Dorsal root ganglion stimulation for chronic neuropathic pain

While being primarily used in the lumbar region, dorsal root ganglion stimulation also can be used in the upper thoracic and cervical region with slight alterations of the surgical approach. This offers new therapeutic options especially in the treatment of neuropathic pain states of the upper extremities.

Dorsal root ganglion stimulation (DRGS) has been used successfully against localized neuropathic pain. Nevertheless, the effects of DRGS on pain processing, particularly at the cortical level, remain largely unknown.

Successful treatment of pelvic girdle pain with dorsal root ganglion stimulation [1].

Dorsal root ganglion (DRG) stimulation has recently emerged as a treatment for persistent neuropathic pain, but the permanent implantation of stimulator leads and the pulse generator can be difficult and is sometimes associated with complications.

The influence of the stimulation frequency on the outcomes of dorsal root ganglion stimulation (DRG-S) to treat pain is not well understood. It is assumed that specific neural components dedicated to different tasks in the DRG can be preferably influenced at specific frequencies. The identification of frequencies designed for the type of pain and the ratio of neuropathic versus nociceptive pain might improve overall pain control and open new indications in DRG-S.

Method: We report on a randomized double-blind clinical trial with a crossover design. Patients with a permanent DRG-S system underwent phases of stimulation with 20 Hz, 40 Hz, 60 Hz, 80 Hz, and sham in a randomized order. Each phase lasted for 4 days and was followed by a 2-day washout period. Pain intensity and quality of life were assessed with visual analog scale (VAS), McGill Pain Questionnaire (MPQ), EQ-5D, and Beck Depression Inventory (BDI). Analgesics intake was assessed.

Results: Overall 19 patients were included in the study. CRPS was the most frequent pain etiology (7). Five patients had a PainDetect score of 12 or lower at baseline. The mean VAS before the system was implanted was 8.6 and 3.9 at the baseline. Pain intensity was reduced to 3.7 by the stimulation with 20 Hz but increased with higher frequencies reaching 5.8 at 80 Hz. A significant difference among the groups was shown over all variables examined (VAS, MPQ, EQ-5D, BDI). The best results were seen at 20 Hz for all variables, including the smallest increase in pain medication consumption.

Conclusions: The choice of the stimulation frequency shows a clear influence on pain reduction and quality of life. Lower stimulation frequencies seem to be most effective in neuropathic pain. Further studies are required to determine whether specific frequencies should be preferred based on the condition treated [2].

1)
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2)
Piedade GS, Gillner S, McPhillips PS, Vesper J, Slotty PJ. Frequency dependency of therapeutic efficacy in dorsal root ganglion stimulation for neuropathic pain. Acta Neurochir (Wien). 2022 Feb 26. doi: 10.1007/s00701-022-05161-6. Epub ahead of print. PMID: 35217898.