

EFFECT OF VAGUS NERVE STIMULATION ON BLOOD PRESSURE AND HEART RATE IN CHILDREN WITH EPILEPSY

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Background

To study the effect of parasympathetic stimulation on blood pressure and heart rate in pediatric patients with pharmaco-resistant epilepsy, treated with vagus nerve stimulation.

Methods

Two female patients with pharmaco-resistant epilepsy, aged 18 and 8 years, were evaluated prospectively. 24-hour ambulatory blood pressure monitoring was done in both of them, prior to and post the surgical implantation of vagus nerve stimulation device. Altogether 205 blood pressure measurements were done. Both patients were without seizures and used the same drugs at the time of study, thus eliminating their potential influence on blood pressure and heart rate. We compared mean blood pressure and heart rate in both patients, prior to and post vagus nerve stimulation device implantation (expressed as mean \pm standard deviation) and tested the statistical significance of difference with a student's t-test.

Results

Mean blood pressure in older patient was 106.1/66.8 mmHg (\pm 14.8/14.7 mmHg) prior to and 105.0/64.5 mmHg (\pm 10.5/10.6 mmHg) post vagus nerve stimulation device implantation (Fig. 1). Mean blood pressure in younger patient was 97.1/58.1 mmHg (\pm 9.8/9.9 mmHg) prior to and 101.0/60.8 mmHg (\pm 8.5/10.3 mmHg) post vagus nerve stimulation device implantation (Fig. 2). The difference in mean blood pressures was statistically non-significant in both patients.

Mean heart rate in older patient was 77 beats per minute (bpm) (\pm 13.8 bpm) prior to and 71 bpm (\pm 11.5 bpm) post vagus nerve stimulation device implantation, a statistically significant difference ($p=0.009$). Mean heart rate in younger patient was 84 bpm (\pm 16.4 bpm) prior to and 83 bpm (\pm 17.1 bpm) post vagus nerve stimulation device implantation, a statistically non-significant difference (Fig. 3).

Fig. 4 shows vagus nerve stimulation device in an epilepsy patient.

Conclusions

The vagus nerve stimulation did not result in a significant change of blood pressure in both patients. However, it caused a significant reduction of heart rate in one of them. The limitation is a small number of patients and the presence of normal blood pressure and heart rate at baseline. Their reduction could perhaps be significant in patients with elevated blood pressure and heart rate. But this is not approved method for treatment of hypertension, therefore such a study would be ethically disputed at this moment.

Fig. 1 Mean blood pressure (BP) prior to and post implantation of vagus nerve stimulation (VNS) device in older patient

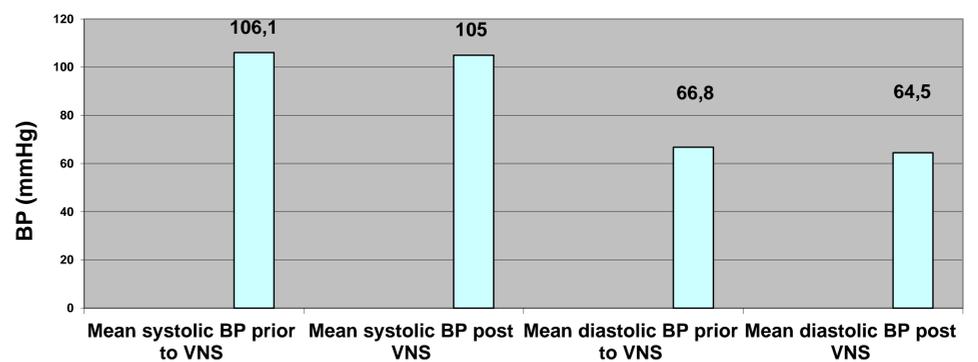


Fig. 2 Mean blood pressure (BP) prior to and post implantation of vagus nerve stimulation (VNS) device in younger patient

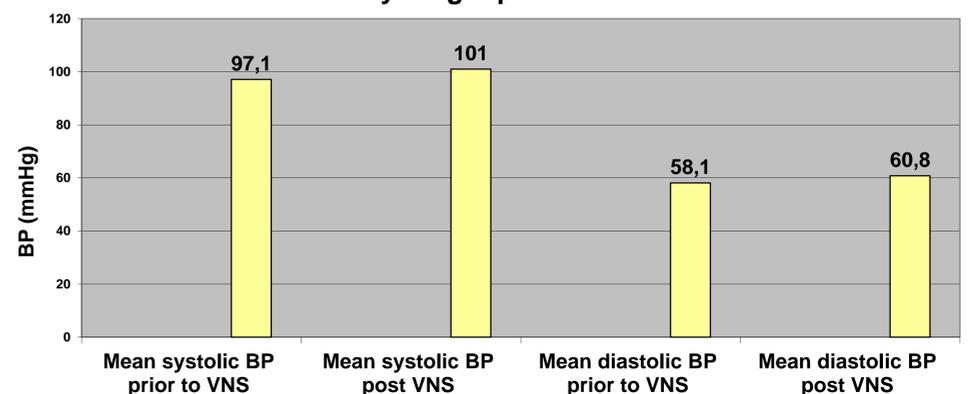


Fig. 3 Mean heart rate (HR, beats per minute - bpm) prior to and post vagus nerve stimulation (VNS) device implantation in both patients

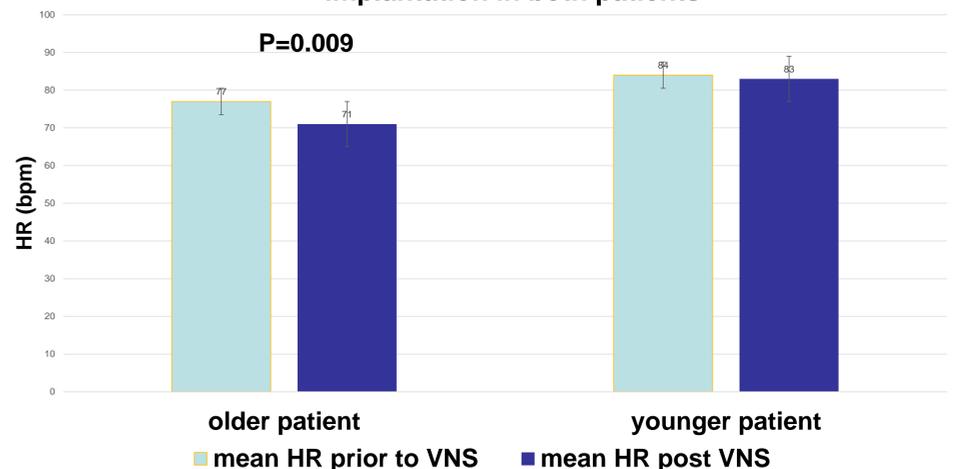


Fig. 4 Vagus nerve stimulation (VNS) device in an epilepsy patient



Conflict of interest: none