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Ultrasound-guided Injection-based Therapies: An Effective Alternative to Opioids for Chronic Pain



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Opioid abuse now claims more lives in North American than car crashes. In 2017, the United States and Canada set new records for opioid-related fatalities, with overdoses killing [nearly 4,000 Canadians](#) and an estimated [50,000 Americans](#). Emergency department visits and hospitalisations involving these drugs also have risen dramatically. Yet prescribing these drugs has increased so sharply in recent years that the U.S. and Canada are the world's [two largest per-capita users of opioids](#), respectively.

The 2017 Canadian Guideline for Opioids for Chronic Non-Cancer Pain includes a strong recommendation to optimise use of non-opioid pharmacologic and non-pharmacologic therapies for patients with persistent non-malignant pain, a disorder that affects [more than 6 million adults](#) in Canada at an estimated annual cost of \$43 billion in Canadian dollars (more than heart disease, cancer, and HIV combined). Chronic pain also has high

social costs: not only is it the leading cause of disability in working-age Canadians, but 60% of those with uncontrolled pain eventually [lose their jobs or incur pay cuts](#) and/or demotions. In the United States, chronic pain affects about [100 million adults](#) at an annual cost of up to \$635 billion (U.S. dollars).

In 2016, the Centers for Disease Control (CDC) issued [guidelines for the management of chronic pain](#). These guidelines, which have been endorsed by several Canadian provincial colleges of physicians and surgeons, advise clinicians to consider the full range of therapeutic options for chronic pain, including interventional procedures, such as regional anaesthesia, for certain conditions. A large body of evidence has demonstrated that [ultrasound-guided regional anesthesia](#) (UGRA) produces [longer block durations](#), faster onset times, [improved block success](#), and a reduced need for opioids. Point-of-care ultrasound (POCUS) guidance may also facilitate other injection-based therapies for painful conditions, including viscosupplementation, corticosteroid injections, nerve hydrodissection, and dextrose prolotherapy.

This article provides an overview of the role of ultrasound-guided injected therapies as a safer, often more effective alternative to opioids for chronic pain. The information is based on recent literature and case histories drawn from the author's experience at the Bill Nelems Pain and Research Centre in Kelowna, British Columbia, where nine physicians log more than 11,000 patient visits annually (new and follow-up). Not only are the vast majority of our patients extremely satisfied with our multidisciplinary opioid-sparing approach, but we have a waiting list of 1,500 patients seeking these therapies. To meet this demand, we are training three additional physicians, and are planning to move to a larger facility.

Improved Outcomes and a 40% Reduction in Opioid Use

In September 2018, we conducted a retrospective chart review of all new patients seen by the author in the previous 12 months for chronic pain. Of the 259 patients who met these criteria, 50 were long-term users of opioids at the start of their treatment. Based on an extensive literature review, the Canadian guidelines cited above recommend tapering such patients to the lowest effective dose, potentially including discontinuation, if they are currently using more than 90 morphine equivalents daily, combined with treatment in a multidisciplinary program advised for those who experience challenges with tapering. Among our cohort of long-term opioid users, we documented an overall 40% decrease in their narcotic requirements after they received one or more ultrasound-guided interventional procedures at our clinic.

Our patients overwhelmingly state that they have achieved greater pain relief and improved functionality after receiving these therapies, as compared to opioid usage. Indeed, there is little scientific evidence to show any benefits of long-term opioids for the treatment of chronic, non-malignant pain. A [recent systematic review](#) funded by the Agency for Healthcare Research and Quality (AHRQ) found no well-controlled, long-term (> 3 months) randomised clinical trials (RCTs) to show that opioid therapy for pain effectively alleviates suffering or improves patients' function or quality of life, while the documented risks include overdose deaths, addiction, misuse or diversion and increased risk for fractures, heart attacks, and sexual dysfunction.

Safe and Effective Treatments for Chronic Pain

Over the past five years, our patients have experienced no significant complications from our ultrasound-guided interventional procedures, other than transient pain or inflammation at the injection site and one instance of joint infection, which was resolved with antibiotics. The vast majority of our patients report being "satisfied" or "very satisfied" with the outcomes of our injection-based therapies, which include the following for appropriate patients:

- Dextrose prolotherapy, a regenerative injection-based treatment for chronic musculoskeletal pain. Hypertonic dextrose is the most commonly used prolotherapy solution, with evidence from RCTs supporting its use for rotator cuff tendinopathy, lateral epicondylitis, plantar fasciopathy, non-surgical sacroiliac pain, and other conditions.
- Corticosteroid injections for joint pain, which have been shown in multiple systematic reviews and comparative studies to provide effective short-term improvement in pain and functionality for patients with a range of conditions, including [osteoarthritis](#), [rheumatoid arthritis](#), [adhesive capsulitis](#), and rotator cuff disease.
- Nerve block/hydrodissection to relieve pain stemming from nerve injuries or entrapment, including carpal tunnel syndrome, tarsal tunnel syndrome (posterior tibial neuralgia), scar neuropathy and compression neuropathic pain syndromes, such as meralgia paresthetica (pain, burning or numbness in the lateral thigh region due to injuries or compression of the lateral femoral nerve).

