

THE ROLE OF ASSISTIVE DEVICES IN REHABILITATION OF POSTOPERATIVE INTERVERTEBRAL DISC DISEASE: CASE STUDY

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Assistive devices play an important role in facilitating return to independent function in physical therapy. As therapists, we analyze movement patterns, muscle imbalance, strengths, restrictions, and level of assistance required for an individual to function. Assistive devices often enable a patient to function with less physical assistance and improved alignment, and make progress faster on the road to recovery.

The use of assistive devices is often underutilized in the world of animal rehabilitation. Some limiting beliefs persist that may hold practitioners back from introducing devices when rehabilitating animals from impaired function. This is common in rehabilitating dogs who have undergone surgery for intervertebral disc disease (IVDD). Early use of assistive devices in cases of dogs with IVDD can provide many benefits. A properly fitting cart, often referred to as a wheelchair, can help maintain straight spinal posture with balanced weight distribution. The right cart, along with a well-fitting harness, also assists the caregiver and reduces physical strain. Dorsiflexion assist devices, such as toe-up straps or boots, may facilitate earlier stepping and motor development/re-education. Physical therapists aim for ideal alignment to minimize joint and physical stress in order to retrain movement with ideal biomechanics. Assistive devices help us achieve this and free up our hands to facilitate movement, so goals can be achieved faster and more efficiently.

We will take a look at these ideas further in Bella's case, as she recovers from a hemilaminectomy due to intervertebral disc disease.

HISTORY

Bella is a 9-year-4-month-old spayed female Basset Hound who has a diagnosis of intervertebral disc disease, now 2.5 weeks postoperative left hemilaminectomy T13-L2 with disc fenestration T12-L3 and L1-L3, done April 16, 2015. Bella presented on April 15, 2015 with acute onset paraparesis. MRI revealed a large disc extrusion at T13-L1 and multiple mild protrusions in the lumbar spine. Surgery was elected with a smooth postoperative course. Bella demonstrates strong tail wag, able to stand briefly on her own, and is trying to drag herself to move. Past medical history is remarkable for anxiety, which is managed medically. She was adopted 1.5 years prior and has no known food restrictions or allergies. Medications: famotidine, gabapentin, carprofen, methocarbamol, fluoxetine, alprazolam to sleep.

Prior level of function: daily walks, runs to front door, not much play with toys or dogs. The client is currently having difficulty lifting and assisting Bella. She is currently confined to her crate or large exercise pen due to anxiety.

Home environment: Single-dog home, 3 cats. Hardwood with rugs and tile, 2 steps to yard with new ramp. Allowed on low couch. Help 'Em Up Harness (HEUH) dispensed post-op.

Client goals: Bella to walk again independently. Interested in cart to help with mobility.

PHYSICAL EXAM

Body Condition Score = 6/9

Weight = 25.364 kg, 55.80 lb, 0.86 m²

Orientation: Bright, alert, responsive, friendly, and interactive.

Other physical findings: Blue HEUH donned, used wagon to help to/from car. Incision quiet.

Posture: Sitting with pelvic limbss extended, mild-moderate increase in extensor tone. Stands with minimal support, needs pelvic limbs placed, otherwise will stand knuckled.

Transitions: Requires max assist to control transitions for supporting pelvic limbs.

Gait analysis: Nonambulatory paraparesis. Standing emerging, tail wag. Stepping emerging with tail work at the level of the hip, fully supported.

Musculoskeletal exam:

Limb girth: 37 cm left pelvic limb, 40 cm right pelvic limb

Palpation: No spinal pain.

Thoracic limb range of motion: Within normal limits.

Pelvic limb range of motion: Within normal limits.

Spinal mobility: Cervical spine within normal limits, thoracolumbar spine moderately hypomobile, difficulty reaching to hip.

Neurological exam:

Reflexes: Within normal limits.

Conscious proprioception placing: Absent in pelvic limbss

Withdrawals: Present x 4

Hopping: Absent in pelvic limbs

Pain sensation: Present

Bowel/bladder function: Normal

ASSESSMENT

Bella is a 9-year-4-month-old spayed female Basset Hound who has a diagnosis of intervertebral disc disease, now 2.5 weeks postoperative left hemilaminectomy T13-L2 with disc fenestration T12-L3 and L1-L3, done April 16, 2015. Bella presented to physical rehabilitation with nonambulatory paraparesis L>R, ataxia, which is severely limiting her functional mobility. Bella will benefit greatly from a physical rehabilitation program focused on improving her strength and balance for gradual return to independent mobility.

Goals (10 weeks)

1. Bella will stand for 30 seconds while she eats a meal.
2. Bella will ambulate household distances independently.
3. Bella will manage the ramp to the yard with contact guard assist.

