

**Results:** The first quantitative result of this endeavor was a Functional Independence Measurement (FIM) score change from 1 to 6 for locomotion of 150 meters. Quality of Life (QoL) and Craig Handicap Assessment and Reporting Technique Short Form (CHART SF) scores are pending. Fatigue remains an issue.

**Discussion:** Rethinking power wheelchair components can provide advances in SCI patient mobility. This design has implications for other high-tetraplegics, such as those who may suffer from amyotrophic lateral sclerosis (ALS) or spinal muscular atrophy (SMA).

**Conclusions:** High-tetraplegics with impaired head, chin, and breath control may still be able to attain independence with a power wheelchair if his or her tongue dexterity remains intact. A microswitch control modified for lingual manipulation has been shown to function successfully for both wheelchair propulsion as well as command of pressure-relief. We expect that as similar modifications to power wheelchairs are made for those for whom total assist for mobility is the only other option, this will be reflected positively in QoL, FIM, and CHART SF scores.

**Keywords:** Rehabilitation, Wheelchair, Tetraplegia.

## Poster 349

### Nephrogenic Systemic Fibrosis in a Spinal Cord Injured Patient: A Case Report.

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**Disclosures:** B. A. Knapp, None.

**Patients or Programs:** We present a case of nephrogenic systemic fibrosis (NSF) in a patient with concomitant spinal cord injury (SCI). This is the first report of this condition in a SCI patient to our knowledge.

**Setting:** Zablocki VA Medical Center/Medical College of Wisconsin, Milwaukee, WI.

**Results:** The patient is a 56-year-old man who sustained injury in November 2004. He was found to have aggressive MRSA which subsequently developed into sepsis and epidural abscess with damage to the spinal cord, specifically C5 ASIA-C. He was treated initially with C2-T2 laminectomy and IV vancomycin. He then developed renal failure secondary to vancomycin treatment and underwent dialysis. Concurrently, he had multiple gadolinium-contrast MRI studies to characterize his spinal cord lesion. He thereafter developed extensive contractures and pain that was presumed to be secondary to his SCI. Dermatology noted confluent, shiny, lichenoid plaques and induration affecting all extremities and performed punch biopsy that was consistent with NSF.

**Discussion:** NSF is a recently identified fibrosing disorder characterized by marked expansion and fibrosis of the dermis with CD34 positive fibrocytes on biopsy. It is seen only in patients with kidney failure and affects skin overlying the trunk and extremities, causing severe contractures. There are over 215 cases reported to date according to the International Center for Nephrogenic Fibrosing Dermopathy Research at Yale University. No cases were reported before 1997. NSF is

thought to be related to exposure of patients with renal failure to gadolinium-containing contrast agents in a dose-dependent manner. Early clinical symptoms include swelling, erythema, pruritis, and pain. Current treatments are physical therapy, extracorporeal photopheresis, renal transplantation, steroids, and pentoxifylline. The treatment of choice is prevention.

**Conclusions:** To our knowledge, this is the first case of NSF reported in a SCI patient. While now improving on optimal care, this patient's treatment was delayed due to lack of recognition of this condition leading to contractures out of proportion to his injury. Physicians dealing with SCI and spasticity should include in their differential this rare disease.

**Keywords:** Rehabilitation, Spinal cord injuries, Epidural abscess, Nephrogenic fibrosing dermopathy.

## Poster 350

### Neurosarcoidosis Presenting as a Central Cord Syndrome: A Case Report.

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**Disclosures:** E. Y. Ben-Ozer, None.

**Patients or Programs:** A 35-year-old African American man with no significant medical history.

**Program Description:** After a basketball game in which he was elbowed in his upper thoracic spine, the patient developed neck pain and trace upper extremity paresthesias. Over 2 weeks, he progressed with bladder/bowel incontinence and difficulty ambulating. He presented to the emergency room with examination revealing central cord syndrome. He had cape-like dysesthetic sensation of the arms and hands with mildly weak grip, triceps, iliopsoas and quadriceps strength, hyperreflexic patellar reflexes and clonus. MRI revealed an enhanced area at C3-C4, vasogenic edema and C3-C6 stenosis. Emergent laminectomy was performed without biopsy given concern for neurologic compromise. He regained bowel/bladder continence and ambulation to 100 ft. Two weeks later, neurologic symptoms worsened with repeat MRI showing an unchanged mass but improved cord compression. CT chest revealed mediastinal and bilateral hilar lymphadenopathy and lung nodules. Bronchoscopic biopsies disclosed non-necrotizing granulomas.

**Setting:** Tertiary care hospital.

**Results:** Neurosarcoidosis was diagnosed per imaging and histology, with initial trauma a compounding factor rather than the sole cause of central cord syndrome. The patient experienced improvement in function with steroids and physical rehabilitation.

