically when a patient has lower spine pathology (L5/S1 symptoms) and/or has undergone prior surgical intervention, making complications less likely when compared to using the interlaminar approach. With this procedure, the patient is in the prone position and the area just above the coccyx is prepped and draped in sterile fashion. The sacral hiatus is identified, and a needle placed through the hiatus into the caudal canal. Contrast is injected to confirm proper placement and a mixture of local anesthetic, saline, and steroid are injected. For billing purposes, the CPT code is 62323. No labs are needed prior to the procedure in otherwise



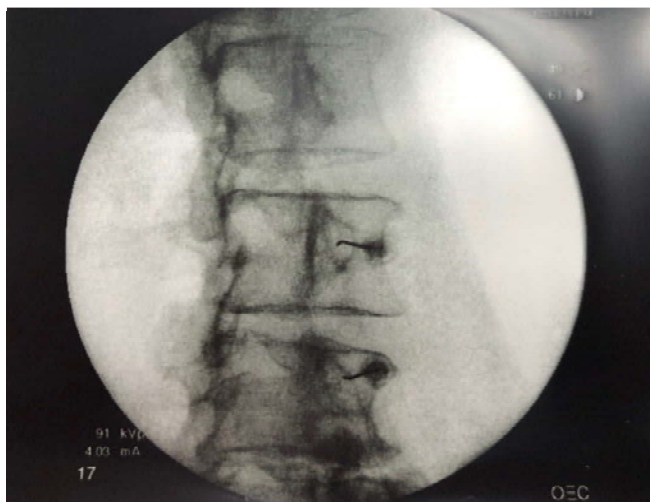
healthy patients. Physical therapy is typically recommended before interventional treatment, but can provide benefit in conjunction with treatment.

Lumbar Facet Pain

When low back pain is mostly axial (only along the low back), the facets are a common cause of pathology. The facets are posterior joints located on both sides of the vertebrae and are implicated in 4.8% up to over 50% of patients with chronic low back pain (Cohen et al., 2019). This cause of low back pain is suspected by history, including mechanism of injury (extension and twisting or whiplash associated disorders) and physical exam findings (tenderness over the facets as well as facet loading).

Lumbar Facet Block

Injection of local anesthetic is used to help diagnose the facets as a pain generator. There are two ways to “block” the facet joints. The first is to inject local anesthetic directly into the joints using a spinal needle under fluoroscopic guidance.



The other way to approach the joint is to numb the nerves that supply sensation to the joint itself. Instead of placing the needle into the joint, a point is located along a bony landmark just outside the joint where the medial branch lies (junction of the superior articular process and transverse process). In order for one joint to be anesthetized, two nerves must be blocked (i.e., the L3 and L4 medial branches innervate the L4/5 joint). Usually medial branch blocks are used instead of intra-articular joint injections as they are more accurate and are the site where the rhizotomies would be performed if the blocks provide adequate relief. For billing purposes, the CPT cost associated with this procedure is 64493. Physical therapy is typically recommended before interventional treatment, but can provide benefit in conjunction with treatment.

Lumbar Facet Rhizotomy

Lumbar facet rhizotomy is the application of radiofrequency energy to the medial branches in order to coagulate or “burn” the target nerves and provide a conduction block for prolonged pain relief. The procedure is carried out as a same-day procedure in a fluoroscopy suite. With the patient in the prone position, the low back is prepped in sterile fashion using an antiseptic solution and the skin is numbed using local anesthetic. A cannula is placed using fluoroscopy to the target nerve and a probe placed into the cannula, connected to a radiofrequency generator. In order to confirm the needle is properly placed, a current is sent to the tip to ensure only the muscles of the low back twitch and no twitching is noted in the extremity. Once this is confirmed, the nerve is anesthetized with local anesthetic and lesioning is carried out at 80 degrees Celsius for 90 seconds. The patient is then observed for about 30 minutes and seen in two weeks for follow up. The goal of this procedure is to provide prolonged relief of up to 1 year, with the procedure repeated when the pain returns to pre-treatment levels. For billing purposes, the CPT code associated with this procedure is 64635. No labs are required prior to the procedure. Physical therapy is typically recommended before interventional treatment, but can provide benefit in conjunction with treatment.



Sacroiliac Joint Pain

There are two sacroiliac joints (SIJs), one on each side of the lower spine where the ilium meets the sacrum. The sacroiliac joint is implicated in up to 15% of patients with chronic low back pain and up to 30% of patients after spinal fusion (Barros et al., 2019). Pain is typically unilateral and located just below the belt line, just above or at the buttock and can refer to the posterior thigh and lower leg. Sacroiliac joint pain is further suspected when physical exam findings elicit three positive provocative maneuvers (e.g., Gaenslen's, FABERs, pelvic compression, pelvic distraction, and SIJ tenderness). Once SIJ pain is suspected, injection of the joint is carried out for confirmation.

