FULL-LENGTH ARTICLE NPub.org/5qf2tf

Noninvasive vagus nerve stimulation as acute therapy for migraine

The randomized PRESTO study

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Study question

Is noninvasive vagus nerve stimulation (nVNS) effective for treating acute migraine?

Summary answer

nVNS provides pain freedom or pain relief within 2 hours after stimulation.

Classification of evidence

Class I.

What is known and what this paper adds

Pilot studies have suggested that nVNS is an effective, safe, and tolerable treatment for acute migraine. This study validates these findings through a randomized controlled trial.

Participants and setting

This study examined 248 participants with migraine with or without aura who experienced 3–8 attacks per month but <15 headache days per month over the previous 6 months. This study was conducted at 10 Italian sites between January 11, 2016, and March 31, 2017.

Design, size, and duration

This double-blind study used site-stratified statistician-generated schedules to randomize participants 1:1 to receiving nVNS or sham treatment. The nVNS device delivered low-voltage sinusoidal signals, while the sham treatment consisted of perceptible low-frequency biphasic signals that were not intended to stimulate the vagus nerve. Participants self-administered 120-second stimulations bilaterally to the neck within 20 minutes of migraine onset and repeated the procedure if pain had not improved after 15 minutes. Logistic regression and a post hoc repeated-measures analysis with generalized linear mixed-effects regression were used to compare the treatment groups for outcomes.

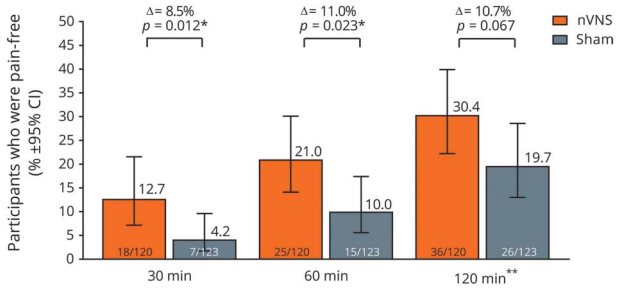
Primary outcomes measures

The primary outcome was pain-free status 120 minutes after stimulation.

Main results and the role of chance

Migraine attacks occurred in 120 nVNS-treated participants and 123 sham-treated participants. nVNS outperformed sham treatment in providing pain-free status at 30 and 60 minutes, but not at 120 minutes in the logistic regression analysis. A repeated-measures analysis confirmed that nVNS was superior to sham through 120 minutes (odds ratio, 2.3; 95% confidence interval, 1.2–4.4; $p = 0.012$).

Figure Pain freedom after first treated attack



Harms

No serious adverse events were reported, but 2 sham-treated participants withdrew due to adverse events.

Bias, confounding, and other reasons for caution

The perceptible sham signal might have elevated the placebo effect.

Generalizability to other populations

The large sample size favors the generalizability of this study's results.

Study funding/potential competing interests

This study was funded by electroCore. Some authors report receiving consulting/advisory fees, travel grants, and funding from healthcare companies, including electroCore; serving as clinical trial investigators for healthcare companies; and receiving funding from government agencies. Eric Liebler is an electroCore employee and owns electroCore stocks. Stefanie Dorlas is a MedLogix Communications employee. Go to Neurology.org/N for full disclosures.

Trial registration number

NCT02686034 on ClinicalTrials.gov.

A draft of the short-form article was written by M. Dalefield, a writer with Editage, a division of Cactus Communications. The authors of the full-length article and the journal editors edited and approved the final version.