DISTURBANCES OF NEUROLOGIC FUNCTION

SPINAL CORD INJURY & NEUROGENIC SHOCK

NR 40

PROFESSOR THORNTON

SPINAL CORD INJURY

- Incidence: 10-12,000/yr
- 80-85% males (usually 16-30 y/o), 15-20% female
- 50% of SCI’s are complete
- 50-60% of SCI’s are cervical
- Immediate mortality for complete cervical SCI ~ 50%

SPINAL CORD INJURY

- CERVICAL SPINE INJURY- FX to C2 or C3-
- C5, C6, or C7 most common-
- Damage to the spinal cord ranges from concussion (with full recovery), to contusion, laceration, and compression of the cord to complete transection
- Secondary reactions of ischemia,
- Early treatment prevents total and permanent damage.

Classification of Spinal Cord Injury

- Stable or unstable
- Depends on the integrity of the ligaments and bony structures
- Spinal Stability is when there is no potential for progression of injury

SCI- ETIOLOGY

- MVA
- MCA
- Sports accidents-diving, skiing
- Cord invading tumors
- Gunshot wounds, stabbings etc

Effects of injury cannot be reversed

- Loss of:
  1. Motor function
  2. Sensation
  3. Reflex activity
  4. Bowel/bladder control
- Behavior/emotional problems:
  1. Changes in body image
  2. Role performance
  3. Self-concept
7 SPINAL CORD INJURY
- Complete - spinal cord has been severed-eliminates all innervation below level of injury
  - absence of sensory & motor function in lowest sacral segment
- Incomplete- allows some function or movement below level of injury
  - presence of sensory & motor function in lowest sacral segment (indicates preserved function below the defined neurological level)
- Fractures of C2 or C3 produce complete respiratory paralysis, complete flaccidity and loss of reflexes- death

8 SPINAL CORD INJURY
- C1-C3 need mechanical ventilation (portable vent or phrenic nerve stimulator)
  - Functional Capacity C1-C4
    - Dependent in self-care and transfers
    - Motorized wheelchair w/ special controls
- C4 may need CPAP or BiPAP for nocturnal hypoventilation
- C5, C6, or C7 most common injury- partial use of shoulder girdle, deltoid and biceps, loss of deep tendon reflexes and loss of sensation below clavicles
- Functional Capacity C5
  - Active elbow flexion present
    - Capable of some simple ADL’s w/ setup
      - may eat w/ balanced forearm orthosis
      - may write/type w/ opponens splint
    - Still dependent for transfers/ bed positioning
- Secondary reactions of cord ischemia
- Early treatment prevents total and permanent damage.

9 Spinal shock:
- transient flaccid paralysis
- areflexia
- while present, unable to predict recovery

Neurogenic Shock:
- Loss of sympathetic tone, vasomotor/cardiac regulation
- Hypotension w/o tachycardia

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12 SPINAL SHOCK (NEUROGENIC SHOCK)
- following complete cord transection and can occur after incomplete-
- Form of Distributive shock
- Massive vasodilatation due to loss of sympathetic tone- rare and transitory
- Signs and symptoms-
  - complete and immediate loss of motor sensory, autonomic and reflex activity below level of lesion.
    - Flaccid paralysis
    - Bradycardia due to loss of sympathetic outflow
    - hypotension
    - Paralytic ileus (occasionally)
    - Respiration’s vary
    - Skin- vary
    - Mental Status- anxious, restless, lethargic progressing to coma
ease
    - Urine Output- oliguria to anuria
    - Other-lowered body temperature

13 SPINAL SHOCK
(NEUROGENIC SHOCK)
- Spinal reflex activity occurring automatically after spinal cord severance include
the flexor withdrawal reflex and the reflex emptying of the bladder and bowel.

14 SPINAL SHOCK
(NEUROGENIC SHOCK)
■ As recovery progresses after cord transection, flexor responses are interspersed with extensor spasms.
■ Spasticity may remain indefinitely or gradually decrease over time.

