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PHOTO-STIMULATION USING LOW REACTIVE LEVEL LASER CAN IMPROVE ABNORMAL MICTURITION REFLEX IN SPINAL CORD INJURY MODEL.

Hypothesis / aims of study

Micturition reflex, in particular storage reflex, is constructed by spinal reflex via peripheral A δ -fibre afferent nerves, and which is controlled by central descending inhibitory system. On the other hand, abnormal micturition reflex is constructed by spinal reflex via peripheral A δ - and C- fibre afferent nerves, and which is caused by dis-inhibition of central system. This abnormal micturition reflex is well shown in the status of spinal cord injury (SCI). Photo-stimulation using low reactive level laser is reported to have some neurobiological effects, and which is clinically used to relieve pain in pain clinic. As these effects, inhibition of A δ - and C-fibre nerve conductions in peripheral afferent nerve tract, activation of central descending inhibitory system via peripheral nerve stimulation, and suppression of local synaptic neurotransmission were reported. Then, the photo-stimulation will be applicable to modulate neural control of lower urinary tract and normalize abnormal micturition reflex. Therefore, we investigate the photo-stimulating effect of low reactive level laser on neurogenic lower urinary tract dysfunction (LUTD) in SCI.

Study design, materials and methods

Experiments were performed on adult male Sprague-Dawley rats in standardized environmental conditions. Several weeks before studies, total spinalization was performed at T8 level (SCI model) and intermittent voiding by Crede maneuver was continued until the establishment of independent voiding. Under urethane anaesthesia, a polyethylene catheter (PE-50) was inserted into the bladder from the bladder dome with midline abdominal incision. After the operation, animal was placed on mesh table. Thereafter, cystometric investigation was performed under remaining anaesthesia. Interval time between voids, urine volume per void, and maximum bladder pressure during voiding were investigated under continuous saline infusion. After achievement of reproducible micturition cycle and 30-60 minutes' baseline recording, photo-stimulation using low reactive level laser (180W ; 10, 30, 60, 180 seconds) or sham stimulation was irradiated to bilateral L6/S1 intervertebral foramen transcutaneously via the probe contacted to body. Recording after the stimulation was continued for several hours until micturition cycle returned to baseline. The data obtained in each condition were compared with each other.

Results

In SCI mode, Interval time between voids and urine volume per void decreased generally. Compared with the baseline record, in sham-stimulated groups, interval time between voids and urine volume per void were not unchanged. In photo-stimulated groups, interval time between voids and urine volume per void was significantly increased. These changes were stimulation-time dependent. And in any groups, maximum bladder pressure in voiding phase was unchanged.

Interpretation of results

Photo-stimulation using low reactive level laser to bilateral L6/S1 intervertebral foramen inhibited abnormal micturition reflex during filling without decrease in bladder contraction during voiding in neurogenic LUTD of SCI model.

Concluding message

Photo-stimulation using low reactive level laser to bilateral L6/S1 root can improve storage disorder by abnormal micturition reflex without exacerbation of voiding disorder in LUTD of SCI model.

Disclosures

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