

Epidural Nerve Blocks(ENB) in the Treatment of Complex Regional Pain Syndrome (CRPS)

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Abstract: Complex regional pain syndrome (CRPS) is a definitive chronic pain syndrome which is associated with multiple manifestations and complications which makes this disease very difficult to treat. The frontline treatment option for most patients, after a clinical diagnose of CRPS is with a stellate ganglion nerve block (SGB). This type of nerve block can be helpful with the initial diagnoses of CRPS. When SGB are done repetitively they can cause more harm to the patient.

In this article, we will discuss other safer and more effective types of nerve blocks such as epidural nerve blocks (ENB), caudal blocks, and paravertebral nerve blocks(PNB) that can be more beneficial in the management of CRPS treatment.

Key words: *Complex Regional Pain Syndrome (CRPS), Epidural Nerve Block(ENB), Caudal Nerve Blocks, Paravertebral Nerve Blocks(PNB), Stellate Ganglion Block (SGB), Depo-Medrol®.*

INTRODUCTION

Complex regional pain syndrome (CRPS) is disease with multiple signs, symptoms and stages. Early diagnose is key in the outcome of this disease. The use of nerve blocks is an important form of treatment to help break the vicious cycle of pain in CRPS. The symptoms of CRPS respond to treatment differently in each patient. Treatment with nerve blocks combined with the use of proper non-additive pain medications, antidepressants, and physical therapy are essential in the management of CRPS.

Stellate ganglion blocks(SGB) are the standard nerve blocks for neuropathic pain such as CRPS. However, these blocks are not consistently successful (1-6).

The use of epidural nerve blocks (ENB) is the last resort type of nerve block for patients suffering from late stage chronic CRPS. In our clinic, we have found that CRPS patients gain more benefit from treatment with ENB compared to treatment with standard SGB.

EPIDURAL NERVE BLOCKS (ENB)

The reason for the administration of an epidural nerve block (ENB) in the treatment of CRPS is the fact that the pathology is chronic and it affects both the sympathetic and somesthetic systems. This type of nerve block does help relieve the pain and helps improve the circulation in the target area. ENB are applied by insertion of the needle into the epidural space (the space between the spinal cord and the spinal canal). ENB are performed under the use of fluoroscopy (x-ray) guidance. After the epidural space is identified, a combination of four-fifths Marcaine local anesthetic and a minuscule amount of Depo-Medrol® is injected in the epidural space (7).

Depo-Medrol® itself consists of a large inert and innocuous protein attached to a small amount of Methylprednisolone. The local anesthetic Marcaine relieves the pain, and the small amount of corticosteroid attached to the protein reduces the inflammation (7).

Because of the heavy molecule of protein attached to the corticosteroid, the blood circulation cannot readily absorb the Depo-Medrol®. As a result, the beneficial effect of pain relief and anti-inflammation last approximately two to three months. During the same period of time, physical therapy, massage therapy, and other forms of treatments should be applied. In 90% of such patients do not need any more than one complete course of nerve blocks. In 10% of the patients who have chronic CRPS with permanent nerve damage may need a reinforcement course of nerve blocks done every three to four months (7).

The types of nerve blocks that we perform on patients in our clinic, are epidural, caudal, paravertebral, occipital or brachial plexus nerve blocks which are done with a combination of 10-20 cc Marcaine and a maximum of 5 to 20 mg Depo-Medrol®. As the name Depo-Medrol® implies, the prednisone is attached to a large molecule of protein which cannot penetrate through capillaries causing systemic side effects of corticosteroids unless it is given in toxic doses (7).

In patients who have had such ENB when they have a laminectomy, at the time of surgery we found wafers of crystallized molecules of Depo-Medrol®, still present in the extracellular tissue even years after the performance of the nerve blocks. Clinically, the patient receives excellent pain relief and anti-inflammatory effects lasting anywhere from two to three months (7).

The anti-inflammatory aspect of a block refers to the fact that the involved extremity usually shows neuroinflammatory edema and even skin rashes. Obviously, single injection of local anesthetic cannot do anything for this but the Depo-Medrol® markedly reduces the neuroinflammation. As a result, the neuroinflammation is not mistaken for carpal tunnel, thoracic outlet, or tarsal tunnel syndromes and the patient does not have to go through damaging and unnecessary surgical procedures (7).

The side effects from this form of treatment are nil to negligible. The molecule of protein does not allow the corticosteroid to spread to other organs of the body, and helps the beneficial effect of the treatment to last up to two to three months (7).

According to Cooper et al, the use of ENB has many advantages over SGB. A SGB may help relieve the pain initially, but when the stiff joint is aggressively mobilized, the pain usually recurs which then causes the pain cycle to return. ENB allows pain-free mobilization because it blocks sympathetic pain fibers as well as somatic pain fibers (8).

The research by Cicala and colleagues found that ENB with local anesthetics along with corticosteroids have been used successfully to treat the causalgic pain of CRPS that were incompletely responsive to sympathetic blockade (9).