15 SPINAL SHOCK
(NEUROGENIC SHOCK)
■ General Care
  1. Identify the cause if possible
  2. Maintain adequate tissue perfusion- “golden Hour”
  3. Fluid replacement and maintenance of BP
  4. Lab data to assess the type of shock-
     a. H&H
     b. Cardiogenic shock
  5. Cardiac enzymes for cardiogenic shock
  6. Other diagnostic-
  7. O2 keep PaO2 > 80mm hg the first 4-6 hrs of care.
  8. Fluid replacement-
  9. Positioning-
 10. Sympathomimetic and vasopressor drugs-

16 ■ Mechanisms of injury
  1. Hyperflexion
  2. Hyperextension
  3. Axial loading (vertical compression)
  4. Excessive rotation
  5. Penetrating injuries
■ Extent of injury
  1. Complete
  2. Incomplete

17 HYPERFLEXION INJURY OF THE CERVICAL SPINE

18 HYPEREXTENSION INJURY OF THE CERVICAL SPINE

19 AXIAL LOADING INJURY OF THE CERVICAL SPINE AND THE LUMBAR SPINE

20 Spinal Cord Injury-Collaborative Management
  □ Obtain history
    ■ Maintain adequate airway
    ■ Hemorrhage: intra-abdominal or at fracture site. Hypotension, weak thready pulse
    ■ LOC using GCS
• Level of injury
  1. Quadriplegia (tetraplegia)- cervical cord injury
  2. Quadriparesis- cervical cord injury
  3. Paraplegia- lower thoracic & LS regions
  4. Paraparesis-weakness- lower thoracic & LS regions

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22 Level of Injury

23 SCI Collaborative Management
  • Sensation
  • Motor ability- using American Spinal Injury Association (ASIA) scale
  • Cardiovascular
  • Respiratory
  • Gastrointestinal

24 SCI Collaborative Management
  • Genitourinary
    • Musculoskeletal-
    • heterotropic ossification- etidronate disodium (Didronel)
  • Psychosocial

25 DIAGNOSTIC ASSESSMENT
  • ROUTINE LABS TO ESTABLISH BASELINE
  • COMPLETE SPINE SERIES TO ESTABLISH TYPE AND DEGREE OF INJURY
  • CT AND MRI TO DETECT BLOOD AND BONE FRAGMENTS WITHIN THE SPINAL COLUMN

26 SCI
Nursing Diagnosis
  • Altered (spinal cord) tissue perfusion
  • Ineffective airway clearance
  • Impaired physical mobility
  • Altered urinary elimination
  • Impaired adjustment
Treatment and Nursing Care

- Body alignment, immobilization and skeletal traction HALO CAST OR JACKET.
  - Thoracic and Lumbar/Sacral injury-fiberglass or plastic body cast. Thoracic lumbar sacral orthoses (TLSOs) light weight used when OOB

TYPES OF CERVICAL SPINE TRACTION

HALO VEST

Roto Bed

Drug therapy
- High doses of steroids - Methylprednisolone (Solu-Medrol) no longer first line of treatment but offered as an option
- Naloxone to promote neurologic improvement (Narcan). Naloxone and thyrotropin-releasing hormone (TRH)-improve spinal cord blood flow
- Atropine for Bradycardia
- Dextran-to increase blood flow to the spinal cord and treat hypotension
- Dantrolene (Dantrolene) and baclofen (Lioresal)-control muscle spasticity

Many agents in clinical trials
- Sygen for acute and chronic SCI, & 4-AP a potassium channel blocker to improve spinal cord conduction
- Research into muscle stimulation & neural regeneration promising

Surgical approaches
- Decompressive laminectomy-remove bone fragments or foreign objects, evacuate hematoma
- Stabilizing surgeries- spinal fusion, Harrington Rod instrumentation
- Post-op care focuses on neurological status, potential hematoma formation, CV stability r/t loss of sympathetic innervation, position changes-bracing before movement, log roll

