Treating Spinal Cord Injury

Common causes of spinal cord injury (SCI) in dogs include vertebral fracture, intervertebral disk herniation (IVDH), and ischemic myelopathy. In small animal practice, IVDH is the most common cause of SCI. Various types of cells have beneficial effects on the promotion of functional recovery and tissue repair in SCI. The objective of this study was to determine whether injection of bone marrow stromal cells (BMSCs) into cerebrospinal fluid (CSF) could promote improvement of locomotor function in dogs with chronic SCI. Dogs with paraplegia and loss of nociception in the pelvic limbs at least 1 month after decompressive surgery were assigned to transplantation (n = 10) or control (n = 13) groups. All dogs were fecal and urinary incontinent. Dogs in the control group received no additional treatments. In the transplantation group, BMSCs were injected into the CSF 3 times at 1-week intervals 1 to 3 months after decompressive surgery. The total number of transplanted BMSCs ranged from $1.4 \times 10^6$ to $5.6 \times 10^6$ cells. Physical and neurologic examinations were performed monthly for ≥6 months posttransplantation. The Texas Spinal Cord Injury Scale (TSCIS) was used to evaluate improvements in gait, proprioceptive positioning, and nociception. Six of 10 dogs in the transplantation group regained the ability to walk versus 2 of 13 dogs in the control group. TSCIS scores in the transplantation group were significantly higher than scores in the control group at the study endpoint. Only 1 dog (transplantation group) recovered nociception. No complications were noted in relation to BMSC transplantation.

**Commentary:** This study’s procedure appears easy to perform and could revolutionize neurologic practice if isolation of BMSCs were available. However, the study has several major drawbacks. Only 1 dog regained nociception, suggesting that recovery was actually due to spinal walking. Another drawback was the failure to perform sham procedures. Simply injecting material into the CSF may have altered conditions in the spinal cord enough to allow recovery. Of most importance, all patients remained fecal and urinary incontinent. Many owners will tolerate canine mobility carts if a dog does not regain the ability to walk, but long-term bladder expression/catheterization and recurrent urinary tract infections often lead to owner-elected euthanasia. If these results sustain in larger, double-blind, placebo-controlled studies, a 60% recovery rate would be extraordinary.—Mark Troxel, DVM, Diplomate ACVIM (Neurology)