

Neurological Emergencies



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GREAT FALLS**

Alteration in Consciousness



Consciousness



- **Arousal**
 - primitive set of responses
 - depends on structures located in the brainstem. ARAS
- **Awareness**
 - high level integration of multiple sensory inputs.
 - Resides into the cerebral cortex.

Vegetative state



- Bilateral diffuse cerebral cortex failure.
- Intact arousal mechanism.
- Most commonly results from diffuse anoxic or ischemic injury.

Brainstem failure



- Impaired arousal mechanisms.

Diagnosis of Consciousness Alterations



- **History is important:**
 - trauma
 - illnesses
 - medications
 - drugs, alcohol.
 - Psychiatric disorders.

Physical exam



- **General:**
 - vital signs
 - skin (trauma, needle marks, etc)
 - head (trauma)
 - neck stiffness (attention in trauma)
 - chest, abdomen, heart, extremities
 - breath (liver dysfunction, alcohol, uremia, ketoacidosis in diabetes)

Neurological exam



- **Observation of patient**
 - position
 - spontaneous motions
 - open eyelids and/or hanging jaw =extremely deep coma.

Neurological exam



- **Level of consciousness (from mild to severe)**
 - confusion, delirium
 - drowsiness
 - stupor
 - light coma
 - deep coma

Neurological exam



- Position of head and eyes
 - deviations of the head and eyes
 - spontaneous roving eye movements
- Funduscopy exam
- Pupils (reactivity to light, asymmetry)
- Doll's eyes test
- Ice water caloric

Coma etiology



- Non convulsive status epilepticus
- Trauma
- Vascular diseases
- Infectious
- Neoplasms
- Systemic causes
 - metabolic
 - hypoxic
 - toxic

Laboratory Tests



- Routine tests
- Toxins screen
- MRI or CT scan
- Spinal Tap
- EEG
- Angiography



Infections

Infections



- **Meningitis**
 - Viral
 - Bacterial
 - Fungus
- **Encephalitis**
 - Viral
 - Bacterial
 - ✦ Usually abscess

Clinical Presentation



- Fever
- Headache
- Stiff neck
- Change in the level of consciousness
- Seizures
- History of immunosuppression, head trauma, sickle cell anemia, local infections.
- Type of bacteria depending on age and immune status

Diagnosis



- Spinal tap is the most important tool.
- A CT scan of head should be performed.
- PT, PTT and thrombocyte count.
- Informed consent.

CSF Studies



- **Tube 1**
 - glucose (get a fingerstick BS too)
 - protein
- **Tube 2**
 - Cultures
 - ✦ bacterial
 - ✦ PCR meningitis panel
 - ✦ AFB,
 - ✦ fungus cultures

CSF Studies cont.



- **Tube 3**
 - cell count with differential
- **Tube 4**
 - cytology if needed
- **Remember to order to hold the remaining CSF**

Prognosis



- Depends on the offending agent
- Depends on the age of patient
- Depends on the Immune system status

Treatment



- Initial treatment is empirical based on the age and other contributory factors.
- When CSF data is available then modify the treatment accordingly



Status Epilepticus

Status Epilepticus



- **Definition**

- generalized seizures lasting more than 30 minutes or repeated seizures without regain of consciousness between the seizures for 30 minutes.

Status Epilepticus



- Can occur in new onset seizure disorder
- Patient known with seizure disorder who stop suddenly the medications
- Alcohol withdrawn
- Drug abuse (cocaine, amphetamines)
- CNS infections (especially herpes encephalitis)

Treatment



- Start Lorazepam 1-4 mg iv.
- Prepare and start Fosphenytoin (Cerebrix) 20 mg PE/Kg IV at a rate of up to 50mg PE/min.
- If seizures not stopped then give IV 10 more milligrams PE/Kg
- If seizures not stopped then Keppra 1g IV.
- If seizures not stopped then Phenobarbital IV 20 mg/Kg (attention to the BP)
- If seizures not stopped then intubate and start barbituric coma under EEG monitoring.

Treatment



- After the seizures stopped do further diagnosis tests to clarify the etiology of the event.
- If possible treat the etiology of the status epilepticus.



Stroke

Stroke



- Ischemic about 90%
 - Anterior circulation about 80%
 - Posterior circulation about 20%
- Hemorrhagic about 10%

TPA protocol for ischemic stroke



- **Inclusion criteria:**
 - age 18 or older
 - time of onset less than 4.5 hours
 - clear stroke presentation
 - ✦ significant weakness
 - ✦ significant speech difficulty (aphasia)
 - ✦ substantial visual deficit
 - ✦ patient awake or drowsy

TPA protocol for ischemic stroke



- **Exclusion criteria:**
 - history of stroke in the previous 3 months
 - history of intracranial hemorrhage ever
 - serious head trauma in the previous 3 months
 - history of GI or urinary bleeding in the previous 21 days
 - major surgery in the previous 14 days
 - lumbar puncture in the previous 7 days

