EPIDURAL STIMULATION
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Epidural Stimulation Surgery / C4-C5, USA

Patient Case Report
#ES180005

Patient Overview

Age: 38

Sex: Male

Nationality: American

Diagnosis on Admission: Spinal Cord Injury, C4-C5 Incomplete

Treatment Received: Epidural Stimulation Surgery, Medtronic Restore Advance 16-electrode MRI Compatible Device. MSCs and hAFSCs 120 million.

Date of Admission: 14/01/2018

Date of Discharge: 22/02/2018

Patient's Condition on Admission

Patient sustained a C4-C5 spinal cord injury on September 6, 2014, resulting in incomplete quadriplegia and complete paraplegia. Patient has limited hand and arm sensory and motor functions, but no voluntary motor function in his lower limbs. Patient suffers from neurogenic bladder and bowel, and extensor spasms. Patient does not suffer from neuropathic pain.

Previous Therapies and Treatments

Patient underwent spinal fusion surgery between C3 and C6 vertebrae and, one month after surgery, began rehabilitation at Shepherd Center in Atlanta, Georgia. Patient has been receiving restorative therapy for his arms and legs since that time.

Treatment Received

After a Spinal MRI scan, EMG, and comprehensive blood work, patient underwent Laminectomy and implantation of the Epidural Stimulation device on January 15, 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	93	23	1
Physical Therapy	32	8	1
Occupational Therapy	11	2	1

Cytotherapy

Type	Amount	Delivery Method	Number of Applications
MSCs	40 Million	IV Injection	2
hAFSCs	80 Million	Lumbar Puncture Injection	3

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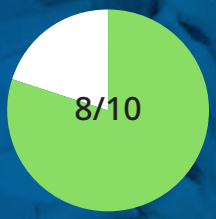
Symptoms Improvement Post-Surgery

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	No
Gross motor Skills	Not Present	Yes
Fine Motor skills	Limited	No
Balance	Poor	Yes
Coordination	Not Applicable	Not Applicable
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
Sweating Ability	No	No

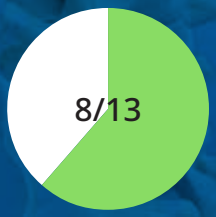
Improvements are monitored in 15 targeted areas: 11 Motor areas and 4 Sensory areas. However, the number of targeted areas may vary depending on patient's condition prior to admission. If patient does not experience symptoms in certain Motor/Sensory functions, or is not impaired in a specific targeted 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

Overall Functions



Results Interpretation

This patient was unable to take steps prior to his Epidural Stimulation surgery, therefore Coordination has been excluded from the report and only 10 out of 11 Motor Function areas were measured. Motor Function improved in 8 out of the 10 targeted areas when the Epidural Stimulation device was switched on.
Patient does not suffer from neuropathic pain, therefore only 3 of 4 Sensory Function areas were measured. Patient has not experienced any improvements in the three measured Sensory Function areas, but more feedback will be collected after 6 months to note any improvements made by Cytotherapy. Overall, improvements were observed in 8 out of 13 targeted Motor and Sensory Function areas.

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Treatment Summary

After Epidural Stimulation surgery, patient received 93 Mapping sessions, 32 Physical Therapy sessions and 11 Occupational Therapy sessions. Patient also received 120 million: 40 million MSCs and 80 million hAFSCs through two IV injection, three lumbar puncture injections, respectively. All three applications went well without adverse effects and no short-term or acute complications have been reported.

Patient's Gross Motor Skills improved moderately, with minor improvement in hip and knee flexion, but no ankle flexion in either leg. Patient demonstrated fair knee extension (kicking out) when Epidural Stimulation device is switched on, even with slight resistance applied.

Patient has good static sitting balance with minimal support, but does not exhibit dynamic sitting balance. Patient required full assistance when changing position from sitting to standing, and exhibits static standing balance when assisted by a hoist.

Patient is able to lock his knees while standing, but requires assistance in locking his hips. Patient does not exhibit trunk control and cannot bear weight equally on his legs. Due to orthostatic hypotension, patient's blood pressure would drop when changing from sitting to standing, therefore patient was not able to carry out his therapist's stepping exercises.

Patient experienced significant extensor spasms, especially in the morning, but the therapist's overnight spasm-reduction program was starting to reduce them. Muscle mass and endurance were improved upon discharge.

There was no noticeable improvement to her 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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