28. INTERVENTIONAL CHRONIC PAIN TREATMENT IN MATURE THEATERS OF OPERATION

IMPACT OF NONBATTLE-RELATED INJURIES AND TREATMENT

Acute nonbattle injuries (NBIs) and chronic pain conditions that recur during war have been termed the "hidden epidemic" by the former surgeon general of the US Army, James Peake. Since statistics have been kept, the impact of NBIs on unit readiness has increased. In World War I, NBI was the fourth leading cause of soldier attrition. In World War II and the Korean conflict, NBIs were the third leading cause of morbidity. By the Vietnam War, NBIs had become the leading cause of hospital admissions, where they have remained ever since. However, increasing evidence demonstrates that in-theater management of NBIs and recurrent chronic pain syndromes can improve return-to-duty rates.

The current system of military treatment levels, designed to facilitate the rapid evacuation of wounded soldiers based on their medical condition and needs, was developed in World War II—predating the establishment of pain management as a medical specialty. No personnel are currently deployed specifically for pain management (acute or chronic) at level-III combat support hospital (CSH) facilities in either Iraq or Afghanistan. Instead, anesthesiologists and other pain specialists are deployed in their primary specialties and are expected to provide pain management services as needed in addition to their regular full-time duties. This situation has resulted in a varying standard of pain management care in theaters of operation. The modern CSH has key infrastructure such as radiology services (eg, fluoroscopy, radiography, computed tomography) and full surgical, laboratory, and pharmacy support, which can facilitate chronic pain clinical services if properly staffed.

The most common presenting complaints of NBI during Operation Iraqi Freedom have been radicular leg pain, axial low back pain (LBP), nonradicular leg pain, nonradicular arm pain, groin pain, noncardiac chest pain, and neck pain. The most common diagnoses conferred on these patients were lumbosacral radiculopathy, recurrence of postsurgical pain, lumbar facetogenic pain, myofascial pain, neuropathic pain, and lumbar degenerative disc disease.

The most common noninterventional treatments have been nonsteroidal antiinflammatory drugs (NSAIDs; > 90%); physical therapy referral (for back pain, neck pain, and leg pain); muscle relaxants (for spinal and myofascial pain); and anticonvulsants and tricyclic antidepressants (usually prescribed for radicular and other forms of neuropathic pain). The large majority of patients received at least one interventional procedure. The most frequently employed nerve blocks were lumbar transforaminal epidural steroid injections (ESIs), trigger point injections, cervical ESIs, lumbar facet blocks, various groin blocks, and plantar fascia injections. Table 28-1 lists procedures for common nerve blocks conducted in

TABLE 28-1

PROCEDURES FOR COMMON NERVE BLOCKS CONDUCTED IN THEATER

Injection	Injectate Volume* (mL)	Need for Fluoroscopy?	Comments
Cervical ESI	2–4	Yes	Use of local anesthetic controversial. Cervical TFESI may result in death or paraplegia and should not be done in austere environment.
Interlaminar lumbar ESI	3–5	Strongly advised	Performing blind ESI associated with a high likelihood of injectate failing to reach targeted area.
Transforaminal lumbar ESI	2–3	Yes	Superior outcomes compared to interlaminar ESI.
Intraarticular facet blocks	Cervical: 1 Lumbar: 1–2	Yes	Likelihood of relief higher in patients with acute inflammatory process.
Trochanteric bursa injection	3–5	No	Similar outcomes for fluoroscopically and landmark-guided injections.
Sacroiliac joint block	2–4	Yes	< 25% chance of intraarticular spread in landmark-guided injections.
Lateral epicondylar injection	0.5–1.5	No	Mixed results for treatment.
Subacromial bursa injection	4–10	Advised	May use posterior or anterolateral approach; 50%–80% accuracy rate for blinded injections.
Piriformis muscle injection	3–8	Yes	May use nerve stimulator to locate sciatic nerve (adjacent to muscle) if fluoroscopy is not available. Injection of local anesthetic may cause sciatic nerve weakness.
Carpal tunnel injection	1–2	No	Not superior to NSAID treatment after 2 months.
Greater occipital nerve injection	2–4	No	Difficult to clinically distinguish from referred cervical pain.

