Reconstruction of bladder function and prevent renal deteriorate through end-to-side neurorrhaphy in rats with neurogenic bladder

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Introduction
Neurogenic bladder (NB) is common and incurable nowadays, which remains an important cause of renal injury and, eventually, end-stage renal disease. Neurorrhaphy provided a new way for reconstruction of bladder function in patients with NB, but is still controversial. Whether the neurorrhaphy is effective requires further study.

Objective
To investigate the feasibility of restoring bladder function and preventing renal deterioration by L⁶ ventral root (L⁶VR) and L⁴ ventral root (L⁴VR) end-to-side neurorrhaphy in rats with NB.

Methods
Forty-two rats were assigned to the end-to-side coaptation (ECG, n=16), no coaptation (NCG, n=16), or control groups (CG, n=10). The ventral and dorsal roots (VR, DR) of left L⁶ and S¹ were transected in ECG, and the distal stump of L⁶VR was sutured to the lateral face of the L⁴VR. In NCG, the ventral and dorsal roots of left L⁶ and S¹ were transected, but the distal stump of L⁶VR was not coapted; in CG, no operative procedure was performed. Nerve regeneration, bladder function, and renal function were evaluated with fluorogold (FG) retrograde tract-tracing, cystometry, electrical stimulation, histology and serum biochemistry measurements. The data were analyzed using one-way analysis of variance.

Results
In ECG, the FG-labeled neurons were observed in the left ventral horn of the L⁴ spinal cord. Maximum cystometric capacity, post-void residual urine, and bladder compliance in ECG were less than in NCG rats, but significantly greater than in CG. There was no significant difference in maximum detrusor voiding pressure between ECG and CG, but both were greater than NCG. ECG rats showed a significant increase in intravesical pressure when the left L⁴ VR proximal to the coaptation was stimulated. The bladder weight of ECG rats was significantly lighter than in NCG rats. Serum creatinine, blood urea nitrogen, and the fibrotic area of bladder and kidney were decreased in ECG compared with NCG.

Conclusion
End-to-side neurorrhaphy is a useful method to restore bladder function and protect renal function in NB.