PLAN

It is recommended that Bella participate in physical rehabilitation twice weekly for 6 to 8 weeks to work towards her goal of independent ambulation. Bella's sessions will include manual therapy (myofascial release, joint mobilizations/compressions, stretching), modalities (pulsed electromagnetic field therapy with Assisi Loop, laser, neuromuscular electrical stimulation [NMES]), gentle therapeutic exercise, and underwater treadmill training. A home program was started today to ensure smooth progress towards Bella's goals. We will strongly consider a cart to assist Donna with Bella's mobility at home.

Clinical Progress and Assistive Devices:

May 14, 2015 Prescribed Thundershirt to help manage anxiety and support core, used wagon and HEUH to transport to/from car, PAWZ booties for traction.

May 7, 2015 Recommended cart, client ordered May 11, 2015. Approved by neurologist.

May 20, 2015 Fit Walkin' Wheels rear wheel cart, short dorsiflex assist wraps, continue Thundershirt.



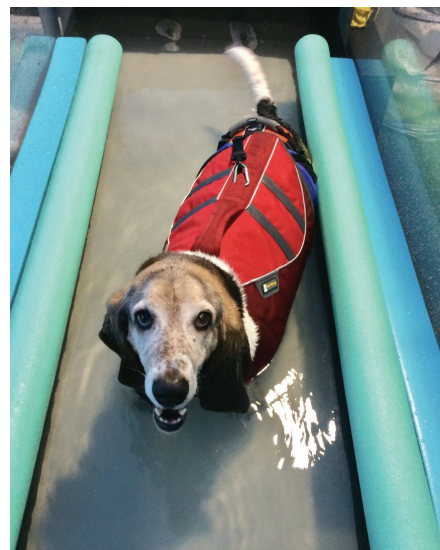
Bella was reluctant to use the cart at home despite being able to walk with modified independence after a couple sessions at the clinic. Bella was admitted for sessions twice weekly and incorporated multiple sessions of cart walks into her day at the clinic. Bella was able to step without knuckling or dragging by June 6, 2015 and had modified independence with the cart, no wraps. We utilized the strategy of having her walk to get to the wagon, lent for home use, to encourage walking at home. By June 4, 2015, Bella was ambulating short distances with tail stimulation for balance-only contact guard assist (CGA). By June 9, 2015, Bella was taking steps independently with poor to fair balance. Her core strength and standing balance improved over the next 2 months, and by August 10, 2015, Bella was ambulating 5 feet independently, up to 10 to 15 feet with turns August 25, 2015. By September 21, 2015 Bella was ambulating

10 minutes at 5 months post-op. Bella continued to use the rear wheel cart for walks at home due to limited motivation, though she walked readily around the clinic each session independently. Bella continued on for maintenance therapy ongoing for the next few years until the client moved out of the area.

Her initial goals were met by August 2015, roughly 12 weeks after her initial evaluation.

TREATMENT SESSIONS

Bella initially attended sessions twice weekly. She was dropped off for the day partially due to client scheduling/work and Bella's significant anxiety. She was able to have more practice ambulating in the cart and eventually independently throughout the clinic, as she was a more willing participant there as compared to in the home environment. Her initial sessions consisted of neuromuscular electrical stimulation (NMES) paired with function, such as standing and weight shifting, lifting limbs to increase muscle fiber recruitment and provide sensory stimulation; class 3b laser 12J/segment per side along the thoracolumbar spine; gentle myofascial release such as tail traction; and underwater treadmill training with manual facilitation and cueing of the hind limbs.

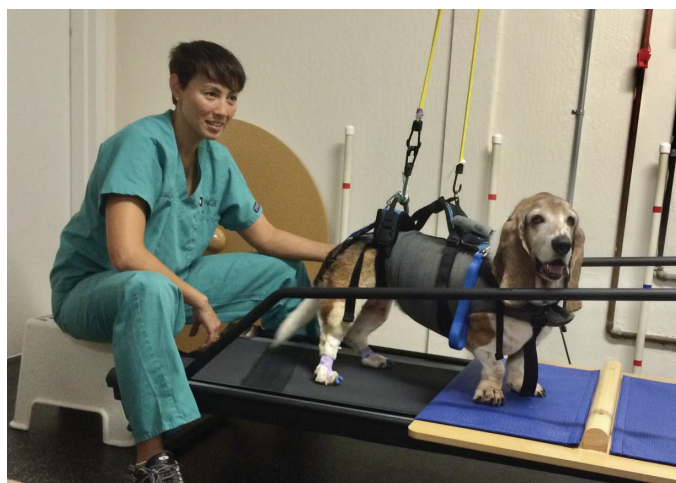
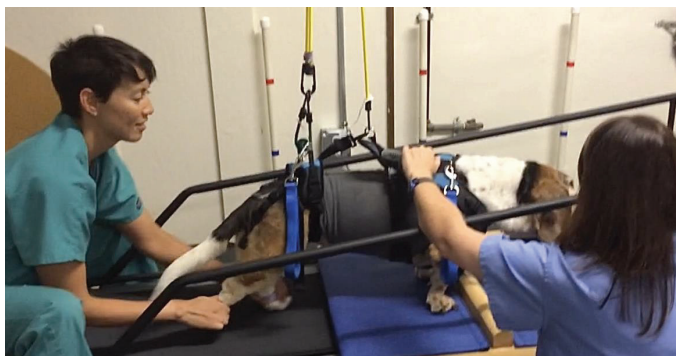


