

NEUROPHYSIOLOGICAL MODIFICATION OF PELVIC FLOOR PARAMETERS DURING SACRAL NERVE NEUROMODULATION

Hypothesis / aims of study

Sacral neuromodulation (SNM) works on the neural reflexes that influence the bladder, rectum and pelvic floor. Since the initial experience in 1980 SNM has been widely used both for bladder and rectal dysfunctions but the exact mechanism of action is still unknown. The aim of this study was to investigate the functional modifications of peripheral perineal innervation using SNM.

Study design, materials and methods

The study involved 27 patients (3 males, 24 females) affected by urinary incontinence (44%), urinary retention (30%), obstructed defecation (18%), fecal incontinence (4%), and chronic pelvic pain (4%). The average treatment time – using Interstim implantable pulse generator (IPG) - was 56 months (range 19 - 88) and all patients experienced full remission of symptoms with the electrical parameters individually programmed. The following tests were performed: 1) Electromyography (EMG) of the external anal sphincter (EAS); 2) EMG of the urethral sphincter (US) at resting, in voluntary contraction and in reflex contraction; 3) Somatosensory evoked potentials (SEPs); 4) Pudendal nerve terminal motor latency (PNTML). The tests were performed with IPG on and off and data were statistically analyzed by Student's t -test.

Results

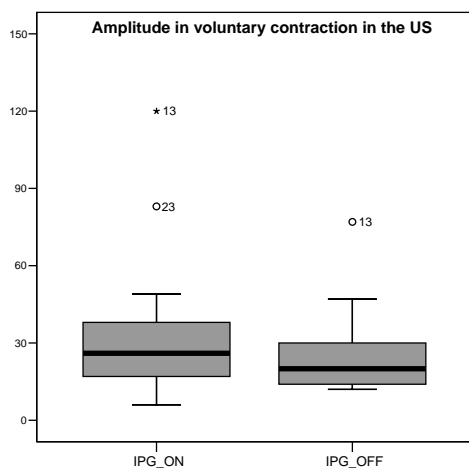
We observed the following significant changes: EMG 1) A rise in amplitude of motor unit potentials (MUPs) during maximal contraction in the US with IPG on - average 31.5 +/- 24.4 uV compared to IPG off average 25.5 +/- 25.8 uV - (p=0.058). 2) Duration of MUPs at resting was decreased with IPG switched on and this decrease was greater for US - average 4.2 +/- 0.9 msec compared to IPG off average 4.6 +/- 1.1 msec (p=0.010) - as well as for EAS - average 3.4 +/- 0.9 ms compared to IPG off average 4.2 +/- 1.2 ms (p=0.049). (Picture 1, 2, 3) PNTML After the IPG was turned on, examination of PNTML revealed a decrease in latencies on both sides. The data collected were: average 1.8 +/- 0.36 msec compared to IPG off average 1.9 +/- 0.37 msec (p=0.036) on stimulated side and average 1.85 +/- 0.6 msec compared to IPG off average 2.1 +/- 0.9 msec (p=0.024) on the unstimulated side. (Picture 4). The remaining examinations and parameters were unchanged.

Interpretation of results

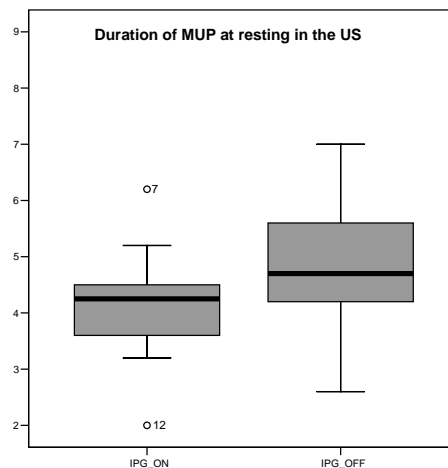
Some papers (1, 2, 3) suggested the use of electrodiagnostic techniques in order to better or to reprogram SNM but nobody has reported before studies about the effects of SNM on perineal responses. We have observed that SNM produces significant changes in EMG and in PNTML. About EMG, SNM has increased amplitude of activation pattern in US and has decreased the MUPs duration at resting in both sphincters. These results suggest a greater recruitment of pelvic muscular fibers and a better synchronization of fibers firing, moreover lasting in time. The decrease of latencies in PNTML, observed on both sides, probably means that SNM rises motor conduction velocity of pudendal nerves and ameliorates integration between peripheral innervation and spinal cord.

Concluding message

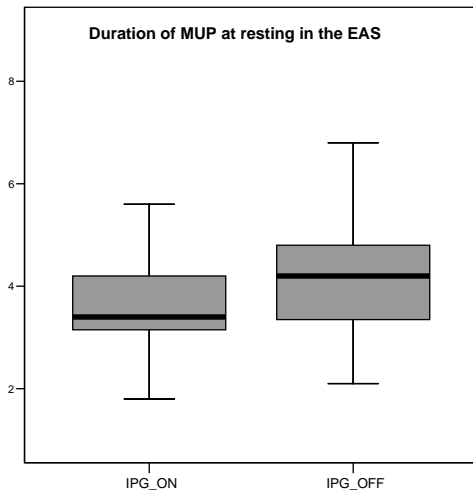
SNM produces significant modifications in function of peripheral perineal innervation. We observed an increase of amplitude of voluntary contraction in SU-EMG, a decrease of duration of MUP at resting in sphincters and a decrease of latencies of PNTML on both sides.



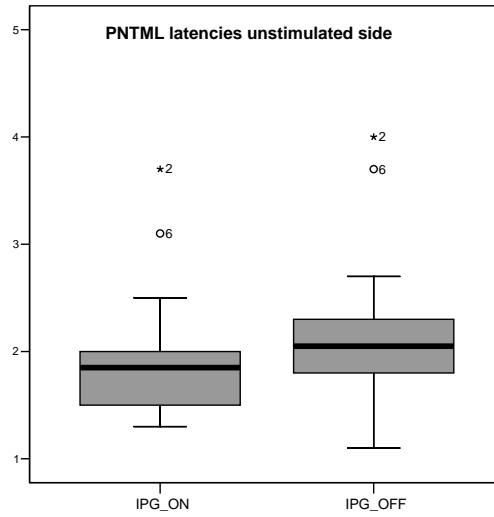
1)



2)



3)



4)

References

1. J.T. Benson Sacral nerve stimulation results may be improved by electrodiagnostic techniques
2. M.T. McLennan The role of electrodiagnostic techniques in the reprogramming of patients with a delayed suboptimal response to sacral nerve stimulation
3. S. Malaguti, M. Spinelli, G. Giardiello, M. Lazzeri, U. Van Den Hombergh Neurophysiological evidence may predict the outcome of sacral neuromodulation

Specify source of funding or grant	Nothing
Is this a clinical trial?	No
What were the subjects in the study?	HUMAN
Was this study approved by an ethics committee?	No
This study did not require eithics committee approval because	Patients underwent follow-up during the therapy
Was the Declaration of Helsinki followed?	Yes
Was informed consent obtained from the patients?	Yes