Interventional pain management procedure for treating low back pain: anaesthesiologists should come forward

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Introduction

Although the variety of specialists caring for patients with chronic pain is broad, anesthesia is the speciality that represents the majority of physicians who use interventional approaches in the treatment of low back pain. Anesthesiologists who consider themselves as interventional pain management specialists agree that the spectrum varies widely from those who use only epidural steroid injections in a recovery room setting to those who are fellowship-trained and exclusively provide image-guided spine intervention.

Training and skill level among such anesthesiologists vary widely, mainly because until recently, no common comprehensive standards or guidelines existed for interventional pain management physicians. This situation changed in 2001 as the result of the establishment of guidelines set forth by the American Society of Interventional Pain Physicians1 and more comprehensive practice guidelines recently published by the International Spine Intervention Society (ISIS).2 As these standards become more commonplace in this specialty, the gap of varied skill levels and training will narrow with the expectation of improved outcomes based on randomized control trials that are ongoing to further delineate more accurate guidelines for each specific procedure.

Image-guided spine intervention is used primarily for its precise diagnostic capabilities. This article reviews basic principles of the more common image-guided diagnostic techniques specifically as they relate to patients with low back pain. It also includes discussion of advanced modes of therapy, including spinal cord stimulation and intrathecal therapy, providing primary care physicians with an understanding of the primary indications for these therapeutic modalities.

Low Back Pain

Low back pain is a major health and socio-economic problem throughout the world. The lifetime prevalence has been estimated at anything between 59% to 90%.3 In any one year, the incidence of back pain is reported to be ~5% of the population.3 Though we have no definite data in Bangladesh but incidence is quite high. The symptomatology of LBP is nonspecific with many possible etiologies. The lumbar spine is a complex structure, and for many years, treatment of patients with LBP was based on speculation. Limited understanding of lumbar spine anatomy, specifically neuroanatomy, and a lack of knowledge of functional anatomy contributed to this approach to treatment. The concept of precisely diagnosing a potential anatomic structure responsible for generating LBP rests on the idea that for a structure to be a source of pain, it must have a nerve supply. Hence, a diagnostic nerve block can be administered to test this hypothesis.4 Based on several studies by Schwarzer et al,5-9 Bogduk10 postulated that precision diagnostic injections can assist in formulating a specific diagnosis in 70% to 80% of those who suffer from LBP.

With respect to the relative contributions of various structures in chronic LBP, Manchikanti et al11 evaluated 120 patients with a chief complaint of LBP by administering precision diagnostic...
injections. These injections targeted facet joints via medial branch blocks, inter vertebral discs via provocation discography, and sacroiliac joints (SIJs) via intra-articular injections. They concluded that the facet joint contributed to chronic LBP in 40% of the population, the inter vertebral disc in 26%, and the SIJ in 27%. Anecdot al knowledge among physicians at Advanced Pain Consultants PA, in Voorhees, NJ, indicates that the inter vertebral disc is the more frequent significant source of chronic LBP than are lumbar facet joints.

Facet Joint Pain
Osteoarthritis and trauma are among the most common conditions leading to pain emanating from facet joints. The primary symptom of pain emanating from this site is that of LBP. By injecting a solution of 10% hypertonic saline solution in the region of the facet joints, Hirsch and colleagues demonstrated that pain can be created in the upper back and thigh regions. Pain frequently is also referred into the groin, buttocks, hip, or lateral and posterior thigh regions (or a combination of these sites). Pain is often described as a "deep, dull ache" and may be either unilateral or bilateral. On physical examination, there may frequently be increased pain with extension, tenderness to palpation over the affected joints, and normal findings on neurologic examination. Electrical stimulation of the medial branch nerves has also assisted in identifying referral pain patterns.

Facet joint injections or medial branch nerve blocks are primarily diagnostic tools. An intra-articular facet injection usually includes use of a steroid such as methylprednisolone, which theoretically reduces inflammation within the joint, thereby potentially reducing pain. However, injecting steroid into the facet joint does not usually provide lasting relief. Dreyfuss et al have demonstrated that clinically significant and prolonged relief from back pain can be achieved with radiofrequency neurotomy of the lumbar medial branches. Patients’ pain must be carefully diagnosed with controlled diagnostic blocks of the lumbar medial branches.

Sacroiliac Joint Pain
There is no scientific evidence that history or physical examination can accurately identify the SIJ as a source of pain, controlled intra-articular injections are the only available means of identifying this site as causing such discomfort. Because innervation of the SIJ is poorly defined and most likely complex, pain emanating from here cannot be diagnosed using nerve blocks. Intra-articular injection of a local anesthetic (e.g. lidocaine or bupivacaine hydrochloride) into the SIJ is the technique of choice used to prove or disprove that it is the etiologic factor.