**Discussion:** This is the first case of central cord syndrome presentation of neurosarcoidosis in the literature. Neurologic sarcoidosis is 5% of sarcoidosis cases, and is even rarer in the spinal cord. Four cases reviewed presented with cauda equina sarcoidosis; none presented as a central cord syndrome. We discuss the case of central cord dysfunction that presented as a trauma and lesion. Symptoms did not resolve

with decompression leading to workup/diagnosis of spinal sarcoidosis. Clinical, pathologic, and radiologic findings as well as differential, treatment outcomes and published data will be discussed.

**Conclusions:** The presenting symptoms of neurosarcoidosis involving the spinal cord require a high degree of suspicion with careful review of findings to make a diagnosis. It should be considered in patients that do not improve with decompression and have a continued mass lesion on repeat imaging.

**Keywords:** Rehabilitation, Neck pain, Neurosarcoidosis, Central cord syndrome.

## Poster 351

### Over 20 Years Survival in Men with C2 Tetraplegia and the Implanted Diaphragmatic Pacer System: A Case Series.

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**Disclosures:** T. Johnson, None.

**Objective:** To report on the long-term survival of men with high level tetraplegia who utilize a diaphragmatic pacer system (DPS) for respiratory paralysis and improved quality of life.

**Design:** Case series.

**Setting:** A spinal cord injury long-term care unit and the community.

**Participants:** Men (n = 3) with traumatic C2 motor complete tetraplegia, ventilator dependent respiratory paralysis, and the implanted DPS.

**Interventions:** DPS.

**Main Outcome Measures:** The number of years each patient survived after DPS placement and quality of life.

**Results:** Bilateral phrenic nerve pacers were surgically implanted in each patient 1 year after acute spinal cord injury. The ages of the subjects were 22, 36, and 40 years old. Subject 1 survived for 22 years and subject 2 for 21 years. Both died from causes unrelated to pacer malfunction. Subject 3 survived for 21 years and is still living in the community with the pacers. The mean survival among the 3 subjects is  $21.33 \pm 0.58$  years. All needed to have replacements, but were able to tolerate this process and resume use of the device.

**Conclusions:** The DPS is a viable consideration for those with intact phrenic lower motor neurons and respiratory paralysis. For many with ventilator dependent tetraplegia, DPS provides an alternative to mechanical ventilation. It has been reported to reduce the frequency of upper airway infections and improve speech quality. There are very few studies on the long-term survival of people with tetraplegia and DPS. In our experience, patients have utilized the device for 20 plus years with the added benefit of improved quality of life.

Subjects gained independence in power wheelchair mobility allowing them to participate in more activities on the unit and in the community. However, larger scale studies are needed to fully assess the benefits and average survival.

**Keywords:** Phrenic nerve, Respiratory paralysis, Diaphragmatic.

## Poster 352

### Post-traumatic Bilateral Shoulder Heterotopic Ossification in a Man with T7 Complete Paraplegia: A Case Report.

Karen A. Velez, MD (TUFTS Medical Center, Boston, MA); Vidya Jayawardena, MD; Tova Johnson, DO.

**Disclosures:** K. A. Velez, None.

**Patients or Programs:** A 47-year-old man with T7 complete paraplegia secondary to a recent motor vehicle accident.

**Program Description:** Patient sustained an acute thoracic SCI associated with aortic disruption and liver laceration. He also had fractures of the T10 vertebra, sternum, hyoid, wrist and acetabulum. After several weeks of medical stabilization and prolonged immobilization, the patient began complaining of bilateral shoulder pain. Plain films were obtained at an outside facility prior to transfer to the inpatient SCI unit.

**Setting:** Inpatient spinal cord injury (SCI) unit.

**Results:** Bilateral shoulder films 5 weeks after collision revealed calcifications in both coraco-clavicular ligaments, consistent with early heterotopic ossification (HO). Given the patient had ongoing limitations in upper extremity range of motion and worsening shoulder pain, both shoulders were re-imaged 10 weeks later. Radiographs showed significantly worsened HO surrounding the coracoid processes. He was treated with intra-articular steroid injections and indomethacin. However, range of motion remained severely limited, reducing his ability to perform activities of daily living to a much lower level than would be expected for a person with a thoracic SCI.

**Discussion:** HO is the process of mature lamellar bone formation in soft tissues, which is precipitated by severe trauma in 60-75% of cases. It is also well documented in persons who suffer a SCI. In this population, lesions occur most commonly below the level of injury, and show a strong propensity to recur. Literature review did not reveal any cases of bilateral shoulder HO in an acute traumatic spinal cord injured person above the level of injury, making this the first documented case.

**Conclusions:** Prolonged immobilization in patients with SCI following polytrauma may lead to HO. Since a SCI itself may cause severe functional limitations, prevention and early recognition of HO is crucial to improving quality of care and avoiding compounded disability.

**Keywords:** Rehabilitation, Spinal cord injury, Heterotopic ossification.