ESI: epidural steroid injection. NSAID: nonsteroidal antiinflammatory drug. TFESI: transforaminal epidural steroid injection.
*Volume of injectate consists of 1 to 2 mL of depot (long-acting) corticosteroid plus local anesthetic.

theater. Significantly, when treated in theater, 94.7% of soldiers returned to their units. Differences in return-to-duty rates support aggressive pain management in forward-deployed areas.

TRIAGING PATIENTS FOR TREATMENT

As a result of limited pain management resources, coupled with the risk involved with soldier transport, healthcare providers must triage NBI pain patients based on the anticipated risk–benefit ratio. Soldiers with acute or recurrent overuse injuries (eg, tendonitis or bursitis) can usually be handled at a level I facility such as a battalion aid station. For soldiers who require more sophisticated interventions, the battalion or brigade surgeon must decide whether a medical evacuation to a CSH is warranted. This decision is based upon several factors: the likelihood of quick resolution of the pain issue, the soldier's motivation to remain in theater, the soldier's military occupational specialty, the probability of recurrence, the commander's desire to keep the soldier in theater, the treatment capabilities at the CSH, and the risk of medical evacuation.

CHRONIC PAIN CONDITIONS ENCOUNTERED IN THE FIELD

Low Back Pain. LBP is the most common complaint likely to be encountered by the pain practitioner deployed to the CSH. Its high incidence is probably caused by a combination of factors encountered in theater: the heavy loads service members must carry, frequent transportation over rough terrain in military vehicles with stiff suspensions, heavy individual body armor, sleep deprivation, and the high degree of psychosocial stressors faced by soldiers deployed to combat zones. Among the various causes of LBP, radiculopathy from nerve root irritation may be the most commonly encountered condition.

A mainstay interventional treatment for LBP is ESI. ESIs exert their beneficial effects through their antiinflammatory properties, inhibition of the enzyme phospholipase A2, and suppression of ectopic discharges from injured neurons. Although ESIs have been successfully used to treat axial back pain, ideal candidates for the procedure are those with pain of less than 6 months' duration, leg pain greater than back pain, young age, intermittent pain, and absence of concomitant spinal stenosis. The use of fluoroscopic guidance is highly recommended for interlaminar ESIs and is required for transforaminal ESIs. ESIs performed without the fluoroscope have a high technical failure rate, even when performed by experienced practitioners. Transforaminal ESIs, although technically more challenging than interlaminar ESIs, are generally associated with superior outcomes because medication is deposited directly over the affected nerve root (Figure 28-1).

Patients suspected of radicular pain should receive computed tomography (CT) scans of the appropriate spine level. Whereas magnetic resonance imagery (MRI) is the gold standard for imaging soft tissue and disc anatomy, CT scans are sensitive at determining the presence of disc pathology. Although ESIs are considered by many practitioners to be the best interventional therapy for radicular pain, controversy exists regarding their long-term efficacy.

Zygapophyseal Joint Pain. Lumbar zygapophyseal (facet) joint pain accounts for approximately 15% of patients with chronic axial LBP. Typical presentation is a dull aching pain, usually bilateral, that radiates from the low back into the buttocks and thigh. Although the history and physical examination can be suggestive of facet joint pain, an analgesic response to fluoroscopically guided low-volume diagnostic blocks, of either the zygapophyseal joints themselves or the medial branches that innervate them, is the gold standard for diagnosis. The interventional treatment of facetogenic pain consists of either intraarticular injections with corticosteroid, which may benefit a small percentage of patients with an acute inflammatory component, or more frequently radiofrequency denervation of the nerves that innervate the painful joints. Because of the lack of radiofrequency capability, combination diagnostic/therapeutic intraarticular facet injections are recommended in theater. In patients with radiological evidence of an acute inflammatory process, intraarticular corticosteroids may afford up to 3 months of excellent pain relief (Figure 28-2).

Figure 28-1. Lateral fluoroscopic view demonstrating needle position for L4-5 transforaminal epidural steroid injection.