Sacroiliac Joint Injection

This procedure is carried out as a same-day procedure in a fluoroscopy suite. With the patient in the prone position, the low back is prepped in sterile fashion using an antiseptic solution and the skin is numbed using local anesthetic. The posterior-inferior portion of the joint is identified and a spinal needle used to enter the joint. Contrast is injected to confirm placement, followed by a mixture of local anesthetic and steroid for a total volume of 2mL. If the patient reports at least 50% relief, this is considered to be a positive response. If the patient does not have a long-term response, rhizotomy can be employed to coagulate the lateral branches that supply sensation to the posterior joint. For billing purposes, the CPT code used is 27096. No labs are required prior to the procedure. Physical therapy is typically recommended before interventional treatment, but can provide benefit in conjunction with treatment.



Lumbar Provocational Discography

Axial low back pain due to discogenic pathology accounts for up to 42% of all chronic low back pain (Manchikanti et al., 2013). This is suspected when the patient complains of centralized pain with or without some degree of referral to the buttock or upper portion of the leg,

which is worse with prolonged sitting or standing. Disc pathology can be seen on advanced imaging, with MRI being the modality of choice. Unfortunately, many people have disc pathology seen on MRI in the form of bulging or herniation without pain, making the diagnosis of discogenic pain, and to that degree pinpointing the symptomatic disc somewhat difficult (Jensen, et al., 1994). In such situations where discogenic pathology is suspected and MRI shows more than one level of disc herniation and/or bulging, prevocalational discography can be used to help elucidate the pain generator.

The procedure is carried out as a same-day procedure in a fluoroscopy suite. An intravenous line is started, and the patient is provided with prophylactic antibiotics to prevent infection. With the patient in the prone position, the low back is prepped in sterile fashion using an antiseptic solution and the skin is numbed using local anesthetic. A spinal needle is placed into the suspected discs, as well as a normal disc used as a control. Contrast is injected into each disc using a device that can measure the pressure within the disc and the patient's response is recorded. If the patient reports concordant pain with the disc pressurization, that disc is identified as the likely source of their low back pain. The patient will then undergo a CT scan or MRI to evaluate the contrast spread within the disc. This information is then used to plan the next step in treatment, which may be surgical (e.g., discectomy, fusion, intradiscal rhizotomy). For purposes of billing, CPT codes typically include 62290 and 72285. No labs are required prior to the procedure. Physical therapy is typically recommended before interventional treatment but there is no utility for physical therapy after this procedure.

Spinal Cord Stimulation

If the patient has continued low back and/or leg pain despite conservative treatment, injections, medication, and in many cases surgical intervention, spinal cord stimulation is an option. Spinal cord stimulation utilizes electrodes placed in the epidural space, over the spinal cord to effectively block pain signals to the brain. The exact mechanism of this is still unknown but is presumed to be multifactorial.

The procedure is commonly performed in two parts. The first is a trial procedure where two leads are placed percutaneously and dressed in sterile fashion, then connected to an external generator. The procedure is carried out as a same day procedure in a fluoroscopy suite. An intravenous line is started and the patient is provided with prophylactic antibiotics to prevent infection. With the patient in the prone position, the low back is prepped in sterile fashion using an antiseptic solution and the skin is numbed using local anesthetic. A spinal needle is placed at the thoracolumbar junction to gain entry to the epidural space using loss of resistance to air. Once the epidural space is identified, the lead with anywhere from 8-16 contacts is placed up to the T8 vertebral body. A second needle is then placed so another lead with 8-16 contacts is threaded, either parallel to the first lead

at the T8 vertebral body, or stacked at the mid T9 vertebral body with the rest of the second lead extending down to T10. The needles are removed, and the leads secured to the skin and dressed with an extension then connected to an external generator worn on a belt. At the end of the trial period (typically 5-7 days), the leads are removed and the area is allowed to heal. If the patient experiences significant relief, the patient is scheduled for a permanent implant. There is a choice for the type of lead used for the permanent implant, which can either be the same cylindrical leads or a paddle lead. The paddle lead is placed by a spine surgeon and requires a larger incision and laminectomy (removal of bone) to accommodate the larger device. The benefit of the paddle lead is more directed electrical penetration to the spinal cord as the electrodes place the energy in one direction, versus with a cylindrical lead that sends the energy in all directions.

