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

Disclosures
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