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Neuromodulation: The Future of Pain Medicine

Neuromodulation includes treatments that involve stimulation or administration of medications directly to the body's nervous system for therapeutic purposes. The target cells for stimulation include nerves in the central and peripheral nervous systems, the autonomic nervous system, and the deep cell nuclei of the brain, resulting in modulation of their activity. Neuromodulation includes several modalities, and is a cross-disciplinary approach to pain control and neurologic dysfunction. Neuromodulation can be used to treat movement disorders, spasticity, and epilepsy, as well as pain syndromes.

Devices are implanted which can either include drug delivery pumps or neural stimulators. The most common type is spinal cord stimulation, which is used for back or lower extremity pain.

This will be an in-depth review of current literature regarding Spinal Cord Stimulation and its efficacy in treatment of various intractable pain syndromes. The body of evidence has grown exponentially over the past decade to include Neuromodulation as a standard or care in interventional pain management. Kumar et al, 2008 published the landmark study which proved the efficacy and cost effectiveness of spinal cord stimulation in failed back surgery syndrome. In the past 10 yrs the scientific advancements in the technology especially specific waveforms e.g. "Burst Stimulation" and "HF10 HIGH FREQUENCY" have changed the landscape of neuromodulation. Recently conducted multicenter US SENZA clinical trial compared an implantable high-frequency SCS system that delivers 10,000 Hz of stimulation (Senza HF10, Nevro) with a system that is currently approved in the United States, delivering a stimulation of 50 to 100 Hz (Precision Plus, Boston Scientific).

The HF10 system is available in Australia and Europe and is under investigation for approval by the US Food and Drug Administration.

For the study, 198 patients at 10 centers in the United States with severe, chronic pain of the trunk and/or limbs who had not responded to therapy for 3 or more months were randomly assigned to implantation with the high-frequency (n = 101) or standard (n = 97) SCS. Patients had average back and leg pain intensity of 5 or higher out of 10 on the visual analogue scale (VAS). Ninety patients in the high-frequency SCS group and 81 in the standard SCS group were included in the final analysis. Measures of back pain, assessed according to VAS scores, were significantly reduced in both groups at 3, 6, 9, and 12 months, but scores of back pain with high-frequency SCS were consistently lower at all time points (2.5 vs 4.3 at month 12, respectively).

Biography

Dr. Kalia specializes in interventional pain management, cancer pain rehabilitation and interventional spine procedures.

He earned his Master's degree in Public Health from Western Kentucky University in Bowling Green and his medical degree from the Mahatma Gandhi Memorial Medical College in Indore, India. He interned in General Surgery at St. Joseph's Mercy Hospital in Pontiac, Michigan and did residencies at the University of Rochester in both Physical Medicine and Rehabilitation and Preventive Medicine and Public Health. He completed a Fellowship in Pain Medicine in the Department of Anesthesiology at the University of Rochester as well.

Dr. Kalia is certified by the American Board of Physical Medicine & Rehabilitation and the American Board of Pain Medicine. He belongs to the American Academy of Physical Medicine and Rehabilitation, American Academy of Physiatrists, American College of Preventive Medicine, American Pain Society, American Society of Interventional Pain Physicians, American Academy of Pain Medicine and American Society of Regional Anesthesia & Pain Medicine.

He won the Leadership Education in Neurodevelopmental Disorders (LEND) Fellowship Award from the Department of Pediatrics at the University of Rochester for the 2007 – 08 school year and was the chief resident in Physical Medicine and Rehabilitation for the 2011 – 12 school year. He also received the Young Investigator Travel Award from the University of Rochester in 2013.

Dr. Kalia's publications include topics such as cancer pain management and interventional spine care.

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