Once the rear wheel cart was acquired by late May 2015, it was incorporated into therapy sessions, gait training throughout the day in the clinic, and home use. Dorsiflexion assist devices were utilized as Bella was able to take steps on her own with them donned. She was quickly able to downgrade from tall straps that provided a dorsiflex assist spring, wrapping from the tarsus through the toes, to short wraps that only went through the toes. These helped her ambulate with better timing and eliminated the need for manual cueing/facilitation. Tail stimulation was provided as needed for overflow sensation to encourage a stronger reciprocal stepping pattern.

Facilitated therapeutic exercise was incorporated in June 2015, such as facilitated sit-to-stands, facilitating transitions whenever possible, paws up on an elevated surface to encourage pelvic limb weight-bearing, and weight shifting to reach treats for core activation. Other strengthening activities were incorporated into rest breaks in the underwater treadmill, such as walking backwards and swishing water to encourage balance reactions, and gait training with body weight support on the land treadmill.

SUMMARY

Bella was able to ambulate much sooner with modified independence using a rear wheel cart, shortly after it was introduced about 3 weeks into rehab, 5 weeks post-op. She progressed to short distances without the cart and CGA via tail stimulation one month after starting rehab, 6 weeks post-op, and was ambulating independently without the cart approximately 3.5 months post-op. Bella did have a slower progression than some patients, but made steady progress. The cart would have been utilized earlier if it was acquired by the client. Bella was deemed back to her full prior level of function by early November 2015, 6 months after injury.

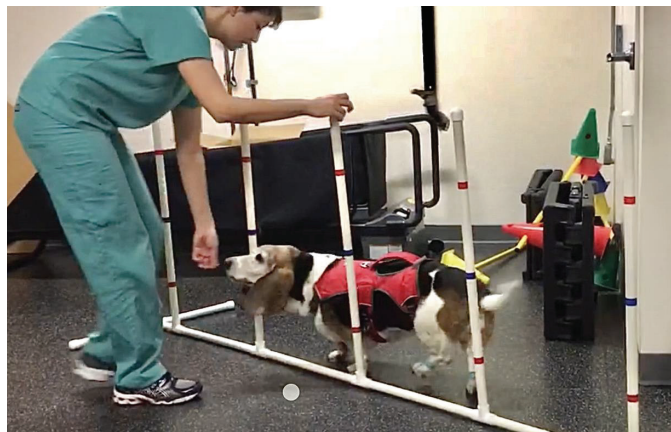


A few of the significant benefits to Bella over the course of her recovery from the incorporation of assistive devices include early modified independence, supporting her body weight to alleviate stress from her caregivers, and improved spinal alignment. Out of the cart, Bella demonstrated a significant kyphotic posture and caudal rotation of the pelvis. She had a hard time getting her hind legs underneath her pelvis and did not use them much when assisted with the full-body harness. She quickly demonstrated a neutral spinal alignment and improved pelvic limb weight bearing in the rear wheel cart. Thin rubber booties were used to provide traction in the clinic and rugs were put out in the home to provide traction. A Thundershirt facilitated core engagement and weight shift to the pelvic limbs, and also provided calming input. As Bella regained function, a ramp was integrated to get into the car and go from the house to the yard.

Bella was able to stand and walk sooner with a rear wheel cart, especially with the client's limited ability to support her body weight. The cart allowed neutral spinal alignment and improved weight-bearing on pelvic limbs, as opposed to kyphotic

posture prior to use of the cart. PAWZ booties provided traction in the clinic, and more rugs were placed down in the home. Ramp training was incorporated to go to the yard independently. Use of the Thundershirt facilitated core engagement and weight shift to pelvic limbs. It was agreed by Bella's team that the use of assistive devices shortened her recovery time and made caring for her much easier on the client.

Bella was able to stay strong and mobile with ongoing physical therapy sessions through 2017, when she moved out of the area. She was able to work through 2 flares of back and cervical pain without any loss of function. She was happy to run out into the yard and go on her usual long walks, and nap with the cats.



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