

High Frequency (10,000 Hz) stimulation for low back and lower extremity pain: Retrospective case series

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High frequency (HF) stimulation at 10,000 Hz was conceived as a treatment for low back and lower extremity pain and has been developed over the last decade receiving initial FDA approval in 2015. In contrast to traditional stimulation at low frequencies (2 to 1200 Hz) patients receiving HF stimulation do not experience paresthesia in the affected areas and instead have relief of pain without added sensations. This paresthesia free stimulation has been shown to be superior to traditional low frequency (LF) stimulation for the treatment of low back and leg pain. HF stimulation has been shown to be effective at rescuing patients who have failed traditional LF stimulation with traditional spinal stimulation devices. In 2022 HF stimulation received FDA approval for non-surgical refractory back pain and painful diabetic neuropathy as indications.

This retrospective case series reviews the application of HF10 (high frequency 10,000 Hz) stimulation by a single practitioner over a three-year period. Patients that had failed 6 months of conservative treatment, including medication management, physical therapy, epidural injections, with a pain score of 5 or above on the visual analogue scale. No contraindications, such as, ongoing infection, psychological co-morbidities, spinal instability or other surgically correctable conditions were identified prior to proceeding with spinal stimulation trials. All patients in the series were trialed prior to implant with a successful trial providing greater than 50% relief of pain on a visual analogue scale. Total number of patients trialed was 21 divided into back/leg pain 10 patients, non-surgical refractory low back pain 6 patients, and painful diabetic peripheral neuropathy 4 patients. Out of the trials there was a 90% success rate with 1 successful trial not proceeding to implant at the time of this writing. Preferred trial waveform amongst all successful patients (N 18) was 10,000 Hz continuous as this was the program delivering the most pain relief from trials of LF, burst, multiplexed, burst 10,000 Hz, combined LF / HF and pulse dosing.

Total implanted patients were 17 in this series. Out of these 17 patients the average post implant time for follow up was 12 months (ranging from 1 month to a maximum of 30.1 months). 3 patients were lost to follow up. Out of the remaining 14 patients, 12 had greater than 50% pain relief at a responder rate of 86%. 16 patients were using 10,000 Hz and one a combination LF/HF pairing. 55% of the patients had no change in medication usage with 45% reporting a reduction in medication usage including opioids. 50% of the patients reported improvement in sleep and 86% reported an improvement in function directly correlating with the improvement in pain relief.

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In summary the results of this single provider case series demonstrates that HF10 high frequency stimulation can be used long term in patients post implant with continued preference for HF stimulation and continued improvement in pain reports and physical function. Paresthesia free stimulation is well tolerated with a high concordance between the trial outcomes and permanent implant results. Further longitudinal data needs to be obtained to determine if there is tachyphylaxis to HF stimulation in this patient population.

Biography

Haider N is currently working as Division Chief [Interventional Pain](#) at the University of Vermont Medical Center. He received his medical degree in 1991 from the University of Peshawar, Khyber Medical College. He then worked at the Cleveland Clinic Foundation, the University of Iowa and University of Michigan serving as Assistant Professor. He was appointed Chief of Anesthesiology at Huron Medical Center. He has authored several publications in various journals and books. His publications reflect his research interests in Acute Pain and Regional Anesthesiology and Interventional Pain Management. He is serving as a member in the American Society of Anesthesiologists, Vermont Association of Anesthesiologists, American Society of Regional Anesthesiology, International Association for the Study of Pain, American Society of Interventional Pain Physicians and the Spine Intervention Society. He is honored by a gold medal from the University of Peshawar.

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