Occipital Nerve Stimulation for Headache and Craniofacial Pain: An Investigation of Device Settings for Optimal Pain Control

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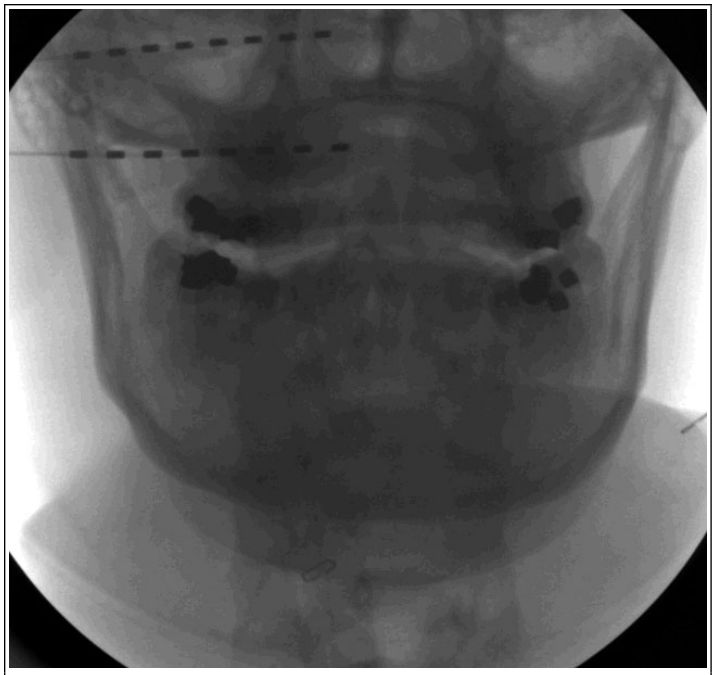
Introduction

Advances in neuromodulation have led to an increase in off-label use of occipital nerve stimulation (ONS) for treatment of headache and craniofacial pain. While various studies have demonstrated considerable long-term pain relief (1-5), there remains little understanding of how devices should be programmed to achieve rapid, optimal pain control.

Methods

A retrospective chart review of 7 patients who have undergone ONS for headache and craniofacial pain at our institution was conducted. At each follow-up appointment, ONS device settings were adjusted until patients reported optimal pain reduction. Lead configuration, pulse width, amplitude, and frequency were extracted from the patient's ONS device at each follow-up visit.



Left-sided occipital leads for treatment of hemicrania continua.

Results

We have currently obtained data from 14 follow-up visits for 7 patients. The following parameters were adjusted during reprogramming sessions: frequency, amplitude, and pulse width. Optimal pulse width ranged from 287-600 microseconds. Amplitude ranged from 0.5-6.5V and 7.8-10.5mA. Frequency ranged from 30-110Hz. We did not find any trends over time in the mentioned parameters. Regarding lead configuration, we observed that all contacts within the array are used simultaneously, but did not notice a consistent anode/cathode configuration.

ONS Device Settings At Which Patients Had Optimal Pain Control

Device Parameter	Range
Pulse Width	287-600μsec
Amplitude	0.5-6.5 V 7.8-10.5 mA
Frequency	30-110 Hz

Data obtained from 14 follow-up visits for 7 patients reflecting ranges at which patients felt optimal pain control.

Conclusions

While we recognize that changes in device frequency, amplitude, and pulse width are paramount in optimizing ONS devices, the reasons why certain settings optimize some patients and not others remain unknown. With such large ranges in device settings, there currently does not appear to be a certain frequency, pulse width, or amplitude at which all patients experience maximum pain control. As well, programming changes among patients are dissimilar in terms of magnitude and direction. We must continue to analyze settings that report optimal pain control in this population in order to better understand how these parameters affect outcomes. Further investigation will include long-term trending of device parameters in these patients and establishment of finite ranges for optimal pain control.

Learning Objectives

1) Identify trends in occipital nerve stimulation (ONS) device programming that lead to optimal headache and craniofacial pain control. 2) Understand how changes in lead configuration, pulse width, amplitude, and frequency affect patient pain control. 3) Evaluate how ONS device parameters can be modified to optimize pain relief.

References

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