

CASE STUDY: T 12 ASIA A PARAPLEGIA NOW WALKING WITH KAFOs AND CRUTCHES

BACKGROUND:

Many individuals who sustain a spinal cord injury (SCI) do not regain their ability to walk, even though it is a primary goal of most people impacted by spinal cord injury and their rehabilitation team. Recent technological developments in rehabilitation may be enhancing the ability of those impacted by spinal cord injury to realize their potential to walk again.

One such development is the exoskeleton called Ekso, manufactured by Ekso Bionics. Ekso combines the benefits of conventional over-ground gait training with body weight-supported gait training. It has great benefit in regards to specific task learning and plasticity. It also has an advantage over conventional training in that it frees up the need for hands-on therapy assistance and enables the therapist to focus on guidance and patient feedback. The Ekso allows individuals to walk full weight bearing in a normal reciprocal gait pattern.

The case study below illustrates the remarkable progress made 12 years post spinal cord injury by an individual classified as a T 12 ASIA A paraplegia at the Good Shepherd Spinal Cord Program.

PATIENT HISTORY:

46-year-old male involved in a snow mobile accident in January 2001. Paramedics arriving at the scene found him unable to move his legs. He also sustained a closed head injury and was amnesic of the event. He was evacuated to an ER where he was started on a steroid protocol. An MRI revealed multiple vertebral fractures of T11 to L5 and a left scapular fracture. Soon afterwards, he underwent internal fixation of T9 -10 extending down to L1- 2. His spinal cord injury was classified as T 12 paraplegia - ASIA A.

REHABILITATION:

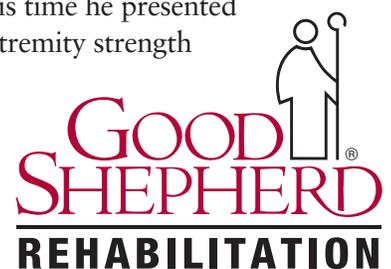
Eleven days after the accident, the patient was transferred to inpatient rehabilitation. He progressed well and was discharged home 18 days later. At the time of discharge he was essentially independent with all activities of daily living, with close supervision for sit pivot transfers, and he was independent with wheelchair propulsion. Sensation was absent along the T 12 dermatome and distal to it. Upper extremity strength was 5/5 throughout. Lower extremity strength was 0/5 for all muscles except for trace strength of the iliopsoas bilaterally.

He then initiated outpatient rehabilitation. His care plan included strengthening/ROM exercises, dynamic balance activities, transfer training, advanced wheelchair mobility skills and standing activities.

For approximately the next 10 years, he would periodically continue with outpatient therapies to increase lower extremity/trunk range of motion and attempt to ambulate with the use of lower extremity bracing. However, these attempts at ambulation were unsuccessful.

In August of 2011, the patient returned again for outpatient physical therapy. At this time he presented with marked tightness of both lower extremities (hips, knees and ankles). Lower extremity strength remained at 0/5 for all muscles except for trace strength of the iliopsoas bilaterally.

He was referred back to physical therapy for aggressive stretching to improve lower extremity range of motion with a goal of walking with stance control knee ankle foot orthoses (KAFOs).



REHABILITATION CONTINUED:

Patient underwent intense stretching of bilateral lower extremities and pelvic area. He was educated on the importance of stretching, specifically hip flexors and knee extensors. He was independent with an aquatic therapy program and upper extremity lifting program, as well as lower body stretching program. He improved lower extremity range of motion and was appropriate to be fitted for custom KAFOs.

The patient then began gait training with KAFOs requiring minimal to moderate assist initially for balance, mid-line orientation and weight shifting during gait activity. He needed verbal and manual cues to retrain his body to find his mid-line balance point. In six months, after intensive stretching, balance and gait training, he progressed to gait training at contact guard level, however he continued to need verbal cues for weight shifting and mid-line orientation. During this time there was no sensation changes reported. Patient presented with increased hip flexion and extension strength a quarter through range in gravity-eliminated positions.

In March 2012, the patient began using the Ekso. This was the first time that he was able to stand and walk for a prolonged time. It was a very task specific approach to therapy, and it allowed the patient to take numerous steps in attempts to retrain the body to walk in a normal walking pattern. Patient started with as few steps as 100 and quickly progressed to taking more than 1,000 steps per therapy session. He hit 1,000 steps on his 26th session using Ekso. His highest step count (in one session) was 1,252 steps, with a session average of 900 steps in 45 minutes.

He used the Ekso for 17 months. During gait training with Ekso, he developed better awareness of mid-line posture and balance and was able to stand with only contact guard of therapist. He progressed to using bilateral forearm crutches during gait and was independent with weight shifting and balance. In addition to improving mid-line and balance, the patient improved his lower extremity range of motion to within normal limits. The patient no longer is on a bowel program and is able to sense when he has to pass a bowel movement.

MOST RECENT RESULTS:

The patient experienced significant motor and sensory improvement. His sensation has improved, and he can now distinguish light touch on the left and right lower extremity to L3 dermatome, absent distally. He made tremendous strength gains in both lower extremities. His current strength is as follows:

	Right	Left
Iliopsoas	3/5	3-/5
G.Medius	2+/5	2/5
G.Maximus	2-/5	2-/5
Adductors	2+/5	2/5
Quadriceps	1/5	1/5
Hamstrings	1/5	1/5

In January 2013, nine months after starting Ekso, the patient progressed to the point where he began using bilateral forearm crutches while using bilateral stance control KAFOs. Patient is able to ascend/descend a ramp with bilateral stance control KAFOs and bilateral forearm crutches. The patient requires contact guard to minimal assist of a therapist, and the supervision of a helper for safety.

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