Lymphedema Therapy for the Treatment of Complex Regional Pain Syndrome

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CRPS Pathophysiology

Immobilization of the affected limb, regardless of the severity of injury, has been recognized as a primary risk factor for CRPS. While bone fracture is a common preceding diagnosis, both animal and human studies have also shown that CRPS-like symptoms, including edema, can be elicited with immobilization alone. Muscle guarding and/or motor impairments may also contribute to sequelae, and is correlated with chronicity. As light touch and movement become excessively painful, the patient may start avoiding use of the affected limb, which could potentially lead to abnormal limb posture and excess muscle guarding. However, a subconscious neglect-like condition may also develop to the point where patients cease to notice or identify with their affected limb.

Leading experts theorize that CRPS may involve a series of feedback (effector) and feedforward (afferent) loops that are triggered between the peripheral and central nervous systems, leading to the sensitization of both systems. These loops are self-maintaining and can “spread” over time, increasingly involving more and more of the CNS. As functional mobility is compromised, existing neurogenic dysfunction may be further complicated by structural and physiological changes in the tissue of the affected limb due to immobilization. This creates another positive feedback cycle at the tissue level. Pain, edema and fibrosis interfere with afferent signaling from the affected limb, which in turn may cause further neurofunctional dysfunction and pain sensitization. Thus, if one element of this pain-deactivation-edema-pain cycle can be targeted early on, it may be possible to inhibit exacerbation of CRPS before pain becomes centrally mediated. Regardless of whether edema is caused by local inflammation or autonomic dysfunction, the movement of edematous fluid away from the affected limb allows for decreased pain and increased ROM, which improves potential for functional mobility. Due to its ability to prevent further immobilization, a key risk factor, lymphatic drainage techniques should be administered early on, it may be possible to inhibit exacerbation of CRPS before pain becomes centrally mediated. Regardless of whether edema is caused by local inflammation or autonomic dysfunction, the movement of edematous fluid away from the affected limb allows for decreased pain and increased ROM, which improves potential for functional mobility.

Lymphedema Therapy

Dynamic insufficiency occurs when lymph flow exceeds the transport capacity, while mechanical insufficiency is when the transport capacity is diminished secondary to a mechanical failure in the lymphatic ducts, vessels, or at the site of the nodes. The combination form exists when both dynamic and mechanical insufficiency are responsible for the buildup of lymphatic fluid. It is theorized that CRPS-related edema may be a result of combination form insufficiency.

The goal of lymphedema therapy is to assist the body’s response to impending lymphostasis thus decreasing opportunity for excessive edema accumulation, exacerbation of pain, and functional loss. Complete decongestive therapy (CDT) is a systematic treatment approach that includes diligent skin care, manual lymphatic drainage (MLD), compression therapy, and performance of decongestive exercises. These techniques aim to enhance the body’s safety valve function of intact lymph vessels, collateral circulation, development of lympho-lymphatic anastomoses as a means to restore lymph flow, formation of lymphovenous anastomoses, and bridge watershed with lymphatic channels. CDT – particularly MLD and compression therapy – may benefit the CRPS population in reducing edema and increasing functional mobility of the affected limb.

By targeting dynamic insufficiency, early application of lymphatic drainage techniques may prevent development of mechanical insufficiency, thus the progression of the lymphatic system deterioration theorized to be associated with a CRPS diagnosis.

References