TPA protocol for ischemic stroke



- **Exclusion criteria: (cont.)**
 - arterial puncture in a non-compressible site
 - pregnancy, lactation, or parturition within previous 30 days
 - coma
 - minor stroke symptoms
 - major stroke symptoms improving rapidly
 - clinical presentation of arachnoid hemorrhage with normal CT examination

TPA protocol for ischemic stroke



- **Exclusion criteria: (cont.)**
 - SPB >185 or DBP >110 at the time of treatment
 - associated serious medical or terminal illness
 - seizure at stroke onset
 - acute MI or pericarditis at stroke onset
 - platelet count < 100,000
 - PT INR >1.7; PTT >37; blood sugar <50 or >400
 - hemorrhagic stroke by CT
 - in the case of early signs of stroke by CT TPA should be avoided

TPA protocol for ischemic stroke



- Laboratory orders:
 - STAT
 - ✦ CBC, platelet count, PT, PTT, blood sugar, renal panel
 - ✦ CT of the head
 - ✦ EKG
- review lab results and review inclusion/exclusion criteria
- treat SPB > 185 or DBP > 110 with Labetalol 1- mg IV (over 2 min.) can be repeated once after 10 minutes

TPA protocol for ischemic stroke



- Vital signs and neuro checks q 15 min.
- give TPA dose if less than 4.5 hours from stroke onset
- TPA dose:
 - ✦ 0.9 mg/kg; maximum dose 90 mg regardless of the patient weight.
 - ✦ 10% is given in bolus over 1 minute and the remaining 90% infused over 60 minutes)

Mechanical Thrombectomy



- Major advancement in stroke care
- We have robust data and indications for the anterior circulation large vessels occlusion
- Obtain CTA after TPA is administered
- Obtain CTA if there are contraindications to the TPA and the time of onset is less than 24 hours
- Perfusion/diffusion mismatch



Myasthenia Gravis

Myasthenia Gravis



- Autoimmune disorder where antibodies are directed toward neuromuscular junction acetylcholine receptors.
- Basic treatment consists in:
 - Anticholinesterase drugs
 - drugs that induce immunosuppression

Myasthenic crisis



- Changes in the absorption of medication or the natural worsening of the disease may cause increased weakness
- Anticholinesterase medication have a bell-shaped dose-response curve and too much medication can induce weakness

Myasthenic crisis



Medications that can worsen the neuromuscular junction transmission

- ✦ Quinine
- ✦ Quinidine
- ✦ Procainamide
- ✦ Propranolol
- ✦ Lidocaine
- ✦ Aminoglycoside
- ✦ Quinolones
- ✦ Polymixin
- ✦ Viomycin
- ✦ Colistin
- ✦ Morphine
- ✦ Barbiturates
- ✦ Sedatives
- ✦ Magnesium supplements

Myasthenic crisis



- **Treatment**
 - admit into intensive care unit for monitoring
 - monitor respiratory function and not the pulse oximetry
 - intubate electively if decrease in respiratory function or in difficulties in protecting the airways
 - plasmapheresis or IVIG can be used for the treatment

Myasthenic crisis



- If patient is intubated you can decrease the anticholinesterase drugs to see if the weakness is due to overdose
- If patient is on oral pyridostigmine (Mestinon) and you want to give it IV the ratio oral/IV is 30/1 mg



Guillain Barré Syndrome

Guillain Bare Syndrome



- Autoimmune disorder
- Antibodies directed toward peripheral nerves myelin sheets
- Usually occurs a couple of weeks after a viral illness
- Patient has progressive weakness that starts distally
- It may involve respiratory muscles

Guillain Barre Syndrome



- Patient needs monitoring of respiratory function and not pulse oximetry
- Intubate electively if decreased in respiratory function or difficulty protecting the airways
- Treatment is either plasmapheresis or IVIG, the steroids are not useful.



Spinal cord compression

Spinal cord compression/myelopathy



- Trauma
- Disc herniation
- Synovial cysts
- Medical conditions
 - metastasis
 - ✦ multiple myeloma
 - ✦ lymphomas
 - ✦ lung cancer
 - ✦ breast cancer
 - ✦ prostate cancer
 - ✦ kidney cancer
 - ✦ sarcomas

Spinal cord compression/myelopathy



- **Clinical features**
 - Examination shows upper motor neuron signs
 - ✦ Babinsky present
 - ✦ Brisk DTR
 - prodrome (can precede the event weeks to months)
 - ✦ unremitting severe back pain
 - ✦ unremitting severe radicular pain
 - ✦ or both
 - stage of spinal compression
 - ✦ subtle weakness and/or numbness in the legs
 - ✦ urinary hesitancy, urgency and retention
 - ✦ in a few day patient becomes paraplegic

Spinal cord compression/myelopathy



- **MRI with contrast or CT myelogram are the exams of choice**
 - Spinal cord ends at L1, obtain the imaging of the proper CNS section/s
 - Plain CT of spine is not enough
- **Treatment**
 - Directed by the nature of the spinal cord lesion
 - IV steroids
 - radiation therapy
 - surgery