

Supplemental Information for Treatment of Chronic Musculoskeletal Pain

This letter is written to aid understanding of the treatment and rehabilitation done at Avicenna Spine and Joint Care for chronic musculoskeletal pain.

Nature of Musculoskeletal Pain

Chronic pain arises due to dysfunctional response of the body's own central nervous system to musculoskeletal degeneration (weakness secondary to aging) or injury. Pain stimuli arise as a result of tissue damage and inflammation. The nerves carry these painful stimuli to the brain, which responds by releasing inhibitory substances to decrease the pain. Neurogenic inflammation (inflammation created by nerves) is continuing inflammation in the musculoskeletal system generated by nerve impulses and the release of inflammatory substances at the site of the original injury with more inflammation and pain resulting. Prolonged inflammation and pain lead to protective muscle spasm, consequent accumulation of fibrous tissue and muscle shortening. The fibrous tissue form palpable taut muscle bands and trigger points. Such muscle dysfunction and spasm lead to compression of blood vessels, and decreased blood flow, which also has been implicated in pain stimulation, and decreased joint mobility. Nerve root compression by shortened paravertebral muscles disrupts nerve blood supply, causes nerve dysfunction, and leads to neurogenic inflammation.

Target-Specific Nerve Treatment:

-- **Spinal pain treatment:**

Step 1: Diagnostic nerve blocks with local anesthetic under X-ray guidance. (Epidural injection, selective spinal nerve blocks, facet nerve blocks, sacroiliac joint blocks).

Step 2: If diagnostic blocks are helpful it confirms diagnosis and the next step is radiofrequency ablation of affected nerves.

During **radiofrequency ablation** a special type of needle is positioned near the nerve causing the pain. This has to be done very accurately using X-ray guidance to make sure that the effect is optimal.

-- **Peripheral Joints (hip, knee, shoulder, elbow)**

Nerves dysfunction maintains joint inflammation and pain. Diagnostic Nerve blocks done with an electrical nerve locator help to find dysfunctional nerves. If diagnostic blocks are helpful the next step is radiofrequency denervation of the affected structures.

Radiofrequency can be used for heat nerve lesioning or it can be used as a pulsed radiofrequency to cause a prolonged depression of the nerve function. Pulsed radiofrequency uses a current applied in short bursts. When this technique is used the tip of the needle does not heat up and there is no destruction of the nerve at all. The **nerve reacts** to the electricity **by changing its behavior**. This is sufficient **to relieve the inflammation** and pain for a long time. Before doing this treatment we must know which is the best nerve to treat. This is done by so-called diagnostic nerve blocks. A diagnostic block is a very precisely located injection done under X-ray control with local anesthetic. If the right nerve is blocked that causes the pain, the pain will go away for a period of up to a few days or even weeks.

Physical therapy contributes to pain relief and functional restoration of joints. Movement of muscles and improved joint function lead to release of endorphins in the brain, which decrease pain and neurogenic inflammation. Massage, electrical muscle stimulation, ultrasound, manual therapy, and therapeutic exercises contribute to muscle lengthening and strength, thus enhancing joint mobility and freer movements by the patient. These freer movements allow further endorphin release and even better pain control.

TREATMENT RESULT

Generally, during one treatment session, 10-15% of functional improvement and reduction of pain is expected. Medial branch blockade, trigger point injections, muscle needling, and acupuncture begin the process by elongating muscles and decreasing pain, and physical therapy restores musculoskeletal function and more autonomous pain control is achieved. Radiofrequency (RF) denervation procedures cause long lasting changes in nerve function. The effect of one RF procedure usually lasts 1-2 years.

Restoration of Spinal Function.

Myofascial dysfunction contributes to chronic pain. Myofascial pain originates from prolonged protective muscle spasm resulting in accumulation of fibrous tissue, muscle shortening, and formation of trigger points inside the muscles. To restore normal function, muscle shortening is treated with needling and infiltration (N&I) with local anesthetics to mechanically disrupt the fibrous tissue. Pre-injection medial branch blocks provide the patient comfort by anesthetizing posterior spinal structures before the paraspinal muscle N&I. Needling breaks up muscle fibrosis and allows lengthening. For myofascial pain syndrome resistant to treatment by conventional methods, Botulinum Toxin (Botox, Myobloc) is employed. It inactivates the neuromuscular junction which allows muscle relaxation up to several months. These procedures decrease myofascial pain, and allow the patient to participate in physical therapy.