

EFFECT OF SACRAL NEUROMODULATION ON PELVIC HEMODYNAMICS

Hypothesis / aims of study

Sacral neuromodulation has been used as a therapy in the management of lower urinary tract symptoms (LUTS). However, the mechanisms of action remain unclear. Decreased blood flow following arteriosclerosis has been suggested as one cause of lower urinary tract dysfunction. The aim of this study was to elucidate the mechanisms of sacral neuromodulation by focusing on pelvic blood flow.

Study design, materials and methods

Male Sprague-Dawley rats ($n = 7$) were subjected to electrical pelvic nerve stimulation. Electrical stimulation (1 mA and 20 Hz for 1 minute) of the pelvic nerve was applied with a bipolar hook electrode, and pelvic blood flow, including in the bladder, prostate and penis, were measured using a laser speckle blood flow imager. To confirm pelvic nerve stimulation, intracavernous pressure (ICP) and mean arterial pressure (MAP) were also evaluated by cannulation into the left penile crus and the left carotid artery.

Results

Mean blood flow in the bladder increased from 22.06 before stimulation to 27.88 during stimulation ($p = 0.019$). Blood flow in the prostate and penis also increased during nerve stimulation. In particular, mean blood flow in the penis increased dramatically from 15.14 to 25.86 with increased ICP ($p < 0.001$).

Interpretation of results

Pelvic nerves branch out from the sacral nerves. Sacral neuromodulation was thus considered to increase blood flow to pelvic organs such as the bladder and prostate via stimulation of the pelvic nerves, contributing to improvement of LUTS.

Concluding message

Pelvic nerve stimulation increased pelvic blood flow, suggesting that sacral neuromodulation improves pelvic hemodynamics. Neuromodulation using therapeutic electrical stimulation of the sacral surface may thus represent a useful therapeutic approach to improving LUTS.

Disclosures

Funding: none **Clinical Trial:** No **Subjects:** ANIMAL **Species:** Rat **Ethics Committee:** tohoku university