- Cervical sympathetic trunk block (also known as "stellate ganglion block") to relieve sympathetically mediated neuropathic pain in the upper extremity, such as complex regional pain syndrome types I and II.
- Epidural injection, which the CDC guidelines recommend as an effective alternative to opioids to provide short-term pain relief for certain conditions, such as lumbar radiculopathy. Our clinic also uses ultrasound-guided caudal epidural for some cases of spinal stenosis and coccydynia, while colleagues have also found these injections beneficial for pelvic pain.
- Viscosupplementation (hyaluronic acid) to relieve pain from osteoarthritis and other joint disorders and to improve the patient's functionality.

Rapid, Cost-effective Pain Control with Ultrasound-guided Injections

One of our recent cases highlights the rapid benefits that can be achieved with ultrasound-guided injected therapies. A 67-year-old woman recently presented with significant (grade 4) osteoarthritis of her right shoulder, causing pain and stiffness. Despite treatment by multiple physical therapists—and long-term use of opioids—she remained in unremitting pain. She was assessed as a shoulder joint replacement candidate 2 years prior.

After one treatment with hyaluronic acid viscosupplementation (which also included 18 mg of triamcinolone, a corticosteroid), injected under ultrasound guidance with precision into the glenohumeral joint, she was able to reduce her use of pain medications by 80%. The patient reported dramatic improvements in her range of motion, enabling her to perform daily activities that were previously difficult or impossible. She also reported being able to sleep comfortably for the first time in five years. To date, these effects have endured for more than six months.

A 2018 [comprehensive literature review](#) revealed that in the upper extremity, ultrasound-guided joint and soft-tissue injections provide superior benefit to traditional "landmark" injections at the glenohumeral joint, the subacromial space, the biceps tendon sheath and the joints of the hand and wrist. The review also found superior efficacy of ultrasound-guided injections at the knee, ankle, and foot, with the authors concluding that "ultrasound-guided injections are overall more accurate than landmark-guided injections," and may also be more cost-effective.

A [recent study of 2,343 patients](#) with hip osteoarthritis revealed another way in which ultrasound-guided viscosupplementation may reduce healthcare costs. After receiving an ultrasound-guided intra-articular hip joint injection with hyaluronic acid, the patients' consumption of nonsteroidal anti-inflammatory drugs (NSAIDs) decreased by 61% during 24 months of follow-up, which the authors suggest could lead to a significant decrease in long-term healthcare costs due to reductions in NSAID complications.

Opioid-free Pain Management: A Potential Lifesaver

Ultrasound-guided interventional pain procedures have important safety benefits. Our experience and published evidence suggest that after receiving these injected treatments, opioid users may be able to reduce or discontinue their consumption of these medications, while opioid-naïve patients may avoid their first exposure to these frequently misused drugs. This can be a potentially life-saving benefit, given that in a [recent study of Ontarians](#) ages 15-64 who received opioids for chronic non-cancer pain, one in 550 of them died from opioid-related overdose at a median of 2.6 years from their first prescription.

Mounting public concern about the dangers of narcotic pain medications—as well as recent guidelines and laws that have made physicians increasingly reluctant to prescribe these drugs—have contributed to a dramatic rise in patients who are seeking effective non-narcotic therapies for chronic pain. For example, a 57-year-old grandmother recently presented to our clinic with excruciating neuropathic pain in her lower left leg secondary to nerve injuries in her tibial and superficial peroneal nerves as a result of prior deep venous thrombosis. After years of suffering—and trying several non-narcotic medications and other therapies that failed to help—she was actually considering having her lower leg surgically amputated.

Yet, even in this extreme situation, the patient was determined to avoid opioids due to fear of addiction. She stated that she frequently drank alcohol to excess, stating that, "I often knocked myself out for the night after my grandchild went to bed, just to get some relief from the burning, drive-you-crazy pain in my left foot and calf."

Our interventional treatment consisted of the following: left tibial nerve block/hydrodissection performed with 8 ml of 0.1% lidocaine in a 5% dextrose (D5W) solution, and left foot dorsum superficial peroneal nerve block/hydrodissection, performed with 3 ml of 1% lidocaine in D5W. Both injections were performed with precision under POCUS guidance. The patient was also started on low-dose naltrexone, a medication that increases endogenous endorphins and also inhibits microglial activation and in doing so, suppresses NMDA activation in the brain, leading to diminished pain.

The patient reported an immediate, long-lasting relief after these therapies, stating, “I have my life back. The pain in my foot hasn’t come back, not even in the slightest, and while I still have a little pain in my calf, it’s something I can live with. I smile more, laugh more, and am back to doing almost everything I did in the past with my grandchild. We went on three trips already this year, with no restrictions. I am overwhelmed with how much this care has helped me, and quite frankly, a little angry that I didn’t get the help I needed sooner.”

In summary, as this case and published data highlight, patients with chronic pain deserve to receive safe and effective pain care, delivered through an interdisciplinary model focusing on all aspects of our patients’ pain experience. POCUS-guided injection therapies, used on their own or in combination with non-narcotic oral medications, are part of this helpful approach, offering an ideal technique to provide rapid, compassionate care for the patients who need it most. With millions of North Americans swept up in the rising tide of prescription opioid abuse, and overdose deaths now at record levels in Canada and the U.S., it is time to find novel treatments, fund research, increase patients’ access to available treatments and fight back against chronic pain.

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