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EFFECT ON BLADDER FUNCTION OF INTRATHECAL ADMINISTRATION OF BACLOFEN FOR SPASTICITY

Hypothesis / aims of study

Traumatic brain injury (TBI) is very often associated with spasticity, as a result of upper motor neuron abnormality [1]. Medical interventions may include medications as baclofen, a potent GABA-receptor agonist of poor lipid solubility. Therefore, high doses are administered orally in order to pass the blood brain barrier and achieve a satisfying level into the cerebrospinal fluid, to prevent the response of the motor neurons. Adverse effects are thus provoked such as sedation or somnolence, excessive weakness, vertigo and psychological disturbances make the treatment intolerable. Intrathecal administration of baclofen, is a contemporary treatment option which minimizes adverse effects as the doses of the drug needed are 500-1000 times less than those taken orally. Nowadays the drug is delivered directly into the cerebrospinal fluid space via an epidural catheter connected to an automatic pump implanted sub cutaneously in the abdominal wall. Regarding low urinary track dysfunction, TBI, as a suprapontine lesion, results in overactive bladder syndrome due to neurogenic detrusor overactivity [2]. Urgency and urge incontinence are the predominant signs and symptoms of this condition. The aim of the study was to report and verify objectively the effect of intrathecal baclofen administration on bladder function in patients with TBI who treated with baclofen pump for their severe spasticity.

Study design, materials and methods

We report two cases of traumatic brain injury whose spasticity responded well to intrathecal baclofen administration. We evaluated retrospectively our medical reports referring to bladder function, before and six months after baclofen pump implantation. The baclofen dosage was tolerated according to the needs for spasticity control. We compared three-day bladder diaries, urodynamic parameters (bladder capacity, reflex volume, post voiding residual, maximum detrusor pressure, leak point pressure) and the doses of anticholinergics which were needed.

Results

Considering their bladder function these patients were better regarding incontinence episodes, symptoms of urgency and the doses of anticholinergics which were needed. Urodynamic parameters were also improved; there was higher reflex volume, augmented bladder capacity, lower maximum detrusor pressure and lower leak point pressure.

Interpretation of results

The pathophysiology of overactive bladder syndrome is multifactorial depending on both the central and the peripheral nervous system. Normal micturition in humans and animals depends on afferent signals from the lower urinary tract under the control of circuits in the brain and the spinal cord. Consequently, the activity of the striated muscle of the urethral sphincter and the pelvic floor is coordinated to that of the smooth detrusor and urethra muscles. Neurons in the pons are believed to act as switches that turn the function from voiding to storage and vice versa. Thus, injuries or diseases of CNS may destroy these mechanisms and lead to reflex micturition, which is present in the early infantile period.

Several neurotransmitter systems are involved in the micturition control and constitute targets of therapies for problematic voiding. Glutamate is probably an excitatory transmitter supraspinally involved in different CNS functions, whose receptor antagonist leads to good results (deterioration of overactive bladder symptoms) when used in experimentally cerebral infarcted rats [3]. GABA is a substance that modulates glutamate's action and detected in both spinal and supraspinal synapses in the CNS of mammals. Furthermore, GABA transporters have been detected in the brain, the brainstem and the spinal cord. Experiments on conscious and anaesthetized rats have demonstrated inhibition of the micturition reflex by exogenous administration of $GABA_B$ receptor agonist baclofen. Baclofen acts as a GABA receptor agonist and binds to presynaptic and postsynaptic $GABA_B$ receptors of the motor neurons in the dorsal hors of the spinal cord, eliminating the initial signal for muscle contraction.

Concluding message

Spasticity treatment is extremely important for these patients as it is a factor of poor life quality: it provokes pain, discomfort, difficult care delivery, muscle complications. Although baclofen pump is implanted to treat spasticity, it is possible that bladder function is also affected. Issues that arise concern the mechanism via baclofen that affects the voiding function: is it baclofen that affects the detrusor muscle itself, or is it the urethral sphincter's weakness that leads to lower leak point pressure and therefore lower maximum detrusor pressure? However, the number of patients is not significant and further research needs to be conducted. Therefore, patients' urologic profile should also be re-examined after the baclofen intrathecal administration.

References

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