

Lam Van Ba O¹, Aharony S¹, Carmel R², Biardeau X², Loutochin O¹, Barbe M³, Jacques L⁴, Tuite G⁵, Ruggieri M⁶, Corcos J²

1. McGill university, Montreal , Canada, **2.** McGill university, Montreal, Canada, **3.** Department of Anatomy and Cell Biology, Temple University, Philadelphia, PA, USA, **4.** Department of Neurosurgery, Lady Davis Research Institute and McGill University, Montreal, Quebec, Canada, **5.** Neuroscience Institute, All Children's Hospital/Johns Hopkins Medicine, Saint Petersburg, FL, USA, **6.** Shriners Hospital, Philadelphia, PA, USA,

LUMBAR TO SACRAL NERVE REROUTING TO RESTORE VOIDING FUNCTION IN A FELINE SPINAL CORD INJURY MODEL: RESULTS FROM A PILOT STUDY

Hypothesis / aims of study

Complete spinal cord injuries (SCIs) can induce severe and chronic disabilities, including complex voiding dysfunction (1). Therapeutic options are limited in such cases (2). Lumbar to sacral rerouting surgery has the potential to allow voiding via a new skin-central nervous system-bladder reflex pathway (3). However, published studies have reported contradictory results due to heterogeneity of the populations investigated (complete and/or incomplete SCIs) or the use of non-pathophysiological models (i.e., spinal cord transection (SCT) after rerouting).

Study design, materials and methods

We assessed the potential of lumbar to sacral rerouting surgery to induce voiding after cutaneous stimulation in 8 spinalized cats. These animals underwent SCT at T9-T10. Unilateral L7-S1 ventral root anastomosis was performed 1 month later in 6 cats. The 2 others served as controls. Bilateral evaluation was conducted at 3, 5, 7 and 9 months by electrical and manual cutaneous stimulation and urodynamics coupled with electromyography.

Results

At 9 months, 33.3% (N=2) of rerouted cats presented a voiding stream triggered by ipsilateral cutaneous stimulation. 66.7% of the cats (N=4) also exhibited increased detrusor pressure evoked by stimulation. Neither voiding stream nor significant urodynamic responses were observed in the control group or in rerouted cats, after stimulation of the contralateral leg. All cats were alive at the end of follow-up

Interpretation of results

Our study demonstrates that L7 to S1 rerouting surgery below T10 SCT in an experimental feline model induces voiding in some cats and confirms that the majority of animals present increased detrusor pressure after ipsilateral dermatome stimulation

Concluding message

Lumbar to sacral surgery below the SCT level is possible and can lead to voiding after cutaneous stimulation. . These encouraging results justify a larger investigation with more animals, a control group with rhizotomy and longer follow-up (2 years). Only similar or better results, in a larger animal cohort, will support progression to a clinical study.

References

1. Xiao CG, Du MX, Dai C et al. An artificial somatic-central nervous system-autonomic reflex pathway for controllable micturition after spinal cord injury: preliminary results in 15 patients. J Urol 170:1237, 2003
2. Pannek J, Blok, B, Castro-Diaz D, et al. Guidelines on Neuro-Urology. EAU Guidelines. 2014.
3. Xiao CG, de Groat WC, Godec CJ, et al. "Skin-CNS-bladder" reflex pathway for micturition after spinal cord injury and its underlying mechanisms. J Urol 162:936, 1999

Disclosures

Funding: O. Lam Van Ba was supported by a grant from the French Association of Urology and Groupe Pasteur mutualité.

Clinical Trial: No **Subjects:** ANIMAL **Species:** Cat **Ethics Committee:** local animal research ethics committee of McGill University, Montreal, Canada