# Traumatic central cord syndrome treatment

While there is limited evidence regarding management of Traumatic central cord syndrome, in the presence of mechanical instability or ongoing spinal cord compression, surgical management is the treatment of choice. Further research needs to be conducted regarding treatment strategies and patient outcomes <sup>1)</sup>

# Indication

Nine studies (3 prognostic, 5 therapeutic, 1 both) satisfied inclusion criteria. Low level evidence suggests that patients operated on <24 hours after injury exhibit significantly greater improvements in postoperative American Spinal Injury Association motor scores and the functional independence measure at 1 year than those operated on >24 hours after injury.

Moderate evidence suggests that patients operated on <2 weeks after injury have a higher postoperative Japanese Orthopaedic Association score and recovery rate than those operated on >2 weeks after injury. There is insufficient evidence that lengths of hospital or intensive care unit stay differ between patients who undergo early versus delayed surgery. Furthermore, there is insufficient evidence that timing between injury and surgery predicts mortality rates or serious or minor adverse events.

Surgery for TCCS <24 hours after injury appears safe and effective. Although there is insufficient evidence to provide a clear recommendation for early surgery (<24 hours), it is preferable to operate during the first hospital admission and <2 weeks after injury  $^{2)}$ 

#### Nonsurgical

In many cases, individuals with CCS can experience a reduction in their neurological symptoms with conservative management. The first steps of these intervention strategies include admission to an intensive care unit (ICU) after initial injury. After entering the ICU, early immobilization of the cervical spine with a neck collar would be placed on the patient to limit the potential of further injury.

Cervical spine restriction is maintained for approximately six weeks until the individual experiences a reduction in pain and neurological symptoms.

Inpatient rehabilitation is initiated in the hospital setting, followed by outpatient physical therapy and occupational therapy to assist with .

An individual with a spinal cord injury may have many goals for outpatient occupational and physiotherapy. Their level of independence, self-care, and mobility are dependent on their degree of neurological impairment. Rehabilitation organization and outcomes are also based on these impairments.

The physiatrist, along with the rehabilitation team, work with the patient to develop specific, measurable, action-oriented, realistic, and time-centered goals.

With respect to physical therapy interventions, it has been determined that repetitive task-specific

sensory input can improve motor output in patients with central cord syndrome. These activities enable the spinal cord to incorporate both supraspinal and afferent sensory information to help recover motor output.

This occurrence is known as "activity dependent plasticity". Activity dependant plasticity is stimulated through such activities as: locomotor training, muscle strengthening, voluntary cycling, and functional electrical stimulation (FES) cycling.

# Vasopressor usage

Vasopressor usage is associated with complication rates that are similar to the reported literature for spinal cord injury (SCI). Dopamine was associated with a higher risk of complications in patients > 55 years. Given the increased incidence of central cord syndrome in older populations, determination of mean arterial pressure (MAP) goals and vasopressor administration should be carefully considered in these patients. While a randomized control trial on this topic may not be practical, a multiinstitutional prospective study for SCI that includes (CCS) patients as a subpopulation would be useful for examining MAP goals in this population<sup>3)</sup>.

### Surgical

Recent studies have shown benefits, particularly of early surgery to decompress the spinal cord in patients with pathologic conditions revealed by radiography or MRI<sup>4)</sup>.

Surgical intervention is usually given to those individuals who have increased instability of their cervical spine, which cannot be resolved by conservative management alone. Further indications for surgery include a neurological decline in spinal cord function in stable patients as well as those who require cervical spinal decompression.

# Results

In a sample of 16,134 patients, a total of 39.7% of patients (6,351) underwent surgery. ACDF was most common (19.4%), followed by PCDF (7.4%) and PCD (6.8%). From 2003-10, surgical management increased by an average of 40% each year. The overall inpatient mortality rate was 2.6% Increasing age and comorbidities were associated with higher rates of patient mortality and a decreasing surgical rate (p < 0.01). Hospitals greater than 249 beds (p < 0.01) and the south (p < 0.01) were associated with a higher surgical rate. Rural hospitals (p < 0.01) and persons in the second income quartile (p < 0.01) were associated with higher inpatient mortality <sup>5</sup>.

## Outcome

The ASIA motor score and cervical spine canal diameter proved to be useful predictors of outcome. In the patient group of the Division of Neurosurgery, Groote Schuur Hospital, Cape Town,South Africa, timing of surgery did not appear to influence the outcome <sup>6</sup>.

# Case series

In a retrospective cohort analysis of 34 patients who received any vasopressor to maintain blood pressure above predetermined mean arterial pressure (MAP) goals at a single Level 1 trauma center. The collected variables were American Spinal Injury Association (ASIA) grades at admission and discharge, administered vasopressor and associated complications, other interventions and complications, and timing of surgery. The relationship between the 2 most common vasopressors-dopamine and phenylephrine-and complications within the cohort as a whole were explored, and again after stratification by age.

The mean age of the ATCCS patients was 62 years. Dopamine was the most commonly used primary vasopressor (91% of patients), followed by phenylephrine (65%). Vasopressors were administered to maintain MAP goals fora mean of 101 hours. Neurological status improved by a median of 1 ASIA grade in all patients, regardless of the choice of vasopressor. Sixty-four percent of surgical patients underwent decompression within 24 hours. There was no observed relationship between the timing of surgical intervention and the complication rate. Cardiogenic complications associated with vasopressor usage were notable in 68% of patients who received dopamine and 46% of patients who received phenylephrine. These differences were not statistically significant (OR with dopamine 2.50 [95% CI 0.82-7.78], p = 0.105). However, in the subgroup of patients > 55 years, dopamine produced statistically significant increases in the complication rates when compared with phenylephrine (83% vs 50% for dopamine and phenylephrine, respectively; OR with dopamine 5.0 [95% CI 0.99-25.34], p = 0.044).

Vasopressor usage in ATCCS patients is associated with complication rates that are similar to the reported literature for spinal cord injury (SCI). Dopamine was associated with a higher risk of complications in patients > 55 years. Given the increased incidence of ATCCS in older populations, determination of MAP goals and vasopressor administration should be carefully considered in these patients. While a randomized control trial on this topic may not be practical, a multiinstitutional prospective study for SCI that includes ATCCS patients as a subpopulation would be useful for examining MAP goals in this population<sup>7)</sup>.

#### 1)

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