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Dorsal Root Ganglion Stimulation as a Treatment for Chronic Refractory Groin Pain: A Case Series

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Background: Complex regional pain syndrome (CRPS) can be a debilitating source of pain and is characterized by a combination of sensory, motor, vasomotor, and autonomic abnormalities. Neuromodulation can serve as a therapeutic intervention for groin CRPS.

Case Report: Two patients with refractory CRPS in the groin and perineum underwent bilateral dorsal root ganglion (DRG) stimulation at L1 and S2. Both patients had reduction (> 70%) in their pain with lasting (> 6 months) relief.

Conclusions: CRPS can lead to changes in phenotype and function of the DRG. Stimulation of the DRG can block the passage of impulse trains where peripheral and central pathways of pain are modulated, resulting in improved symptoms and quality of life. Groin and perineal pain, refractory to conventional interventions, can be successfully treated with DRG stimulation.

Key words: Case report, complex regional pain syndrome, groin pain, dorsal root ganglion stimulation, neuromodulation

BACKGROUND

Complex regional pain syndrome (CRPS) is a chronic pain condition that typically affects one limb, often the arm or leg, following an injury or trauma. However, it can also occur without an identifiable trigger (1,2). The Budapest Criteria, established in 2003, is a set of diagnostic criteria used for the diagnosis of CRPS and consists of 4 main categories: clinical manifestations, signs, symptoms, and other contributing factors. Clinical manifestations include the presence of an initiating event or cause, continuing pain disproportionate to any inciting event, and at least one symptom in 3 of the following 4 categories: sensory, vasomotor, sudomotor/edema, or motor/trophic (3).

The dorsal root ganglion (DRG), located at each vertebral level in the neuroforamen, is a critical structure in sensory transduction and modulation, including pain transmission. It contains cell bodies of primary sensory neurons, which relay information from the peripheral nervous system to the central nervous system (4). The anatomy of the T-junction, where the peripheral axon, central axon, and DRG axon meet, allows for a unique target for modulating pain signals (4,5). After an injury, the DRG undergoes dramatic changes in phenotype and function and these plastic changes establish the DRG as the primary site of pain transmission to the cortex (6). The DRG has been recognized for its role in chronic pain intervention since 1949, when a report described a technique for anesthetic infiltration (7). Since then, it has been the subject of numerous other interventions for pain relief, including dorsal rhizotomy or ganglionectomy, dorsal root entry zone lesioning, conventional radiofrequency denervation, pulsed radiofrequency ablation, and steroid ablation (5,8-10). Prior studies (5,11,12) have established that stimulation of the DRG via neuromodulation is an effective treat-

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ment for chronic pain. This effect is presumed to be from blocking the passage of impulse signals through the T-junction (5).

Chronic groin pain with CRPS can be debilitating for patients. In patients with red scrotum syndrome, it presents with persistent erythema of the scrotum with associated paresthesia, hyperesthesia, trophic changes, and hair loss (13). The groin, pelvic, and perineal regions are commonly innervated by the iliohypogastric nerve, ilioinguinal nerves, genitofemoral nerve, and occasionally a contribution from the lateral femoral cutaneous nerve. These peripheral nerves arise from the thoracolumbar plexus and receive axons from levels T11-L3, with the majority contribution from T12-L2 (7,14).

Here we present 2 cases where patients were treated with DRG stimulation for CRPS. Informed consent was not obtained due to the retrospective nature of their chart review.

CASE PRESENTATION

Patient number 1 is a 21-year-old, previously healthy man who presented with persistent scrotal rash and associated pelvic and groin pain for 3 years. He was diagnosed with red scrotum syndrome, resulting in chronic pain, allodynia, and dysesthesia. These symptoms were refractory to multiple conventional treatments, including gabapentin, pregabalin, duloxetine, nonsteroidal anti-inflammatory drugs, doxycycline, topical medications, spermatic cord injections, and acupuncture. He underwent a bilateral pudendal nerve block with 50% reduction in pain for several days with return to baseline level of pain afterward. He then underwent bilateral ilioinguinal and iliohypogastric nerve block with minimal relief. As he had no significant reduction in symptoms, he underwent a DRG stimulation trial, and based on established best practices by anatomy, leads were placed at L1 and L2. He had > 70% reduction in pain and subsequently underwent implantation. At one-month and six-month follow-up visits, he reported > 80% reduction in pain.

Patient number 2 is a 38-year-old, previously healthy man who presented with a 20-year history of groin and perineal pain with associated allodynia, hyperesthesia, erythema, and hair loss. He had previously failed to achieve any significant pain relief with multiple trials of pudendal nerve blocks, pelvic nerve blocks, and L4/L5 lumbar epidural steroid injections. The only interventions that he had mild relief from were hot water, hydromorphone, and morphine, which associated with multiple trips to the emergency department for treatment. He underwent an L1 and L2 DRG stimulation trial and had > 70% reduction in pain, therefore underwent implantation. At the 6-month follow-up visit, he reported > 70% reduction in pain and reported no further visits to the emergency department.

CONCLUSIONS

CRPS can lead to dramatic changes in phenotype and function of the DRG. Stimulation of the DRG can block the passage of impulse trains where peripheral and central pathways of pain are modulated, resulting in improved symptoms and quality of life. Groin and perineal pain refractory to conventional interventions, such as medications and nerve blocks, can be successfully treated with DRG stimulation with optimally placed leads.

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