EPIDURAL STIMULATION
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Epidural Stimulation Surgery / C6, CANADA

Patient Case Report
#ES180053

Patient Overview

Age: 37
Sex: Male
Nationality: Canadian
Diagnosis on Admission: Spinal Cord Injury, C6 Incomplete
Treatment Received: Epidural Stimulation Surgery, Medtronic Restore Advance 16-electrode MRI Compatible Device. MSCs and hAFSCs 120 million.
Date of Admission: 15/09/2018
Date of Discharge: 02/11/2018

Patient's Condition on Admission

Patient sustained a traumatic spinal cord injury at C6 level on February 14, 2018. Patient has limited arm and hand function, but no finger function. He suffers mild spasms and spasticity, but no neuropathic pain. He requires assistance in his daily activities.

Previous Therapies and Treatments

N/A

Treatment Received

After a Spinal MRI scan, EMG, and comprehensive blood work, patient underwent Laminectomy and implantation of the Epidural Stimulation device on September 16, 2018. The surgery was completed without significant adverse events and no serious complications were reported during the postoperative hospital stay. Surgical wounds healed normally and no spinal cord or superficial wound infection was reported.

Device Mapping and therapy were carried out after surgery for 35 days, then patient was discharged.

Device Mapping and Therapy

Post-Surgical Care	Total Sessions	Sessions Per Week	Time (Hr) Per Session
Mapping	124	31	1
Physical Therapy	35	7	1
Occupational Therapy	-	-	-

Cytotherapy

Type	Amount	Delivery Method	Number of Applications
MSCs	40 Million	IV Injection	1
hAFSCs	80 Million	Lumbar Puncture Injection	2

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Symptoms Improvement Post-Surgery

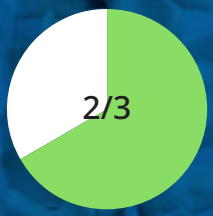
Abilities & Symptoms	Motor & Sensory Function (below injury level, before ES surgery)	Improvement Observed (35 days after admission)
Motor Function		
Standing with support	Not Possible	Yes
Stepping with support	Not Possible	Yes
Gross motor Skills	Not Present	Yes
Fine Motor skills	Limited	No
Balance	Poor	Yes
Coordination	Poor	Yes
Muscle Mass	Low	Yes
Stamina	Low	Yes
Fatigue	Present	Yes
Spasms	Present	Yes
Spasticity	Present	Yes
Sensory Function		
Neuropathic pain	Not Applicable	Not Applicable
Bladder Function	No	No
Bowel Function	No	No
Autonomic Functions		
Bowel Control	No	Yes
Sweating Ability	No	No
Orthostatic Hypotension	Present	Yes

Improvements are monitored in 17 targeted areas: 11 Motor areas, 3 Sensory areas, and 3 Autonomic areas. However, the number of targeted areas may vary depending on patient's condition prior to admission. If patient does not experience symptoms in certain Motor/Sensory functions, or is not impaired in a specific targeted area prior to surgery, it is excluded from the report (Not Applicable). If there is progress in any given area -- either mild, moderate, or significant -- it is measured and reported as positive ("Yes"). No improvement, the existence of pain or spasms, or an inability to perform a measured function is reported as "No".

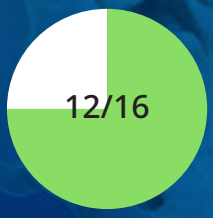
Motor Functions

Sensory Functions

Autonomic Function



Overall Functions



Results Interpretation

Motor Function improved in 10 out of 11 targeted areas when the Epidural Stimulation device was switched on.

Patient does not suffer from neuropathic pain, therefore only 2 out of 3 Sensory Function areas were measured. Patient has not experienced any changes in those two Sensory Function areas, but more feedback will be collected after 3 months to note any improvements made by cytotherapy.

Patient's Bowel Control improved and his blood pressure increased to normal levels when Epidural Stimulation device was switched on. Therefore 2 out of 3 Autonomic Functions have improved. Overall, improvements were recorded in 12 out of 16 targeted Motor, Sensory and Autonomic Function areas.

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Treatment Summary

After Epidural Stimulation surgery, patient received 124 Mapping sessions and 35 Physical Therapy sessions. Patient also received 120 million: 40 million MSCs and 80 million hAFSCs through one IV injection and two lumbar puncture injections, respectively. All three applications went well without adverse effects and no short-term or acute complications have been reported.

Patient is able to stand with support at a parallel bar when the Epidural Stimulation device is switched on. Patient is able to lock his hips, which allows him to stand.

While standing, patient has good upper trunk control, but limited lower trunk control. He applies more weight to his right leg than left leg. He is able to lock his left knee consistently, but right knee only sometimes.

Patient is able to take steps with a walking frame, no hoist required, and is able to lift both feet when taking steps. He has very good coordination between left and right foot when taking steps. Patient does not require assistance with foot placement when taking short steps, but does when taking longer steps.

Patient's Gross Motor Skills have improved significantly, particularly ankle, hip, and knee flexion, and knee extension (kicking out) when Epidural Stimulation device is switched on. Patient has good static sitting balance and no support is needed. However, during dynamic sitting, balance is poor due to weak lower trunk muscles. Static standing balance is good at the parallel bar. Spasms and spasticity are reduced when Epidural Stimulation device is switched on.

Muscle mass and endurance were improved upon discharge. Patient reported that spasms and spasticity increased after receiving stem cell injections, but they decreased when therapists provided the overnight program. Feedback will be collected in 3 months time to see whether spasms and/or spasticity have decreased.

During mapping sessions, patient was put on a bowel program. It helped reduce the amount of time the patient spends emptying his bowel, from 60 minutes to 30-45 minutes daily, a significant improvement in quality of life.

In terms of Orthostatic Hypotension, patient's blood pressure used to drop when changing positions from sitting to standing, which affected his ability to participate in physical therapy. However, with Program C on the Epidural Stimulation device, patient's blood pressure was stable when changing positions, allowing for his therapy sessions as scheduled.

There was no noticeable improvement to his neurogenic bladder and bowel.

Patient received cytotherapy, therefore we expect to see results in these areas within 6 months time. After 35 days, patient was discharged and will continue physiotherapy back home.

For more information please contact:

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