In their research, they found that epidural infusion of local anesthetics alone may be an effective alternative when sympathetic blocks do not provide relief in patients with the causalgic pain of CRPS (9).

In most cases, patients who do not receive proper treatment will become inactive and immobilized due to severe pain. It is very important when patients reach the chronic and complicated stages of CRPS they should be treated with ENB. The use of ENB provide relief lasting up to three months as well as reducing the neuro-inflammation of the disease. The prolonged inactivity and bed rest are the two cardinal sins in the management of CRPS, and are counteracted with these blocks (7).

STELLATE GANGLION BLOCKS (SGB)

According to the late Doctor Bonica who is considered the father of chronic pain management, as he specifies in his book, that the use of stellate ganglion blocks (SGB) in the best of hands (which would be Doctor Bonica) has a 25% rate of failure (2). This is because the stellate ganglion has a very vague anatomical structure which is different from patient to patient. So, it usually takes a few or several sticks before the ganglion block is done. A truly successful stellate ganglion block is accompanied by Horner's syndrome (oculosympathetic paralysis) (10,11). A Horner's syndrome is successfully achieved in around 75% of the patients who undergo the block. It also has other serious complications which would be harmful to the patients (Table I) (10,11).

Table I. Side Effects of Horner's Syndrome

Symptoms on the effected side of the face	
Ptosis (drooping eyelid)	Headaches
Enophthalmos (eyeball sinking into face)	Hoarseness of the voice
Miosis (constricted pupil)	The eyes may show a different color
Anhidrosis (decreased sweating)	Flushed reddish appearance of the face

The worst feature of the SGB is the fact that repeated SGB result in the bombardment and traumatic needle damage to the stellate ganglion sympathetic nerve cells. God created those nerve cells not to be needled and destroyed. Quite frequently, after several SGB, the patient develops sympathetically independent pain (SIP) in a patient who before the ganglion blocks had sympathetically maintained pain (SMP).

This confuses the clinician and because a successful block doesn't help the patient anymore, the patient is accused of being a malingerer or not having "CRPS anymore". Frequently in such patients the hand and forearm become warm and stay warm because of the virtual sympathectomy due to the needling of the stellate ganglion (*Figure. 1*) (4,12-14). Also, doing repetitive lumbar sympathetic nerve blocks can also cause a virtual sympathectomy (*Figure. 2*) (12). Infrared thermal imaging (ITI) is a very useful tool which helps identify the damage from the virtual sympathectomy which is caused by repetitive SGB (4,12-14).

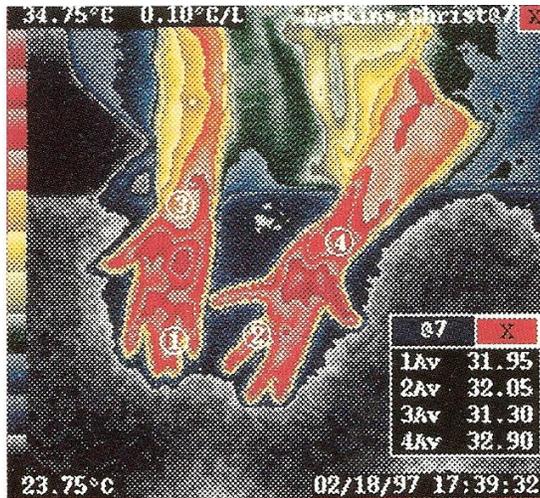


Figure 1. More than two dozen stellate ganglion blocks(SGB) to each side have damaged enough sympathetic nerve to cause permanent hyperthermia as the manifestation of virtual sympathectomy. Further blocks have no diagnostic or therapeutic value. With the use of infrared thermal imaging (ITI), it spared the patient from further sympathetic nerve blocks (4).

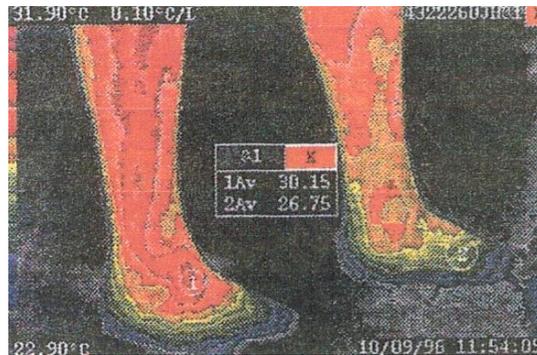


Figure 2. "Virtual sympathectomy" due to repetitive right lumbar sympathetic nerve blocks, resulting in permanent damage and heat leakage in lower extremity. The patient was spared from further nerve blocks on the right side (12).

However, amazingly some people continue with doing SGB even though the SGB has totally destroyed the sympathetic ganglion nerve cell and the patient has undergone a traumatic sympathectomy verified by warm and dry hand and forearm.

When the ganglion cannot be reached because of anatomical variations, then the repeated trauma while performing the block can cause damage to the nerve in the vocal cord causing difficulty with phonation (speaking). It also can cause rupture of blood vessels in the same area.