The permanent implant is carried out in an operating room under sterile conditions and with preoperative antibiotics. The procedure is usually performed with local anesthetic and conscious sedation. A small incision is made over the lumbar spine where the needles will be inserted and the leads threaded to the epidural space in the same position obtained for the trial. The needles are removed and the leads secured. A pocket is then made for the generator, usually over the buttock and the lead tunneled to the pocket and connected to the generator. The incisions are closed and dressed and the patient will follow up in the office for clinical checks. There are two choices for the pulse generator, either a rechargeable system vs a primary cell. The rechargeable system can last up to 10 years, after which the battery will need to be replaced. For the primary cell, the battery life is 3-4 years. For billing purposes CPT code 63650 and 63655 are typically used for the trial and 63655 for the permanent implant. Preoperative labs are not needed for the trial in otherwise healthy patients. For the permanent implant, preoperative labs include a complete blood count with platelets and coagulation profile (PT, PTT, INR). Physical therapy is typically recommended before interventional treatment and there is no utility for physical therapy after this procedure.

Cervical Pain - Injections and Minimally Invasive Therapy

The etiology of cervical pain can stem from numerous pain generators and is treated in similar fashion to lumbar pain.

Trigger Point Injection

Trigger point injections for cervical pain are performed in the same method described for the lumbar spine, but are usually directed to the cervical musculature, most commonly trapezius and rhomboid muscles.

Cervical Epidural Steroid Injection (CESI)

A CESI is typically performed for treatment of cervical radicular pain (nerve root pain associated with arm pain).

The injection is carried out as a same-day procedure using fluoroscopy (x-ray guidance) for accurate placement. With the patient in the prone position, the neck is prepped in sterile fashion using an antiseptic solution and the skin is numbed using local anesthetic. A needle is placed using fluoroscopy and loss of resistance to air or saline. Once the proper location is found, contrast is injected to outline the epidural space and confirm the location, followed by a mixture of saline and steroid. A band aide is then placed over the injection site and the patient monitored for about 15 minutes and discharged home. Pain relief is usually obtained within the first week and the patient follows up 1-2 weeks after for further evaluation. For billing purposes CPT code is 62321 for the procedure. No labs are required prior to the procedure for otherwise healthy patients. Physical therapy is typically recommended before interventional treatment, but can provide benefit in conjunction with treatment.



Cervical Facet Block and Rhizotomy

Similar to the lumbar spine, when axial pain is present, the facets can be a significant contributor. The procedure for

cervical facet blocks (intra-articular or medial branch blocks) is also similar to the lumbar spine. Once a diagnosis is made after positive blocks, rhizotomy can be performed to provide longer lasting relief. For billing purposes the CPT code typically used for a cervical facet block is 64490 and for a cervical facet rhizotomy CPT 64633. No labs are required prior to the procedure for otherwise healthy patients. Physical therapy is typically recommended before interventional treatment, but can provide benefit in conjunction with treatment.

Cervical Provocational Discography

Cervical provocative discography is performed to help elucidate the etiology of axial neck pain. Neck pain can come from numerous sources, but as with the low back, the intervertebral disc is the most common source. This source of pain is confounded by the fact that there are six intervertebral discs, any of which could be the source of pain. When imaging is non specific and shows disc herniations, bulging and degeneration, discography is used to help figure out which disc is the source of pain.

The procedure is carried out as a same-day procedure in a fluoroscopy suite. An intravenous line is started and the patient provided with prophylactic antibiotic to prevent infection. With the patient in the supine position, the neck is prepped in sterile fashion using an antiseptic solution and the skin is numbed using local anesthetic. A spinal needle is placed into the suspected discs, as well as a normal disc used as a control. Contrast is injected into each disc using a device that can measure the pressure within the disc and the patient's response is recorded. If the patient reports concordant pain with the disc pressurization, that disc is identified as the likely source of their neck pain. The patient will then undergo a CT scan or MRI to evaluate the contrast spread within the disc. This information is then used to plan the next step in treatment, which may be surgical. For billing purposes, CPT used include 62291 and 72285. No labs are required prior to the procedure for otherwise healthy patients. Physical therapy is typically recommended before interventional treatment, and there is no utility of therapy after this procedure.

Spinal Cord Stimulation (SCS)

Spinal Cord Stimulation has been performed in numerous cases of continued neck and/or radicular pain despite failed conservative and interventional care, as well as failed surgery. Cervical SCS is performed in the same two-step fashion as lumbar SCS - trial, and if successful, followed by implant. The only difference from the lumbar technique is the placement of the leads. For cervical pain, leads are typically placed up to C2 and sometimes only one lead will be used if there is adequate coverage, but two leads can also be used. Permanent implant can again be with either a paddle or cylindrical lead. The generator is usually placed in the same location as a pacemaker for patient comfort (anterior

chest wall) but can be placed over the posterior shoulder or tunneled down to the buttock as well.

Conclusion

Chronic spinal pain is extremely common in clinical practice and the basic, conservative measures are usually well-addressed by the primary care provider. Interventions for chronic spinal pain are highly specialized, requiring subspecialty training focusing on anatomy, needle manipulation and radiologic interpretation. This article can assist those without such training in understanding some of the basics regarding the etiology and treatment of the most common chronic spinal pain syndromes, as well as providing insight into the specific injection therapy performed by the interventional pain specialist.

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