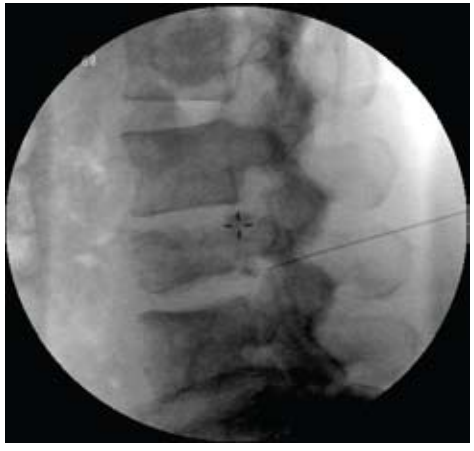

Figure 28-2. Antero-posterior fluoroscopic view demonstrating needle position for bilateral L3 and L4 facet joint (medial branch) nerve blocks.

Sacroiliac Joint Pain. Sacroiliac (SI) joint pain is a frequent source of axial LBP, accounting for roughly 15%to 20% of cases. Compared to other causes of back pain, SI joint pain is more likely to result from a specific inciting event such as a fall, motor vehicle accident, or airplane jump. The primary pain generator in younger patients with documented SI joint pain tends to be extraarticular (ie, surrounding ligaments or muscles). The typical presentation of SI joint pain is a unilateral aching pain in the low back or buttock. SI joint pain, typically associated with tenderness overlying the affected joint, is often reproducible. In patients with SI joint pain, multiple studies have demonstrated good intermediate- to long-term pain relief with intraarticular or periarticular injections of corticosteroid with local anesthetic. Previous studies have demonstrated that radiographic guidance is necessary to achieve accurate placement in or around the joint (Figure 28-3).

Figure 28-3. Antero-posterior fluoroscopic view demonstrating a right side sacroiliac joint injection.

Figures 28-4 and 28-5. Antero-posterior and lateral fluoroscopic views demonstrating right-sided C4 and C5 facet joint (medial branch) nerve blocks.

Myofascial Pain. Myofascial pain accounts for a significant percentage of axial LBP cases, with an estimated prevalence of around 20%. Frequently, muscle spasm is superimposed on a more acute, underlying condition. The hallmark of treatment of myofascial pain is physical therapy to identify and treat the underlying cause, and pharmacotherapy with muscle relaxants and NSAIDs. When discrete bands of contracted muscle are palpable, trigger point injections can provide excellent relief.

Spinal Stenosis and Degenerative Disc Disease. Spinal stenosis and degenerative disc disease are other common causes of LBP, with a higher incidence among the elderly. Whereas ESIs can sometimes provide pain relief for these conditions, the benefit is often incomplete and transient. Less frequent sources of back and leg pain that need to be ruled out include osteomyelitis, vertebral fractures, and acute or worsening spondylolisthesis.

Cervical Spine Pain. An estimated 16% to 22% of adults suffer from chronic neck pain, with a higher prevalence seen in women. Among patients with chronic neck pain, approximately 30% report a history of neck injury, most commonly the result of a motor vehicle accident . In military pain clinics, neck pain and cervicogenic headaches account for about 10% to 15% of NBIs.

Numerous predisposing factors for neck pain are prevalent in soldiers, including prolonged static loads (from body armor), abnormal postures (secondary to body armor or in snipers), work-related stress, and full-force exertion. In patients with acute neck or upper thoracic pain, the etiology is likely to be myofascial in origin. In chronic axial neck pain or whiplash injury, the facet joints are the most common source of pain. Myofascial pain can be treated with muscle relaxants, NSAIDs, tricyclic antidepressants, short-term duty modification, and trigger point injections. For cervical facetogenic pain, intraarticular steroids can provide intermediate-term relief in patients with an acute inflammatory process (Figures 28-4 and 28-5).