A SGB is mainly a traumatic diagnostic procedure, it cannot be considered therapeutic because it doesn't last more than a few hours to a few days. When performing an epidural block, you do not stick the needle into the nerve cells (as is the case with SGB). When an epidural block is performed, with local anesthetic and an anti-inflammatory medication such as Depo-Medrol ® in the back of the neck, it will last up to two to three months.

Treatment with nerve blocks should not be just simply limited to a few SGB or Bier block, but they should also include ENB and PNB. The ENB and PNB are quite effective as a maintenance form of a nerve block. These types of blocks not only block the somatic nerve, but also the sympathetic nerves as well.

In our comparative study of the diagnostic and analgesic values of nerve blocks. Four groups of 100 patients were studied for the efficacy of sympathetic, epidural, regional (Bier block), and plexus blocks. The regional temperature was measured with Bales Scientific Infrared Imaging Thermography (1).

Our results showed that sympathetic nerve blocks were effective in the first few months post-injury lasting an average of 11 days. The technical success of sympathetic blocks was rated at 72%. The success rate of warming up of the extremity and pain relief was reduced by an average of 11 ± 2 days in 41% of patients (1).

This is in contrast to the other types of blocks lasting more than nine weeks (Table II) (1).

- The epidural blocks containing Depo-Medrol® were successful in 89% of patients.
- The regional Bier blocks showed an average success rate of 32%.
- The brachial plexus blocks showed 63% success in regards to analgesia and hyperthermia.

The conclusion of the study showed that sympathetic nerve blocks are more diagnostic than therapeutic in nature. Epidural, regional, and plexus blocks containing corticosteroids provide more effective and longer lasting pain relief (1).

Table II. Comparison of Nerve Blocks

Type of Nerve Block	Duration of Pain Relief
Sympathetic Ganglion Block	11 ± 2 days
Epidural Steroid Block	9 ± 5 weeks
Regional Bier Block	2 ± 1 weeks
Brachial Plexus Block	8 ± 2 weeks

From: Nerve Blocks for Neuropathic Pain. Abstract Number:638-P272. International Association for the Study of Pain. IASP Press 10th World Congress on Pain. August 17-22, 2002, San Diego, California, USA (1)

PARAVERTEBRAL NERVE BLOCKS(PNB)

Paravertebral nerve blocks (PNB) are another helpful and safe form of nerve blocks in the treatment of CRPS. PNB are applied in the paravertebral muscles (muscles on each side of the midline of the vertebrae in the back or neck). The injection is done around the sensory nerves that are transmitting the pain to the spinal cord.

According to Cheema, PNB provides effective pain relief for both sympathetically maintained pain and sympathetically independent pain (14,15).

PNB which are far safer than facet joint blocks. In, facet joint blocks the needle is inserted to the joint and causes trauma to a perfectly normal joint causing a new source of scar formation and sensory nerve damage. The PNB are identical to facet joint blocks with two main differences:

- The needle stops short of invading the joint. The injection helps calm down the nerves in the area of nerve irritation without causing a new source of pain (joint injury).
- Usually chemicals such as hypertonic glucose and other chemical irritants (such as phenol) are injected at the articular facet area for prolotherapy; causing de novo permanent damage to the joint and the nerves in that area. This is in contrast to paravertebral nerve blocks which contain local anesthetic and Depo-Medrol® as an anti-inflammatory medication, not the strong chemicals mentioned above.

REFERRED PAIN

In patients with referred pain of CRPS, they should be treated with PNB, ENB or trigger point injection. In either case, the hand or foot, knee or ankle should not be treated with direct insertion of the needle for purposes of any nerve block or trigger point injection. The needle insertion only flares up the regional pain and aggravates the CRPS.

CONCLUSION

The use of sympathetic ganglion blocks (SGB) are not helpful in cases with late stage CRPS. This is because the patients pain is no longer sympathetically maintained pain(SMP), but rather the pain is now sympathetically independent pain(SIP). In the early stages of the disease, when the pain is SMP in nature, the use of SGB can temporarily help calm down the disease. This type of block is mainly used as a diagnostic tool rather than a therapeutic tool. In late stages of the disease, the use of SGB are more harmful by being traumatic to the sympathetic system (as emphasized by our research), as well as the research done by Doctors Kozin and Schott (4,5,6,12,13,14,16).

The effect of using the standard stellate lumbar and sympathetic blocks with local anesthetics lasts no longer than a few hours to a few days. As such, they are mainly diagnostic rather than therapeutic blocks. In addition, repetitive sympathetic blocks are traumatic and in the long-run cause so much damage to the sympathetic ganglion that the patient develops a "virtual sympathectomy"(4,12-14). As is the case with all sympathectomies, the virtual sympathectomy only aggravates the condition by damaging the temperature regulation of the body (4,12-14).

Treatment for late stages of CRPS should consist of using ENB, PNB, and trigger point injection as safer alternatives to using repetitive SGB in the management of CRPS.

If we move forward according to the current concepts of diagnosis and management of CRPS. The patients are doomed to be in severe chronic pain due to the lack of proper treatment.

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