

NEUROPHYSIOLOGICAL EVALUATION RELATED TO STIMULS FREQUENCY IN S3 ELECTRICAL MODULATION FOR VOIDING DISORDER.

Aims of Study

Aim of the study is the use of short-latency somatosensory evoked potentials (SEPs) in patients implanted for voiding difficulties to find out relationship between stimulus frequency and shortness cortical positive latency (pudendal SEPs)

Sacral neuromodulation is an exciting and effective therapy, despite of the large number of literature about results in implanted patients poor are related to stimulus parameter and neurophysiological monitoring.

SEPs are reliable diagnostic tests that provide an objective measure of function in the somatic sensory system. The stimulus intensity used for SEPs excites only the largest myelinated fibers in the peripheral nerve (cutaneous and subcutaneous somaesthetic and proprioceptive fibers, and alpha motor axons).

The stimulus travels from the peripheral nerve, through the posterior columns of the spinal cord, the medial lemniscus, the thalamus to the frontoparietal sensorimotor cortex.

Methods

Four patients (3 female, 1 male, mean age 41, range 21-71) were submitted to S3 monolateral left sacral percutaneous staged implant (SPI), 3 with tined lead and 1 with fascial fixation. Three female had complete urinary retention (with normal MMPI-2 evaluation), one male had a hypocontractility due to incomplete peripheral lesion after colectomy. All patients underwent pudendal and tibial nerve somatosensor evoked potential at baseline and during chronic stimulation at 21 and 40 Hz.

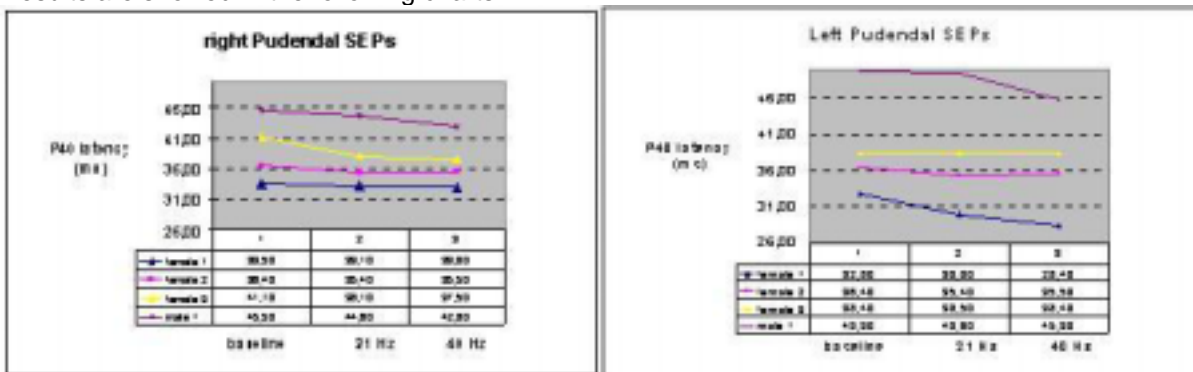
Electrodiagnostic tests included bilateral SEPs of pudendal and tibial nerve. The two dorsal nerve of clitoris (or penis) were electrically stimulated via surface electrodes laterally to the clitoris or on the penile shaft, the cathode being placed proximal.

The stimuli consisted of rectangular pulses 0.2 msec in duration, 3Hz of frequency, 3 times above the subjective threshold, while recording needle electrodes were placed subcutaneously on the scalp, the active electrode being 2 cm behind Cz, the reference electrode at Fpz.

The amplifier band-pass was 1 Hz-3 KHz; 300 responses were averaged twice to extract the evoked potentials from the cortical background noise. and the latency of the first positive deflection was analyzed.

Results

Results are showed in the following charts



Conclusions

Our preliminary results seems to suggest that sacral neuromodulation (SNM) acts on somatosensory afferent fibers, perhaps using faster fiber usually not recruited. It's interesting to observe that the reduction of latency is higher in the controlateral side of stimulation. The reduction of latency acts a positive modulation and in this first group a shorter latency is related with an improvement in clinical symptoms. Our study consider only the effect of variation in stimulus frequency, several parameter

such as pulse width, pulse shape, polarity, intensity should provide further modification. Further and more extensive studies are necessary to better understand mechanism of action of SNM and lead to a less empiric way to setting stimulation parameters.