Cervical radiculopathy typically manifests as neck pain radiating down one or both arms in a dermatomal distribution, sometimes accompanied by weakness and sensory changes. Similar to lumbar radicular pain, cervical radiculopathy can be treated with cervical ESIs (Figures 28-6 and 28-7). Because of reports of death and paralysis, cervical transforaminal ESIs are not recommended in an austere environment. Possible causes of cervicogenic headaches that may be amenable to injection therapy include atlantooccipital and atlantoaxial joint pain. Occipital neuralgia, a frequent cause of occipital headaches, is best diagnosed and treated with injections containing local anesthetic and corticosteroid (Figure 28-8).

Figure 28-8. Needle position demonstrating bilateral greater occipital nerve blocks.

Nonradicular Leg Pain. Nonradicular leg pain (eg, piriformis syndrome, plantar fascitis, and greater trochanteric bursitis [TB]) accounts for approximately 10% of pain clinic visits from NBIs. Many of these conditions tend to be associated with overuse of the affected body part. Piriformis syndrome tends to present as unilateral buttock pain and, depending on the extent of sciatic nerve involvement, pain extending into the lower leg. The diagnosis of piriformis syndrome is predicated on a positive response to fluoroscopically guided intramuscular injection. In addition to their diagnostic utility, these injections can also be therapeutic.

TB is a clinical diagnosis characterized by the association of lateral hip pain, tenderness to palpation, and pain provocation by various movements. Sometimes called "pseudosciatica," TB can radiate into the distal thigh but rarely extends below the knee. Risk factors for TB include coexisting lumbar spine pathology, gait and postural abnormalities, leg length discrepancy, female gender, and advanced age. It is important to note that a majority of patients clinically diagnosed with TB have no MRI evidence of bursa inflammation. In these patients, the true pain generator is often tendonitis, muscle tears, or trigger points (Figure 28-9).

Plantar fasciitis has a lifetime prevalence of almost 10% in the general population but tends to be more common in soldiers. Risk factors include excessive walking or running, especially in the early morning, on uneven surfaces, or wearing heavy backpacks; having flat feet or high arches; being overweight; and being middle age or older. Conservative treatment includes rest, night splints or orthotics, stretching

Figures 28-6 and 28-7. Antero-posterior and lateral fluoroscopic views demonstrating a C5-6 epidural steroid injection.

Figure 28-9. Antero-posterior fluoroscopic view demonstrating trochanteric bursa injection.

exercises, and NSAIDs. Corticosteroid injections may also relieve plantar fasciitis symptoms.

Less Common Pain Complaints. Nonradicular arm pain is less frequently encountered than nonradicular leg pain. Aside from complex regional pain syndrome, which is rarely encountered in soldiers at level III facilities, other causes of nonradicular arm pain include medial and lateral epicondylitis ("tennis elbow"), tendonitis, bursitis, and carpal tunnel syndrome. Injection of any of these overuse inflammatory conditions with corticosteroid and local anesthetic may result in significant pain relief and functional improvement. Since these injections are targeted by palpation and landmarks, they can usually be done in the field.

Lastly, male groin pain, abdominal pain, and female pelvic pain are the least likely pain conditions to improve with the interventional therapy available in theater. Common to all three of these conditions is the diagnostic dilemma each poses, the lack of any reliable pharmacologic or interventional treatments, and the high prevalence of coexisting psychopathology. When a surgical scar is present, scar injections with corticosteroid and local anesthetic may afford pain relief by virtue of releasing entrapped nerves or suppressing ectopic discharges from injured neurons. Even in soldiers who will require medical evacuation, short-term relief can often be obtained with nerve blocks. Most of these blocks tend to be landmark-guided, so fluoroscopy is generally not necessary (see Table 28-1).

SUMMARY

In modern combat, the most common cause of soldier attrition is not battle-related injuries, but rather acute and recurrent NBIs similar to those encountered in civilian pain clinics. Although recent evidence indicates that higher return-to-unit rates can be obtained with forward-deployed interventional pain management capabilities, these techniques are not always practical early in warfare. Chronic pain management in the operational setting is fraught with a unique and often dynamic set of challenges, but the procedures can provide considerable benefit in a mature theater of war with deployment of personnel and equipment as described in this chapter.