

Bladder sensation

Previous patient surveys have shown that patients with spinal cord or cauda equina injuries prioritize recovery of bladder function. The authors sought to determine if nerve transfer after long-term decentralization restores bladder and sphincter function in canines.

METHODS: Twenty-four female canines were included in this study. Transection of sacral roots and hypogastric nerves (S Dec) was performed in 6 animals, and 7 animals underwent this procedure with additional transection of the L7 dorsal roots (L7d+S Dec). Twelve months later, 3 L7d+S Dec animals underwent obturator-to-pelvic nerve and sciatic-to-pudendal nerve transfers (L7d+S Dec+Reinn). Eleven animals served as controls. Squat-and-void behaviors were tracked before and after decentralization, after reinnervation, and following awake bladder-filling procedures. Bladders were cystoscopically injected with Fluoro-Gold 3 weeks before euthanasia. Immediately before euthanasia, transferred nerves were stimulated to evaluate motor function. Dorsal root ganglia were assessed for retrogradely labeled neurons.

RESULTS: Transection of only sacral roots failed to reduce squat-and-void postures; L7 dorsal root transection was necessary for significant reduction. Three L7d+S Dec animals showing loss of squat-and-void postures post-decentralization were chosen for reinnervation and recovered these postures 4-6 months after reinnervation. Each showed obturator nerve stimulation-induced bladder contractions and sciatic nerve stimulation-induced anal sphincter contractions immediately prior to euthanasia. One showed sciatic nerve stimulation-induced external urethral sphincter contractions and voluntarily voided twice following nonanesthetized bladder filling. Reinnervation was confirmed by increased labeled cells in L2 and the L4-6 dorsal root ganglia (source of obturator nerve in canines) of L7d+S Dec+Reinn animals, compared with controls.

New neuronal pathways created by nerve transfer can restore bladder sensation and motor function in lower motor neuron-lesioned canines even 12 months after decentralization ¹⁾.

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Tiwari E, Salvadeo DM, Braverman AS, Frara NA, Hobson L, Cruz G, Brown JM, Mazzei M, Pontari MA, White AR, Barbe MF, Ruggieri MR. Nerve transfer for restoration of lower motor neuron-lesioned bladder and urethra function: establishment of a canine model and interim pilot study results. J Neurosurg Spine. 2019 Nov 8:1-11. doi: 10.3171/2019.8.SPINE19265. [Epub ahead of print] PubMed PMID: 31703192.

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Last update: **2025/05/13 02:17**