Discogenic Pain
Provocation discography involves injection of contrast medium into the disc nucleus to define its morphology; this increase in intradiscal pressure allows simultaneous evaluation of the patient’s response to pain reproduction. Therefore, provocation discography can determine if this anatomic location is a pain source. It is based on the concept that if a particular disc is the source of pain, stressing it should result in reproduction of that pain. Furthermore, if the disc is not the source of pain, then when stressed, it should either not cause pain or it may produce pain that is atypical (dis concordant) of the underlying pain. Immediately following provocation discography, computed tomography (CT) scanning is done to obtain a static axial view of the inter vertebral disc to evaluate the degree of annular disruption. Sachs et al developed the Dallas discogram scale, which grades disruption of the annulus on a four-point scale. A normal nucleogram, one in which contrast is entirely contained within the nucleus, is considered a grade 0 disc. Grades 1 to 3 describe extension of the contrast medium to the inner third, middle third, and outer third of the annulus fibrosis, respectively. Examples include a posterior radial fissure at L4–5 with contrast extravasating into the anterior epidural space and a grade 3 posterolateral annular disruption on the postdiscography CT scan.

Ozone disc nucleolysis and epidural steroid
Outcome studies of lumbar disc surgeries document a success rate between 49% to 95%. Reasons for this failure are: 1) dural fibrosis, 2) arachnoidal adhesions, 3) muscle & fascial fibrosis 4) mechanical instability resulting from the partial removal of bony and ligamentous structures required for surgical exposure and decompression leading to facet & sacro-iliac joint dysfunctions, 5)
radiculopathy, 6) recurrent disc herniation. There has been a surge of interest in search of safer alternative methods of decompressing the nerve roots maintaining the structural stability. Undoubtedly, the epidural steroid injection (ESI) is the precursor of the more specific spinal injection procedures done today and the most familiar to primary care physicians. Epidural steroid injection, transforaminal epidural procedures has a high success rate (up to 84%) but chances of recurrences are also high. Chemonucleolysis using chymopapain has a moderate success rate (approximately 66% at one year). It has also the chances of anaphylaxis following intradiscal chymopapain injection. Injection of ozone for discogenic radiculopathy (low back pain with radiation to legs) has developed as an alternative to chemonucleolysis and disc surgery popularly called ozone therapy for slip disc. Owing to its high success rate, less invasiveness, fewer chances of recurrences and remarkably fewer side effects ozone therapy for slip disc is becoming very popular.

How does ozone therapy work? The action of ozone therapy is due to the active oxygen atom liberated from breaking down of ozone molecule. When ozone is injected into the disc the active oxygen atom called the singlet oxygen or the free radicle attaches with the proteo-glycan bridges in the jelly-like material or nucleus pulposus. They are broken down and they no longer capable of holding water. As a result disc shrinks and mummified and there is decompression of nerve roots.

Radio frequency procedures

Different radio frequency procedures are essential in pain management. It is the best form of treatment for trigeminal neuralgia, different types of cancer pain and spinal pain including low back and neck pain.

There are two types of Radio Frequency pain management procedures. The older one is Conventional Radio Frequency where heat is generated which is producing the lesion and stopping the pain signal. The newer one is Pulsed Radio Frequency where a strong electro-magnetic field is produced around the nerve which is stopping the pain signal. Here the normal function of nerve is maintained and only abnormal pain is stopped.

Advanced Therapies

Spinal cord stimulation and intrathecal therapy are advanced therapeutic modalities used for treating patients with chronic intractable pain. They are essentially reserved for patients in whom continuing pain is not the symptom, but rather the disease. Together, these modalities consist of technology that is considered “neuromodulatory.”

Vertebroplasty may be used for patients with vertebral compression fractures due to osteoporosis, metastatic tumors, or benign tumors such as vertebral hemangiomas. Patients with metastasis and myeloma usually experience severe pain and disability.

Vertebroplasty is performed to provide pain relief and to produce bone strengthening and vertebral stabilization when the lesion threatens the stability of the spine.

Conclusion

Low back pain usually is self-limiting, but when it persists and is unresponsive to rehabilitation and analgesics, precise determination of the source of pain becomes key to planning proper treatment. Patients with LBP may demonstrate varied clinical scenarios, none of which, unfortunately, helps in determining the exact source of the pain. A precise spinal diagnostic evaluation can identify the correct anatomic site of such discomfort in most patients. Different interventional pain management procedure is to be applied to treat this group of patients. Definitely success depends on skill of interventionist. Though blind epidural steroid injection is practiced for LBP by our interventionist as common therapeutic procedure but use of image-guided procedures would be practiced for better outcome. Anaesthesiologists should come forward to take proper role in managing such type of patients after taking proper knowledge on anatomical, pathological and image technique.

References


