MANAGING SPINAL CORD INJURY PATIENTS IN THE ICU

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OBJECTIVES

• Describe Levels of injury related to SCI

• Explain common medical changes related to SCI
SPINAL CORD INJURY

Any damage to the spinal cord that blocks communication between the brain and body.
SPINAL CORD

• Types of Messages
  – Sensory
    • Touch, pressure, pain, temperature and proprioception
  – Motor
  – Reflexes
FACTS & STATISTICS
Model SCI Care System Data, 2014

PREVALENCE

• 12,500 annually

AGE

• Average age is 42 yrs

GENDER

• 79% are males
ETIOLOGY

- Vehicular: 39.2%
- Falls: 28.3%
- Violence: 14.6%
- Sports: 8.2%
- Other/Unknown: 9.7%
CERVICAL BONES (C1 – C7)
CERVICAL NERVES (C1 – C8)

C1
C2  Neck
C3  Diaphragm
C4  Shoulder Shrug
C5  Shoulder Muscles, Biceps
C6  Wrist Extensors, Triceps
C7
C8  Lower Arms, Fingers
THORACIC BONES (T1 – T12)
THORACIC NERVES {T1 – T12}

T1  Hand
T2
T3  Chest;
T4  Transverse Thoracis
T5  Intercostals
T6
T7
T8
T9  Trunk; Intercostals
T10 Abdominal
T11 (coughing and sneezing)
T12
ASSIST COUGH
LUMBAR (L1 – L5)
LUMBAR NERVES {L1 – L5}

L1

L2  Hip Flexion; Iliopsoas

L3  Knee extension; Quadriceps

L4  Lower legs

L5  Foot
SACRUM
SACRAL NERVES \{S1 – S5\}

S1
  Lower legs

S2
  Foot

S3
  Bowel, Bladder

S4
  Sexual Function

S5
CLASSIFICATION of SCI

American Spinal Injury Association

- AISA A – E
- most widely accepted
- “neurologic” basis
ASIA CLASSIFICATIONS

**ASIA A** = no motor or sensory function is preserved in the sacral segments S4-S5.

**ASIA B** = sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-S5

**ASIA C** = motor is preserved below the neurological level, and most of the key muscles below the neuro level have a muscle grade < 3.

**ASIA D** = motor function is preserved below the neurological level, and at least half of key muscles below the neurological level have a muscle grade = or > 3.

**ASIA E** = NORMAL motor and sensory testing.
CLASSIFICATION of SCI

• Complete SCI = no motor or sensory function below the LOI.

• Incomplete SCI = any sensation present and/or any motor function below the LOI.
INCOMPLETE SYNDROMES

Brown-Sequard:
- Damage to one side of the spinal cord
  - Ipsilateral paralysis, loss of proprioception
  - Contralateral loss of pain and temperature
INCOMPLETE SYNDROMES

Central Cord:
- damage to central part of cord
  - greater weakness in arms versus legs
  - sacral sensation
INCOMPLETE SYNDROMES

**Posterior Cord:**
- Lesion within posterior 1/3 of cord
- Sensory and motor function intact
- Loss of proprioception

**Anterior Cord:**
- Lesion within anterior 2/3 of cord
- Paralysis with loss of pain and temperature
- Proprioception intact
INCOMPLETE SYNDROMES

- **Caudal Equina Syndrome**
  - L1 and below
  - Ambulation possible because quadriceps spared

- **Conus Medullaris**
  - Injury to the sacral cord and lumbar nerve root
  - Lower extremity motor and sensory loss
  - Arflexic bowel and bladder
  - Usually can ambulate
SPINAL SHOCK

Loss of all spinal reflexes below the level of injury.
Loss of all motor function.
Loss of sensation.
High dose steroids
Neurogenic SHOCK

Hypotension, bradycardia, and decreased preload to the heart in addition to spinal shock.
Cervical Fixation

• Traction
• Halo and Vest
• Surgery
PROPER NURSING CARE OF THE HALO-VEST

Nursing Care:

• Care of skin beneath the vest: alcohol.
• Pin-site care: soap and water.
• Assure wrench taped to vest at all times.
CERVICAL FUSION & WIRING

Anterior and/or Posterior Fusion.

- Hard collar must be worn at all times for 6-8 weeks post op.
NURSING CARE: CERVICAL FUSION

• Turn every two hours utilizing the “log-rolling” method.
• Monitor surgical incision sites for signs/symptoms of infection.
THORACIC/ LUMBAR FUSION

• Rods, plates or cages are used for thoracolumbar injuries.
• In conjunction with a supportive brace to maintain alignment and prevent torsion movements.
• Bracing decisions are made to allow for rehab and ADL retraining.
AUTONOMIC NERVOUS SYSTEM DYSFUNCTION

- Bradycardia
- Hypotension
- Poikilothermia
- Pneumonia/Atelectasis
- Deep Vein Thrombosis
- Autonomic Dysreflexia
- Stress Ulcers/GI Bleed
- Bowel
- Bladder
- Skin
ANS DYSFUNCTION

Bradycardia:

- ANS disruption
  - Parasympathetic system dominant.
- Often due to vagal stimulation.
- Most prevalent in C2-4 injuries.
- Extreme bradycardia may require:
  - Hyperoxygenate before suctioning – 100% O2
  - Pre-medication prior to suctioning with Atropine.
  - Pacemaker.
ANS DYSFUNCTION

Hypotension:

- Parasympathetic dominance = vasodilation.
- Vasoconstrictive therapy may include inotropics such as dopamine and neosynephrine.
- Florinef and Midodrine may be used for the treatment of severe hypotension.
ANS DYSFUNCTION

Poikilothermia:

- Interruption of sympathetic pathways to hypothalamus.
- Loss of sympathetic response below level of injury resulting in the inability to shiver or perspire.
- Warming or cooling blankets may be used.
ANS DYSFUNCTION

Pneumonia/Atelectasis:
• Leading cause of death in SCI population.
• Due to inability to cough, immobilization, artificial ventilation, and general anesthesia.
• Medical Treatment/Interventions:
  – Aggressive pulmonary toiletry.
  – Antibiotics.
  – Bronchodilator therapy.
Deep Vein Thrombosis (DVT):

- **Signs/symptoms**
  - Unilateral swelling, temp change in limb, low grade fever with unknown etiology

- **IMMEDIATELY** institute regimen of prophylactic anticoagulants.

- DVT may result in pulmonary embolus
Deep Vein Thrombosis (DVT):

- Vena Cava filter (Greenfield Filter)
  - May cause increased edema in limb
  - Long term anticoagulation therapy (3-6 months)
- 3-5% of the SCI population will suffer a pulmonary embolus when taken off anticoagulation therapy.
ANS DYSFUNCTION

Gastrointestinal:

• Gastroduodenal ulcers/GI bleeding.
• Causes
  – stress response and/or hypotension to the gastric lining
• Initiate methods for nutrition.
• Recommend prophylactic acid reducer asap after SCI
ANS DYSFUNCTION

• Bowel
  – Neurogenic
    • Flaccid vs Reflex bowels
• Bladder
  • Foley vs intermittent catheters
• Skin
  • Turn, Turn, Turn!
HEAD INJURY

Initial Head CT may be negative but …

Signs and symptoms of head injury:
1. Agitation
2. Difficulty weaning
3. Difficulty swallowing