Treatment and Nursing Care

- Ineffective airway clearance cough and deep breathe- suction
- INJURY ABOVE 6TH CERVICAL VERTEBRAE-IMPAIRED INTERCOSTAL FUNCTION MAY REQUIRE TRACHEOSTOMY AND MECHANICAL VENTILATION
Treatment and Nursing Care

- CoughAssist™ assists patients in clearing retained broncho-pulmonary secretions by gradually applying a positive pressure to the airway, then rapidly shifting to a negative pressure.
- This rapid shift in pressure, via a face mask or mouthpiece produces a high expiratory flow rate from the lungs, simulating a cough.
- This technique is referred to as Mechanical Insufflation Exsufflation - M.I.-E.
- Those who might benefit include any patient with an ineffective ability to cough due to poliomyelitis, muscular dystrophy, myasthenia gravis or other neurologic disorder with some paralysis of the respiratory muscles, such as spinal cord injury.
- If a patient is tracheal, the CoughAssist™ can be easily and effectively applied through the use of a trach adapter.
- Using M.I.-E. enhances or replaces the patient’s natural removal of secretions.
- The CoughAssist™ comes in two models: one which can automatically cycle from positive to negative pressure and which can also be manually cycled and another which can only be manually cycled.

Treatment and Nursing Care

- Frequent Pulmonary Toilet
- "Assisted Coughing" or "Quad Cough" - or cough assist – place hands on either side of the rib cage or upper abdomen below the diaphragm as the client inhales the nurse pushes upward to help the client expand the lungs and cough.
- Incentive spirometer

Treatment and Nursing Care

- Nutrition: IV- N/G feedings. solid foods patients have to eat prone or supine.
- d. good skin care
- e. urinary - bladder care prevent distention may have foley observe for UTI and calculi long term bladder training and intermittent catheterization.
- f. Bowel - bowel retraining program

Treatment and Nursing Care

- g. Care of tongs-
- h. Positioning, and exercise-
- i. Management of spasms-
- Spasms are involuntary-
- Spasms can be very severe.
- Spasms can be precipitated by
  - Baclofen - Lioresal - Inhibits reflexes at the spinal level. Dantrolene (Dantrolene)
  - j. regular assessment of status and development of complications
  - k. emotional and psychological support for patient and significant others.

Body Weight Supported Treadmill Training

SCI - Functional Goals for Specific Levels of Complete Injury

- See Summary Sheet

Treatment and Nursing Care

- Altered comfort
  - a. Pain-long term, below level of injury (similar to phantom pain), burning, piercing, tightening, spasms
  - Treated with non-narcotic analgesics, nerve stimulators, antispasmodics
Treatment and Nursing Care

- Impaired sexual function
  - If LMN intact, reflex erection and ejaculation possible
  - Penile prosthesis
  - Sildenafil (Viagra)
  - Females may be able to sustain pregnancy
  - SCI support groups

AUTONOMIC DYSREFLEXIA

- Autonomic Hyperreflexia
  - generally occurs in patient with lesions above T6.
  - Serious potentially life threatening complication

  - Triggered by visceral distention

Symptoms of Autonomic Dysreflexia

- Excessively increased blood pressure
- Bradycardia
- Throbbing headache, flushing,
- Diaphoresis usually of the forehead
- Blurred vision, nasal congestion, nausea and pilomotor spasm- goose flesh
- If untreated elevated blood pressure can lead to seizures or stroke

Symptoms of Autonomic Dysreflexia

- Considered a medical emergency. Initial treatment is to remove the triggering stimulus IE reestablishing urine flow- catheterization if necessary if present reestablish patency of the system.
- If fecal mass- Dubricaine ung 10-15 min prior to disimpaction
- Place patient in sitting position to decrease BP. If BP does not come down a (Ganglionic blocking agent) Apresoline- Hydralazine Hydrochloride given. Nifedipine (Procardia) sublingually
- Some doctors use Nitro paste to lower blood pressure- when pressure falls - patch removed.
- When quadraplegic complains of headache, check BP before giving analgesia

SPINAL CORD INJURY QUESTIONS