

INTRASPINAL NERVE RE-ROUTING TO REESTABLISH BLADDER FUNCTION IN SPINAL CORD INJURED PATIENTS

Hypothesis / aims of study

Currently, the approach to treat neurogenic bladder dysfunction after spinal cord injury (SCI) is the implantation of a nerve stimulator. The procedure includes the essential bilateral deafferentation of the sacral roots S2-4. A surgical approach is presented to treat neurogenic bladder dysfunction after SCI creating a skin - spinal cord - bladder reflex pathway for micturation. An anastomosis between the ventral efferent (motor) roots of L5 and S3 seems to restore volitional voiding and physiological storage.

Study design, materials and methods

Based on a recent publication (J Urol 170: 1237-41, 2003), four patients underwent a nerve root realignment. The modified surgical technique incorporated a transurethral microtip catheter connected to a urodynamic unit and a neurophysiological testing unit for electrophysiological monitoring of the respective musculature during the intradural nerve root stimulation. The roots of L4 - S3 are exposed through a small lumbal midline incision, a hemi-laminectomy of L5 and the opening of the dura. The identified ventral roots (VR) are separated from their dorsal roots (DR) by micro-dissection and tested by electrostimulation. Intradural electrostimulation of the S2-3 VRs causes bladder and sphincter pressure to increase and the stimulation of the L4 - S1 VRs provokes contraction of the ipsilateral muscles. Once the ventral roots with the best electrophysiological answers are identified, they are transected. Using 10/0 polyglycolic acid suture technique, the proximal stump of the somatic reflex arc (L4/5/S1) is microsurgically anastomosed end-to-end to the distal stump of the autonomic reflex arc (S2/3). A watertight dura closure and a 3 layer wound closure concludes the surgery.

Results

Physiological urine storage and spontaneous volitional voiding occurred under video urodynamic investigation 12 months after surgery. A computerized animation summarizes the effect of the surgical attempt. A relatively simple microsurgical intervention with minimal risks in spinal cord injured patients may tremendously improve their quality of life.

Interpretation of results & Concluding message

Further improvements in the surgical technique such as increasing root fiber selectivity with subsequent treatment of other lower urinary tract and bowel malfunctions are examples of how this principle of microsurgical nerve root realignment might be used in the future.

<i>Specify source of funding or grant</i>	no funding or grant
<i>Is this a clinical trial?</i>	Yes
<i>Is this study registered in a public clinical trials registry?</i>	No
<i>What were the subjects in the study?</i>	HUMAN
<i>Was this study approved by an ethics committee?</i>	No
<i>This study did not require ethics committee approval because</i>	well known surgical technique first described by Xiao et al.. The surgical manouver is the same like in neuroreconstructive surgery.
<i>Was the Declaration of Helsinki followed?</i>	Yes
<i>Was informed consent obtained from the patients?</i>	Yes